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16. Abstract

The Texas Model for Intersection Traffic has been revised and released as Version 3.0. The new Version 3.0 provides the capability of performing detailed computer simulation of diamond interchanges as well as single intersections. Traffic control choices for actuated diamond interchanges include dual ring controllers operating under "Figure 3, 4, 6, and 7" phase sequence patterns. The basic look and feel of earlier versions of the model have been retained to minimize needs for additional user training. The animated graphics feature has been expanded to include single intersections and diamond interchanges. The progress of each individually-characterized vehicle moving through a simulated intersection or interchange is displayed in real-time or in stop-action on a microcomputer-driven graphics screen. This allows the user to study the overall traffic performance or to examine the behavior of any selected vehicle(s) in great detail. With Version 3.0 of the TEXAS Model that is described in this report, alternative intersection or diamond interchange designs and traffic-control schemes can be evaluated quickly and accurately in a timely and cost-effective manner.

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TEXAS MODEL VERSION 3.0
(DIAMOND INTERCHANGES)

by

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Research Report Number 443-1F

Research Project 3-18-84-443

TEXAS Diamond—A Microscopic Simulation Model for Diamond Interchanges

conducted for

Texas State Department of Highways and Public Transportation

in cooperation with the

U.S. Department of Transportation Federal Highway Administration

by the

CENTER FOR TRANSPORTATION RESEARCH

Bureau of Engineering Research

THE UNIVERSITY OF TEXAS AT AUSTIN

January 1989

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There was no invention or discovery conceived or first actuallly reduced to practice in the course of or under this contract, including any art, method, process, machine, manufacture, design or composition of matter, or any new and useful improvement thereof, or any variety of plant which is or may be patentable under the patent laws of the United States of America or any foreign country.

PREFACE

Research Study Number 3-18-84-443, "Texas Diamond—A Microscopic Simulation Model for Diamond Interchanges," was a three-and-one-half-year project conducted for the purpose of developing a highly detailed diamond interchange traffic simulation model. This objective has been accomplished by expanding the capability of the original TEXAS Model computer simulation package to include diamond interchanges. This approach provides the significant advantage to prospective users of having one simulation model that will simulate either single intersections or diamond interchanges. It also means that anyone familiar with the existing TEXAS Model is also familiar with the new version which includes diamond interchanges because, in all possible aspects, from user-friendly interfaces to graphical output, the new version looks and feels like the previous version.

Actuated traffic controller choices for diamond interchange simulation have been significantly expanded to include dual ring controllers operating under the "Figure 3, 4, 6 or 7" phase sequence patterns. Traffic control choices for diamonds and single intersections also include no control, yield, stop, and pretimed signalization.

The animated graphics feature for interpreting the output from the TEXAS Model was also expanded to include diamond interchanges. This feature consists of a microcomputer-driven animated graphics screen display of vehicles moving through an intersection in real-time or in a stop-action mode. This unique capability permits the user to define and evaluate a wide range of intersection and interchange design and traffic control alternatives by visual inspection of simulated traffic flow on a screen.

At this time, the TEXAS Model for Intersection Traffic continues to run on VAX and CDC mini and mainframe computers in the original languages. The new Version 3.0 includes additional data-entry programs written in FORTRAN 77 which allow the user to build compatible data files and transport them to the mainframe through alphanumeric terminals networked to the mainframe.

The Safety and Maintenance Division, D-18T, and the Automation Division, D-19, of the State Department of Highways and Public Transportation have participated in all stages of the project work. Their timely and pertinent suggestions have been extremely helpful in adapting the simulation model to practical applications.

ABSTRACT

The TEXAS Model for Intersection Traffic has been revised and released as Version 3.0. The new Version 3.0 provides the capability of performing detailed computer simulation of diamond interchanges as well as single intersections. Traffic control choices for actuated diamond interchanges includes dual ring controllers operating under "Figure 3, 4, 6, and 7" phase sequence patterns. The basic look and feel of earlier versions of the model have been retained to minimize needs for additional user training. The animated graphics feature has been expanded to include single intersections and diamond interchanges. The progress of each individually-characterized vehicle moving through a simulated intersection or interchange is displayed in real-time or in stop-action on a microcomputer-driven graphics screen. This allows the user to study the overall traffic performance or to examine the behavior of any selected vehicle(s) in great detail. With Version 3.0 of the TEXAS Model that is described in this report, alternative intersection or diamond interchange designs and traffic-control schemes can be evaluated quickly and accurately in a timely and cost-effective manner.

SUMMARY

The TEXAS Model for Intersection Traffic has been developed at the Center for Transportation Research at The University of Texas at Austin in cooperation with the State Department of Highways and Public Transportation and the Federal Highway Administration. Continuing improvement of this powerful traffic simulation package has recently resulted in the addition of the capability for simulating a diamond interchange that is described in this report.

Version 3.0 of the TEXAS Model provides all functions of previous versions plus the diamond interchange simulation capability. Available traffic control for diamonds includes a full range of sign control schemes, as well as pretimed and actuated signals. The previously available actuated controller has been enhanced to provide for user selection of dual ring controllers operating under the "Figure 3, 4, 6 or 7" phase sequence patterns. The interactive data-entry programs, which greatly ease the task of preparing input data for the Geometry Processor (GEOPRO), the Driver-Vehicle Processor (DVPRO), and the Simulation Processor (SIMPRO) of the TEXAS Model, have been retained and improved in the new version of the package. The user is now able to quickly create input data for mirror images of external legs of diamond interchanges using a "similar to" edit command. A new edit command allowing column-wise editing of input data has also been added.

Appendix A is an updated users guide for Version 3.0, and it lists and describes each data item that must be specified by TEXAS Model users. The methods for entering these data and for saving, recalling, and revising data files are described. A series of illustrative examples is also presented.

A permanent library of typical intersection geometric configurations has been expanded to include a diamond interchange with unusual geometric features, while a default diamond input data set provides users with typical input variable values. The user will often find that one of these permanent library intersection arrangements or a default arrangement is very similar to the intersection of interest and that it may be used with only minor changes. The permanent library of intersection configurations is shown in hard copy in Appendix A.1.

The unique graphics display feature, available in previous versions, has been extended to include diamond interchanges. The speed, position, and time relationship between every simulated driver-vehicle unit and the intersection geometry is displayed in real-time, or in stop-action, on a screen driven by a microcomputer. This animated display allows the user to study the overall performance of traffic and traffic control at an intersection or to examine the behavior of an individual driver-vehicle unit in great detail, if desired. Alternative solutions to intersection or interchange problems can be evaluated quickly and economically by this technique.

IMPLEMENTATION STATEMENT

A TEXAS Model Version 3.0 has been developed, and it is recommended for implementation on the Texas State Department of Highways and Public Transportation's computer system. The interactive data-entry programs utilize the VAX/Intergraph network for generating data files which are passed to the Department's IBM mainframes for execution of the actual simulation programs. With Version 3.0 of the TEXAS Model, data for a simulation run of a diamond interchange or a single intersection can be entered in less than half an hour. Graphical animation of the simulated traffic can then be displayed on a microcomputer for real-time observation of the results.

A further recommendation is that a series of schools or training sessions be given in order to demonstrate to SDHPT personnel the applicability of the TEXAS Model Version 3.0 for solving many day-to-day and special intersection or interchange problems. The ease of use, immediate availability of results, and capabilities of this powerful engineering tool have been enhanced considerably by the developments accomplished under this study.

TABLE OF CONTENTS

CHAPTER 1. INTRODUCTION

There are hundreds of diamond interchanges operating in Texas and around the world today. Even though the basic configuration of these interchanges is similar, the details of geometry and traffic control differ considerably at each location, and the traffic demand varies markedly with respect to time at any given location. Traditional engineering techniques for evaluating the complex traffic operational environment at diamond interchanges have generally involved observation, interpretation, and interpolation of conditions at existing locations. Much has been learned about diamond interchange design and operation through these methods, but a satisfactory engineering evaluation of a specific diamond interchange situation, particularly of an unusual one, using these techniques is difficult if not impossible.

A feasible means for making an evaluation of the complex interaction of road geometry, traffic control schemes, and traffic operations at diamond interchanges has not existed previously, but computer simulation of the traffic environment at the two closely-spaced at-grade intersections which comprise a diamond interchange can serve such a purpose. A microscopic computer simulation model which describes in sufficient detail the critical geometric features of the roadway, various traffic control schemes, and the expected behavior of individually-characterized driver-vehicle units as they respond to the static and dynamic diamond-interchange environment has been needed.

This report describes the development and application of such a model. The model is called the **TEXAS Model, Version 3.0 (Diamond Interchanges)** as it is based upon the existing TEXAS Model for Intersection Traffic [Ref 1], which simulates only a single intersection. The TEXAS Model, Version 3.0 (Diamond Interchanges) handles all traffic movements through the two closely-spaced at-grade intersections of the diamond interchange as well as those on the internal lanes between them. The user-friendly features (see Ref 2) of the newest version of the TEXAS Model for Intersection Traffic have been included in the TEXAS Model, Version 3.0 (Diamond Interchanges) along with the real-time and stop-action animated-graphics displays of each simulated vehicle moving through the interchange.

The following sections of this chapter present a brief overview of the characteristics of the TEXAS Model for Intersection Traffic, and a description of the nature and capabilities of the additional features which have been incorporated into the TEXAS Model, Version 3.0 (Diamond Interchanges). Signalization of diamond interchanges is discussed in Chapter 2, and the procedures that have been used for testing and verifying the new diamond-interchange simulation model are described in Chapter 3. Three appendices, consisting of (A) a comprehensive Guide to Data Entry for Version 3.0, (B) implementation of traffic signal control in Version 3.0, and (C) a Primer for prospective first-time users of this version of the TEXAS Model are also included.

TEXAS MODEL FOR INTERSECTION TRAFFIC – OVERVIEW

The TEXAS Model for Intersection Traffic [Ref 1] is a powerful computer simulation tool which allows the user to evaluate in detail the complex interaction among individually-characterized driver-vehicle units as they operate in a defined intersection environment under a specified type of traffic control. This model deals only with vehicular traffic at a single intersection. In its current version, it includes a user-friendly data-entry process and an animated-graphics display of real-time movements of vehicles through the intersection on a monitor screen driven by an IBM (or compatible) microcomputer [Ref 2]. The following paragraphs summarize the principal characteristics of the single-intersection model.

Structure of the TEXAS Model for Intersection Traffic

The TEXAS Model for Intersection Traffic includes four data processors: GEOPRO (Geometry), DVPRO (Driver-Vehicle), SIMPRO (Simulation), and EMPRO (Emissions) for describing, respectively, the geometric configurations, the stochastically arriving traffic, the behavior of traffic in response to the applicable traffic controls, and the emissions generated by the traffic. The structural relationship among these data processors is shown in Fig 1-1.

GEOPRO defines the geometry of the intersection in the computer. It calculates vehicle paths along the lanes abutting the intersection and within the intersection. The number of intersection legs, together with their associated number of lanes and lane widths, define the intersection size and the location of any special lanes. The azimuth for each leg and the associated coordinates define the shape of the intersection. The allowed directional movements of traffic on the inbound lanes and the allowed movements on outbound lanes define the directional use of the intersection.

DVPRO utilizes certain assigned characteristics for each class of driver and vehicle and generates attributes for each individual driver-vehicle unit; thus, each unit is characterized by inputs concerning driver class, vehicle class, desired speed, desired outbound intersection leg, and lateral inbound lane position. All these attributes are generated by a uniform probability distribution, except for the desired speed which is defined by a normal distribution. Each unit is sequentially ordered by queue-in time as defined by the input of a selected headway distribution. The total number of driver-vehicle units which must be generated by DVPRO is determined by the product of the input traffic volume, in vehicles per hour, and the minutes of time to be simulated.

SIMPRO simulates the traffic behavior of each unit according to the momentary surrounding conditions including any traffic control device indications which might be applicable. Upon entering the inbound approach lane, the entry velocity of each unit is set so that the vehicle will neither exceed a selected desired speed nor collide with the unit immediately ahead of it. If the unit ahead is accelerating, or is traveling at its desired speed, the entering unit will enter the approach at its own desired speed. If the unit ahead is decelerating, the speed of the entering unit is set to a value which is less than its own desired speed. If there is no leading unit on the inbound lane, the unit enters with its desired speed. After entry, the unit is checked moment-by-moment within SIMPRO as to whether or not it is in a car-following situation. If it is not, the magnitude of required acceleration or deceleration which is applicable at any given instant is calculated by linear interpolation between extreme values which are set for each vehicle class with respect to the desired speed and to zero speed. Maximum required acceleration and deceleration occur at or near zero speed, and zero acceleration occurs at the maximum speed that each type of vehicle can attain. If the unit is in a car-following situation, the speed and acceleration of the unit interact with the speed and position of the unit ahead. Current and relative speeds and positions of all adjacent vehicles are thus utilized in determining the behavior of each driver-vehicle unit in the simulation model.

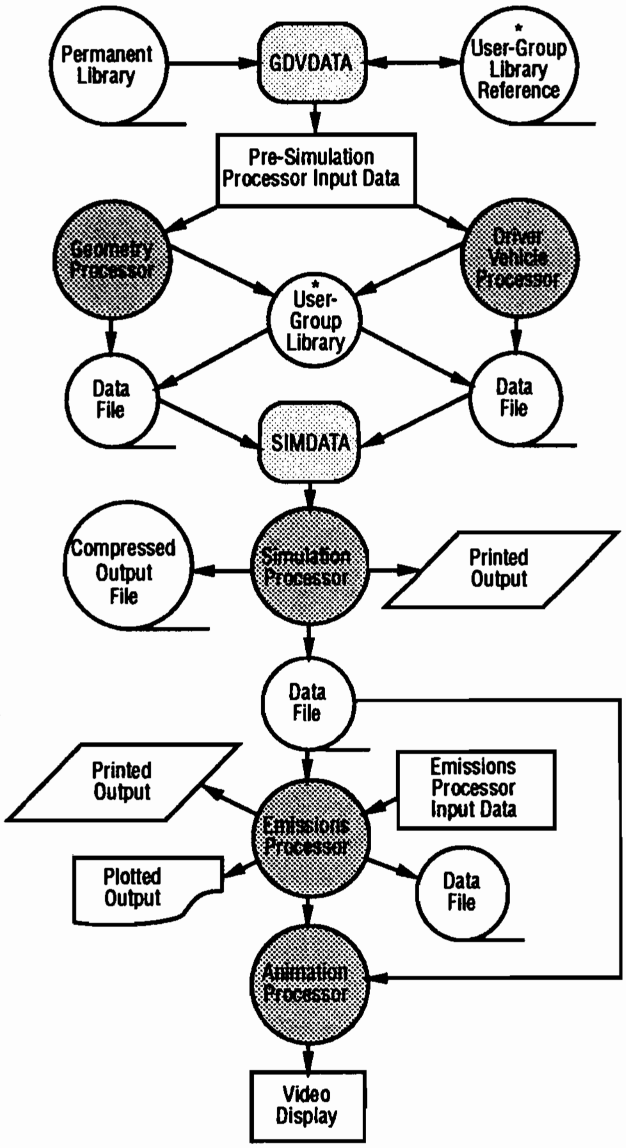

Fig 1-1. Flow chart of the structure of the user-friendly TEXAS Model.

When car following or traffic control makes it necessary for a unit to accelerate or decelerate, the logic in SIMPRO provides for accelerating to the desired speed, accelerating to the speed of the unit ahead, decelerating to follow the unit ahead, or decelerating to the desired speed within the available distance.

As the unit proceeds along the inbound approach lane, the location and the status of traffic control devices are checked moment by moment. The indication of the traffic control devices will apply to the unit as soon as the unit comes into the influence area of the device.

If stop signs control the intersection, SIMPRO lists the units stopped before the sign according to their arrival times and then releases them in a first-arrived-first-served sequence. If there are simultaneous arrivals on adjacent intersection legs, the unit to the right gets priority for earliest release.

If pre-timed signals control, each unit responds to the signal indications which appear in a defined sequence and are of a specified duration for each phase. Each unit will attempt to go on a green indication after checking for intersection conflicts. If the unit is in the leading position and has cleared conflicts, the unit will enter the intersection. If a leading unit has stopped before the unit being examined, or if the leading unit is decelerating, the unit being examined will begin to stop. When the signal indication is red, each arriving unit will stop; however, a right-turn-on-red option is provided.

If control is by an actuated signal controller, the sequence and duration of each indication is selected in response to the information received by the controller from the detectors. The logic for driver response to signal indications is, of course, the same as that described for the pre-timed signal. A detector actuation is defined by the time interval during which the front bumper of a unit has crossed the start of the detector but the rear bumper has not crossed the end of the detector. Actuations may cause the controller to continue the phase or allow the phase to change when a maximum time interval for that phase has elapsed or a sufficiently large gap occurs.

A unit is allowed to change into an adjacent lane if less delay can be expected. The geometric path of the lane-changing unit is a cosine curve. Each unit is processed incrementally in time from its entry onto the inbound lane to the end of the outbound lane. The length of each approach is specified. The instantaneous traffic behavior of each unit including speed, location, and time is written onto a tape by the TEXAS Model for subsequent use in the emission processor (EMPRO). Statistics about delays and queue lengths are also gathered by the TEXAS Model for evaluating the performance of traffic at the intersection.

Delay statistics include the average of total delay and the average of stop delay incurred by each vehicle processed. Each delay is summarized by left-turn, right-turn, and straight movement and by the total of these three permitted directional movements on each inbound approach. Total delay is the difference between travel time for a vehicle through the system and the time it would have taken the vehicle at its desired speed. Stop delay is the time spent by a vehicle which has a velocity less than 3 feet/second. Delay statistics show the overall influence of the intersection environment on traffic passing through the intersection. Comparison of the delays experienced by traffic making various directional movements indicates the interaction among traffic flows on the intersecting streets. Queue-length statistics include average queue length and maximum queue length. Both are measured in units of vehicles, not feet. Average queue length and maximum queue length are the averages taken for each inbound lane over any selected time interval.

EMPRO, the emissions processor, incorporates models to predict the instantaneous vehicle emissions of Carbon Monoxide (CO), Hydrocarbons (HC), Oxides of Nitrogen (NO_x), and fuel flow (FF) for both light-duty vehicles and heavy-duty vehicles. EMPRO utilizes information from SIMPRO about the instantaneous speed and acceleration of each vehicle to compute instantaneous vehicle emissions and fuel consumption at points along the vehicle path.

Data Entry to the User-Friendly TEXAS Model

As shown in Fig 1-1, data that are required for running the TEXAS Model are entered by the user through two computer data-entry programs called GDVDATA (Geometry, Driver, Vehicle) and SIMDATA (Simulation). These are features of the user-friendly version of the model which were not included in the original mainframe computer version. All geometric data are specified in terms of lengths and angles.

In addition to the geometric data needed by the model, the user must enter data to characterize the drivers and vehicles which make up the traffic stream passing through a simulated intersection. The data-entry program GDVDATA also includes user aids for entering the data needed by the driver-vehicle processor (DVPRO) of the TEXAS Model.

For efficiency and for the convenience of the user, a permanent library (see Fig 1-1), which contains 20 typical intersection configurations along with an associated traffic pattern, has been created and stored within GDVDATA. Instructions for using and modifying data files copied from the permanent library are given through prompts on the screen and in Ref 2. A user-group library (see Fig 1-1) is also provided to allow users to develop, store, index, and retrieve conveniently their own data files for modification or for repeated use without modification.

Data that are needed by the simulation processor, SIMPRO, are entered through the data-entry program called SIMDATA (see Fig 1-1). This program pairs the entered data required by SIMPRO with data previously defined by using GDVDATA or with data contained in a permanent library file within GDVDATA. Use of SIMDATA is described in Ref 2 and through prompts and instructions on the screen.

Animated Graphics Display of TEXAS Model Output

Output from the TEXAS Model includes the instantaneous speed, location, and time relationship for every simulated vehicle. These data are routinely written onto a tape for use by the emissions processor, EMPRO, or for other applications (see Fig 1-1). The User-Friendly TEXAS Model provides a feature whereby this information can be displayed graphically in real-time, or in stop-action, on a screen driven by an IBM PC-XT (or compatible) computer. Intersection geometry is extracted from the files created by GDVDATA and displayed on the screen; then, the position of each simulated vehicle is represented on the screen by an outline of the vehicle, scaled to size and color-coded according to performance capability, with respect to time. With this animated-graphics display, the user can study the overall traffic performance at an intersection or examine in great detail the behavior of an individual vehicle in the traffic stream. A wide range of conditions can be defined and evaluated visually on the screen as well as in the form of tabular listings that give summary statistics about traffic and traffic-signal-controller performance.

TEXAS MODEL, VERSION 3.0 (DIAMOND INTERCHANGES)

The TEXAS Model, Version 3.0 (Diamond Interchanges) is a computer simulation software package which provides the user with a tool for studying in great detail the interaction among individually-characterized driver-vehicle units as they approach and pass through the two closely-spaced at-grade intersections of a conventional diamond interchange with one-way traffic on the diagonal ramps that form two opposite legs of each intersection. Traffic control at these intersections may range from the rules-of-the-road, to traffic signs, to complex traffic-signal controls. The model incorporates all the basic features of the TEXAS Model for Intersection Traffic [Refs 1 and 2] and modifies them as needed to handle vehicular traffic operating in the conventional diamond-interchange environment. The principal modifications and additions are:

- Geometry is defined for two adjacent intersections with connecting internal lanes.
- Linking is provided in the simulation processor, SIMPRO, for transferring each simulated driver-vehicle unit on an existing path within the first intersection to an appropriate internal lane. The internal lanes then function as inbound lanes to the second intersection.
- Drivers approaching an intersection look forward into and beyond the intersection and respond to other vehicles on or adjacent to their path and to traffic-control devices ahead when they are within the influence area of such a device.
- Drivers merging into an outbound lane from an intersection look back into the intersection and onto the outbound lane to check conflicts before entering the lane.
- A signal-controller module to simulate actuated diamond-interchange controllers is provided.
- Summary statistics are collected for every vehicle (a) from log-in to the system until log-out from the system, and (b) from log-in to an internal lane until log-out from the system.
- An example of the geometry and traffic for a diamond interchange is included in the permanent library file of Version 3.0.

Each of these modifications and additions is discussed in some detail below. Most of the different operating features of the diamond-interchange version of the model are transparent to the user, but the user should be aware of their fundamental characteristics.

Geometry of the Diamond Interchange

In the TEXAS Model, Version 3.0 (Diamond Interchanges), the geometry of the interchange is configured as two adjacent, three-leg, at-grade intersections connected by a set of internal lanes (Fig 1-2). The intersections are designated as Left Intersection, L, and Right Intersection, R, with the centerline of the internal lanes oriented *perpendicular* to the zero-degree leg angle as shown in Fig 1-2. Legs 2 and 5 and the internal lanes can handle either one-way or two-way traffic, but Legs 1, 3, 4, and 6 (the ramps) accommodate only one-way traffic. Each leg is made up of one or more parallel lanes and the legs *must* be numbered as shown in Fig 1-2. The numbering sequence for inbound and outbound lanes is the same as that used in the User-Friendly TEXAS Model for Intersection Traffic [Ref 2]. The numbering sequence for the internal lanes is indicated by the pattern shown in Fig 1-2, wherein the lanes inbound toward Intersection R are numbered first, beginning at the centerline of the internal lanes and continuing outward until all these lanes are numbered; then, the lanes inbound toward Intersection L are numbered with continuing serial numbers beginning at the centerline and continuing outward until all lanes are numbered. Curb returns *must* be numbered as shown in Fig 1-2. Entry of geometric data to GDVDATA (Fig 1-1) follows the format of the User-Friendly TEXAS Model for Intersection Traffic [Ref 2]. A series of screen prompts, including an on-screen representation of Fig 1-2, guide the user through the geometry data-entry process.

Linking Lanes and Intersection Paths

Simulated driver-vehicle units moving through the diamond interchange may travel along inbound, internal, and outbound lanes as well as intersection paths generated by GEOPRO. Only the units which traverse both intersections utilize the internal lanes. Therefore, internal lanes accept traffic only from the first (upstream) intersection and then function as inbound lanes to the second (downstream) intersection in the simulation processor, SIMPRO.

Driver Look-Ahead Feature

In SIMPRO, each simulated driver is provided with information about the current traffic situation on his, and adjacent, lanes and paths, along with the indications of any applicable traffic control devices ahead. The influence area for a traffic control device is defined dynamically for each simulated driver, and may extend for several hundred feet. In a conventional diamond interchange with closely-spaced intersections, the influence area for a traffic control device located at the second (downstream) intersection can affect drivers approaching the first (upstream) intersection, those in the first intersection, and those on the internal lanes. The TEXAS Model, Version 3.0 (Diamond Interchanges) incorporates features which allow all these drivers to respond to the influence of other vehicles and traffic-control devices located at and beyond the first intersection at the time the simulated driver makes a decision.

Conflict Checking Before Merging into an Outbound Lane

Right-turning vehicles merge into the outbound lanes from an intersection path. The model has been modified to allow the simulated drivers of such vehicles to check for potentially-conflicting vehicles in the intersection as well as on the outbound lane into which they propose to merge.

Signal-Controller Module for Diamond Interchanges

Traffic at diamond interchanges is frequently controlled by signals that are coordinated in an attempt to provide continuous movement of vehicles through both intersections. The signal controller for a diamond interchange can be either pre-timed or actuated. In addition to the signal controllers incorporated in the TEXAS Model for Intersection Traffic, a special signal-controller module for actuated signals at diamond interchanges has been included in the TEXAS Model, Version 3.0 (Diamond Interchanges). The functioning and use of this signal-controller simulation module is described in Chapter 2 and in Appendix B of this report. Screen prompts for entry of required data for both pre-timed and actuated signal controllers are included in Version 3.0.

Summary Statistics for Diamond Interchange

In the TEXAS Model, Version 3.0 (Diamond Interchanges), statistics concerning the performance of each driver-vehicle unit, and of the signal controller if used, are gathered during simulation and presented in summary form at the end of each run. For certain purposes, data concerning the cumulative experience of a driver-vehicle unit as it traversed its entire path through the interchange are desired. These data are accumulated in the TEXAS Model, Version 3.0 (Diamond Interchanges) from initial log-in at the outer end of the inbound lane to the first intersection until final log-out at the outer end of the outbound lane when the vehicle leaves the simulated interchange system. Another set of statistical data is collected beginning with log-in to the outer end of an *internal lane* until final log-out at the outer end of the outbound lane when the vehicle leaves the simulated interchange system. The latter data set permits separate analysis of the performance of traffic on the internal lanes and the second (downstream) intersection of the interchange. Differences between the two data sets indicate the behavior of traffic at the first intersection traversed.

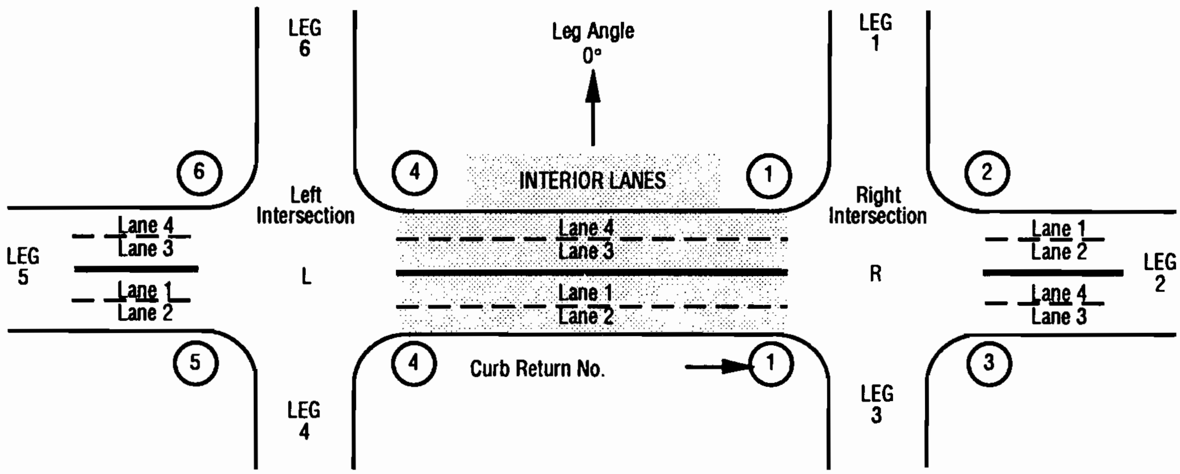

Fig 1-2. Geometry and nomenclature of conventional diamond interchanges.

CHAPTER 2. DIAMOND INTERCHANGE TRAFFIC SIGNAL CONTROL

INTRODUCTION

With flexible, traffic-responsive control of diamond signalization now widely available at moderate cost, it is hard to imagine that 20 years ago, the operation of diamond interchange signalization was not understood by many traffic engineers. There was no real reason for this, for with only a few exceptions, diamond interchange signalization is no different from that at any other pair of closely spaced intersections controlled by multiphase traffic signals. These exceptions include:

1) The shorter distance between the two signalized intersections results in limited storage space for vehicles. Most diamond interchange signalization schemes provide progression between the two intersections to prevent the limited storage area from filling up. Lack of progression can result in vehicles queueing back across the intersection, resulting in gridlock.
2) In the event that progression is not provided between the intersections, the length of some phases must be carefully controlled to avoid gridlock. Also, many diamonds have limited storage space between the interchange and freeway off-ramps. If this storage space fills up, vehicles can spill back through the ramps onto the freeway, creating a serious safety problem.

As with any other intersection, the diamond can be operated under pretimed or traffic-actuated signal control. Current controller technology allows the engineer to implement the best timing and phasing plan for the traffic conditions at hand, either in response to detector actuation patterns, time of day, or any other applicable criteria. What constitutes the "best" signal timing plan is the subject of this chapter.

HISTORY

No uniform method for selecting timing and phasing plans for diamond interchanges existed until research studies began in the early 1960's on the operational characteristics and capacity of the diamond interchange. These studies were prompted by the concern of traffic engineers over the increasingly important role of diamond interchanges as freeways expanded out into rapidly growing suburban areas. The states of California and Texas led the research efforts.

Studies at Texas Transportation Institute, 1960-1962

Pinnell and Capelle [Ref 3] demonstrated that the diamond is capable of carrying high volumes of traffic efficiently. A single location with widely fluctuating demand conditions was evaluated in a field study during four afternoon peak traffic periods. The authors evaluated pretimed vs. traffic-actuated signal control and found that actuated operation resulted in reduced cycle lengths. The effect of type of signal control on traffic delays was not measured in this study.

This study demonstrated that actuated control was possible with available controllers. At the time, signal equipment was electromechanical, and many practitioners did not think it technologically feasible to use actuated control at a diamond.

Also in this study, Pinnell and Capelle compared different diamond phasing patterns. No field trials were actually conducted to compare the operational characteristics of the different phasing plans; rather, the authors discussed (without field experiments) such qualitative issues as left turn storage, cycle lengths, and progression through the interchange. The authors surmised that, since the four-phase overlap signal phasing pattern (discussed in the next section) uses available cycle time more efficiently, it should operate at lower cycle lengths, and thus cause less delay to traffic than other phasing plans which do not feature the overlap phase.

Capelle and Pinnell [Ref 4] used time-lapse film photography to determine saturated flow rates at two interchanges on the Gulf Freeway in Houston. Intersections were filmed with 16mm film at 10 fps from a 35-ft platform truck, and the data were used to measure headways and starting delay for "fully loaded" (saturated) approaches. The most significant finding of this study was that double-lane turn movements have reduced capacity per lane when compared to single-lane turn movements.

Pinnell and Tutt [Ref 5] reviewed economic and operational considerations for the justification of frontage roads. Topics covered included stage development, design life, surface street continuity, and saturated operation of diamond interchanges. Also discussed were the different capacity relationships for various designs of diamond interchanges, including two-level, three-level, and split diamond designs.

The California Diamond Project (1970-1971)

The California Diamond Project was undertaken in the late 1960's by Systems Development Corporation (SDC), a leading firm in the field of simulation and operations research, under the sponsorship of the California Department of Transportation. The objective of the project was to determine the feasibility of traffic-responsive control of diamond interchanges and to find the best way of optimizing signal timing plans. This project demonstrated the relative effectiveness of traffic-responsive control over pretimed control at a diamond, and paved the way for the acceptance of the Type 170 microprocessor-based controller as a standard for diamond interchange control.

Model Development and Validation [Ref 6]. SDC researchers created two traffic simulation models, one macroscopic, the other microscopic. Different strategies for optimizing signal phasing, splits, and offsets were evaluated, and both "before" and "after" timing plans were implemented on the macro and micro models. After field implementation of the improved signal plans, field measurements were made using the floating car technique to verify delay savings.

The microscopic model was validated with travel time data from two intersections. The two locations had different geometrics, but both had heavy traffic. Six data sets were used: four from one intersection and two from another intersection. Each data set was derived from a sequence of 381 to 986 aerial photograph frames.

To validate the microscopic simulation model, Torres et al performed a t-test to determine whether significant differences existed between the mean travel time of all vehicles through the interchange in the film data sets and the mean travel time of all vehicles through the microscopic simulation model. With the exception of one of the six data sets, the differences were not significant at a 5 percent level, and the model was considered validated.

The macroscopic model was validated differently. One set (840 frames) of data was used to calibrate the model, and another (518 frames) was used to validate the model. The validation procedure used the vehicle arrival sequence data obtained from the film data set, and tested the hypothesis that mean total travel time for all vehicles on the film data was equal to the mean total travel time for all vehicles in the macroscopic simulation run. The hypothesis could not be disproved at the five percent significance level; therefore, the macroscopic simulation model was considered validated.

Implementation. To implement the control strategies developed with the aid of the simulation models, SDC designed and built a microprocessor-controlled traffic-responsive controller. The following excerpt is from Ref 7, which describes the field test and evaluation of this signal controller:

"The research installation utilized 49 inductive loop detectors, a Varian 620-I minicomputer with 16K core storage (8K was needed for data evaluation purposes), hard-wire communication, and [two] off-the-shelf, pretimed, electromechanical intersection controllers modified for real-time phase length adjustment and skipping. Cycle lengths, splits, and offsets were computed at prescribed time intervals utilizing the volume inputs detected by the loop detectors. In this way the control system adapted to continuously changing demands and was not restricted to three signal timing plans... The real-time software program was coded in Varian 620-I assembly language with about 3,500 instructions... At a demand of 350 vehicle mi/hr the travel time for the pretimed method of control is 40 vehicle hr/hr compared to 32.5 for the real-time control method. This difference represents an approximate 20 percent reduction in travel time. Part of this research project was an evaluation of the performance of the real-time system when fewer detectors were used. A minimum detector configuration was evaluated as a possible alternative to the full 49-detector configuration. The minimum 18-detector configuration provided the same level of system improvements; for most applications about 20 detectors should be sufficient for real time control of a diamond interchange complex."

CURRENT PRACTICE IN DIAMOND INTERCHANGE PHASING

Diamond interchanges exist in a great variety of geometric configurations, but by far the most common is the conventional, or "full" diamond. This interchange type is typified by entrances and exits from both sides of the freeway and one-way frontage road or ramp approaches. Most of the urban signalized diamond interchanges in Texas are of this type.

When signalizing the full diamond, each intersection is usually controlled by a three-phase traffic signal, with phases assigned to the arterial street through movements, the off-ramp or frontage road through movement, and the protected left-turn movement from the inside of the interchange. With three phases at each intersection, any signal timing plan will generate at any given time only one of nine possible combinations of signal phasings at both intersections.

Assuming that a given phase will be serviced only once per cycle at each side of the diamond, sequencing the nine possible combinations can result in only four basic phasing patterns at the diamond. These sequences are:

- Lag-Lag: Left turns *from the interior lanes* lag the opposing arterial phase at both intersections,
- Lead-Lead: Left turns lead at both intersections,
- Lead-Lag: Left turns lead at the left intersection, lag at the right, and
- Lag-Lead: The mirror image of the Lead-Lag phasing pattern.

Terminology

In the State of Texas, a special terminology has originated and come into popular use to identify diamond phasing patterns. These terms are denoted by the term "Figure XX" where "XX" is the number 3, 4, 6, or 7. The term "Figure 3" refers to all lag-lag phasing patterns, "Figure 4" refers to all lead-lead phasing patterns (of which the so-called 4-phase overlap pattern is a subset), "Figure 6" refers to lead-lag phasing patterns, and "Figure 7" refers to lag-lead phasing patterns. (To avoid confusion in this report between use of the word "Figure" to refer to both phasing plans and illustrations, the word will always be enclosed in double quotes when it is used to refer to a phasing plan.)

The first two terms originated because the most popular implementation of the "Figure 3" plan is the so-called "Three-phase" pattern with simultaneous left turns, and "Figure 4" is usually implemented as the "Four-phase with overlaps" phasing plan. The names "Figure 6" and "Figure

7" are used arbitrarily for the lead-lag and lag-lead phasing patterns, and do not refer to 6-phase or 7-phase patterns.

The remainder of this report will refer to other aspects of the diamond geometry as illustrated in Fig 2-1. The terms used include:

- The *diamond interchange* itself, which consists of two *intersections.*
- The diamond usually consists of the intersections of an *arterial* and a pair of ramps or frontage roads. Since most urban freeways in Texas are equipped with one-way frontage roads, the term *frontage road* will be used exclusively in this report. The operational characteristics of ramp approaches are the same.
- With respect to the direction of traffic flow, those movements proceeding through both intersections of the diamond interchange traverse the *upstream* intersection first, then the *downstream* intersection.
- *Interior lanes* and *exterior legs*: Traffic movements approaching the upstream intersection are said to be traveling on the *exterior legs* to the diamond. The *interior lanes* are those between the two intersections and are traversed by traffic streams approaching their respective downstream intersections.

In some of the discussions, references are made to the cardinal directions of the compass to indicate the direction of a traffic movement in a diagram. In all cases, these directions follow a map orientation, with the up direction as "north", right as "east", down as "south", and left as "west".

Lead-Lead or "Figure 4" Pattern

This phasing pattern has become the preferred phasing plan for most diamond interchanges because, when proper splits and offsets are selected, it allows all traffic movements to proceed through the interior lanes of the interchange without additional stops. The "Figure 4" pattern achieves progression within a wide range of traffic volumes, from light to heavy, but sometimes is not the best phasing plan in cases of extremely unbalanced flow (where flows are much higher on one side of the diamond interchange than the other), widely spaced intersections, very light arterial left turns, or heavy U-turns from one frontage road to another. In those cases the "Figure 3" pattern may be superior to "Figure 4".

The most common manifestation of the "Figure 4" pattern is the "four-phase overlap pattern". This pattern provides progression through the diamond for all movements except frontage road U-turns. This pattern is illustrated in Fig 2-2. The main characteristic of the four-phase overlap pattern is the presence of two so-called "overlap" phases. These phases, during which two opposing external traffic streams are moving toward each other, must be of a fixed length, usually equal to a second or two less than the travel time between the intersections.

The "Figure 4" pattern usually offers superior capacity for a given cycle length to all non-symmetric lagging left patterns for cases with intersections with more than 50 feet spacing, which includes almost all diamonds. The

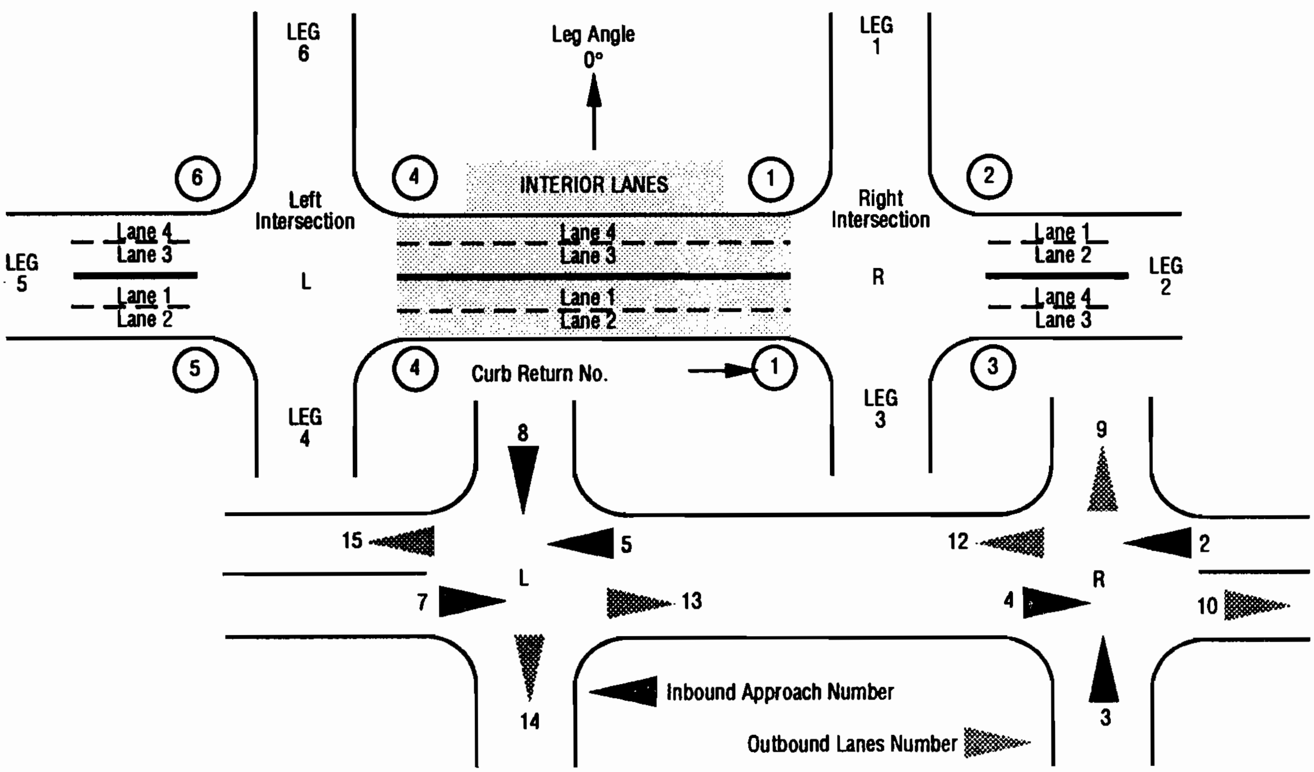

Fig 2-1. Diamond interchange nomenclature and terminology.

superiority arises because, when implemented as the four-phase overlap plan, "Figure 4" has a longer "effective" cycle length than its physical cycle length. This is because, during the overlap phases ("2 + 6" and "1+7" in Fig 2-2), two opposing external traffic streams are in movement simultaneously. This reduces the cycle length necessary to accommodate the vehicles in the external traffic streams (or increases the capacity for a given cycle length) by an amount equal to the sum of the length of the two overlap phases; for this amount of time, there are two opposing external traffic streams moving between the intersections. To avoid making vehicles stop on the interior approach, the overlap phases are of a fixed length equal to or less than the travel time between the two intersections.

It has been argued that, because of the increased number of phases, the four-phase overlap pattern has greater lost time, and thus requires longer cycle lengths for the same degree of saturation, compared to the symmetrical three-phase pattern; and thus, for light traffic volumes, the three-phase pattern is generally better. This is not actually true. Since, during the course of a single cycle, each external traffic movement must start up and stop exactly once, all diamond interchange phasing patterns have the same amount of lost time. Although it has not been experimentally proven, the "Figure 4" pattern may actually have less lost

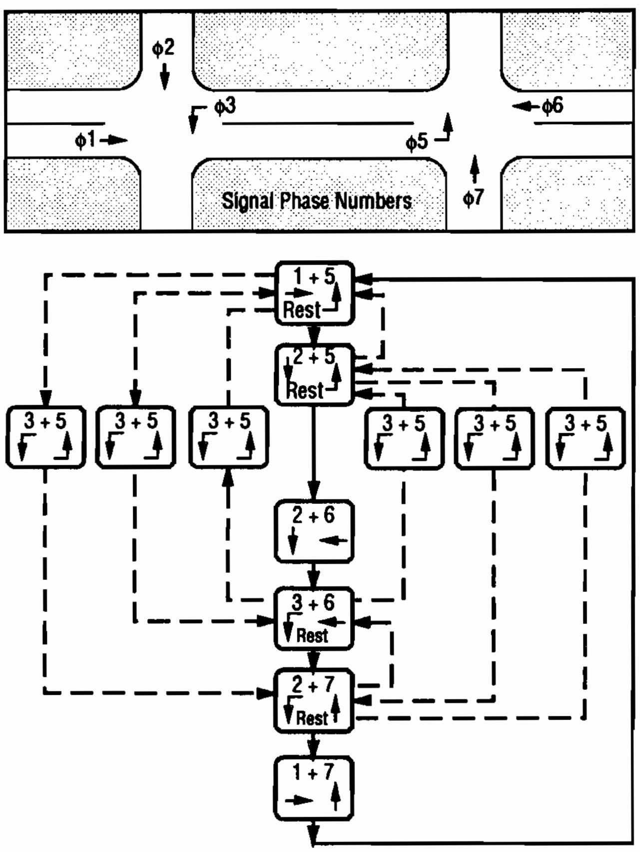

Fig 2-2. Operation of the "Figure 4" signal controller pattern.

time than other patterns that do not provide progression through the diamond because queue startup delays are usually reduced or eliminated for the traffic stream being progressed through the downstream intersection [Ref 8]. The real reason why the three-phase pattern may have shorter cycle lengths than the four-phase overlap pattern in some cases is not because of reduced lost time, but because the three-phase pattern is not constrained by the presence of two potentially lengthy fixed-length overlap phases. In light traffic conditions, with wide intersection separation, the cycle length of the symmetrical three-phase pattern will be shorter. This disadvantage of potentially longer cycle length must be traded off against the delays imposed to left turning traffic if the symmetrical three-phase plan is used.

The above comparisons are between the four-phase overlap pattern and the symmetrical three-phase pattern. Recall that the four-phase overlap is a special case of the "Figure 4" pattern, with fixed length overlap phases and approximately a 50 percent offset. Likewise, the symmetrical three-phase pattern is a special case of the "Figure 3" pattern, which is a lag-lag pattern with about 0 percent offsets. Performance differences between the "Figure 3" and "Figure 4" plan begin to blur in the case of unusual traffic patterns which demand the use of offsets not near 50 percent or 0 percent. In these cases, only construction of a time-space diagram will indicate which phasing plan offers better operation.

Another aspect favoring "Figure 4" phasing is that, for diamond interchanges with short intersection spacing, the interior storage requirements of "Figure 3" patterns will probably be exceeded for anything other than light flows.

Lag-Lag or "Figure 3" Phasing Pattern

This phasing pattern (Fig 2-3) is best used in cases when arterial left turning traffic and frontage road left turning traffic is light. This pattern is also good for locations with heavy arterial through traffic, as long as left turns do not exceed the queueing capacity of the interior storage bays. Frontage road and through left turn storage is limited to queues equal in length to the spacing between the intersections. If the symmetrical phasing plan is used, care must be used when allocating the amount of time for the frontage road phase; if the length of the phase exceeds the travel time between the intersections, an unexpected stoppage of vehicles on the interior through approaches may occur, resulting in increased potential for accidents.

The "Figure 3" pattern should not be used at intersections without interior left turn storage bays.

Lead-Lag or "Figure 6" Phasing

This phasing pattern favors unbalanced traffic flow on the leading left turn or the "lagging" frontage road side. In Fig 2-4, eastbound traffic turning left onto the northbound frontage road will have to first stop or yield to oncoming traffic (in Block 1+6 of the Figure). Westbound leading left turn traffic can move through the interchange to the southbound frontage road without having to stop at the interior approach. Similar advantages are given to northbound frontage road traffic; southbound frontage road traffic is cut off at the end of Block 2+7.

Lag-Lead or "Figure 7" Phasing

This phasing pattern is the same as "Figure 6" but has been rotated 180 degrees (see Fig 2-5.) As in "Figure 6" operation, timing advantages are afforded to the leading interior left turn and the lagging frontage road movement.

Actuated Operation: Conditional Phase Skipping

All of the phasing patterns shown above could be implemented in a pretimed or an actuated controller. The primary differences between pretimed and actuated operation are that during light traffic, phases can be skipped under actuated control.

The phasing patterns followed by actuated diamond controllers during light traffic periods when phases are skipped are actually simpler than might be followed by a conventional controller because the patterns are more restrictive in terms of which phases can be followed by other phases. At a conventional four-leg intersection, any green signal indication can be followed by any other green signal indication (separated, of course, by a proper clearance interval.) At the signalized diamond interchange, certain sequences must be followed in order to avoid trapping vehicles on the interior lanes.

Choosing the Best Timing and Phasing

Choosing the best phasing and timing plan for a diamond is difficult because of the large number of factors affecting the decision:

- the large number of combinations of possible phasing sequences,
- traffic volumes and saturation flow rates at the intersection,
- minimum green times, and
- storage capacity of internal approaches.

One scheme for timing a diamond interchange traffic signal was given by Munjal [Ref 9]. This report, part of the California Diamond Project, describes a methodology based on first selecting a basic phasing plan, then selecting cycle length, splits, and offsets, in that order. Munjal was also concerned with progression through arterial street intersections adjacent to the diamond, so the procedure includes the selection of a common cycle length, splits, and offsets for adjacent arterial signals.

Generally, once a phasing pattern is chosen, the timing of the external movements follows the same rules as with a

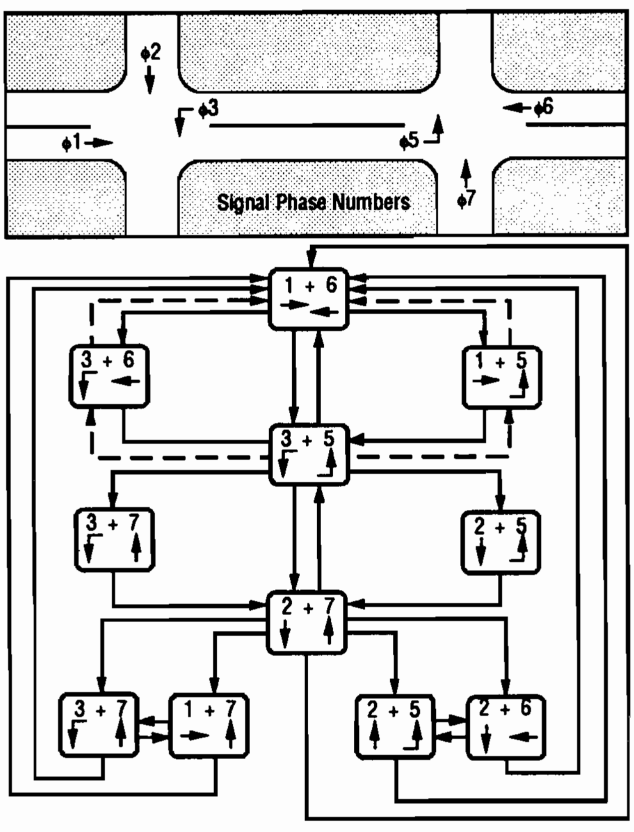

Fig 2-3. Operation of the "Figure 3" signal controller pattern.

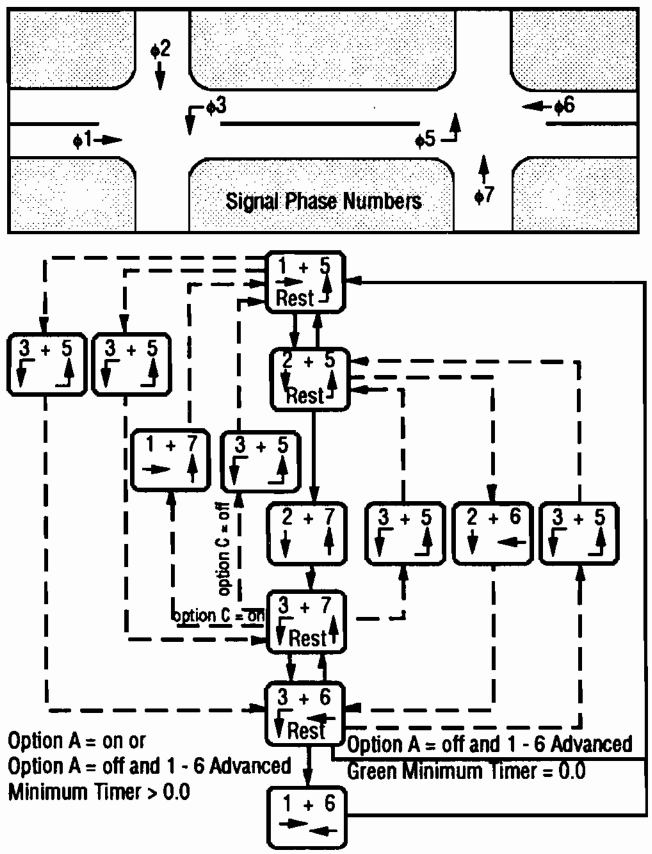

Fig 2-4. Operation of the "Figure 6" signal controller pattern.

conventional four-leg intersection: the green time for each external movement of the diamond interchange is proportional to the ratio of that movement's volume-to-saturation-ratio (y-value) to the sum of the volume-to-saturation-ratios of all the external movements.

At this point the timing of the internal approaches must be determined. A time-space diagram can be constructed for the phasing plan, cycle length, and external movement timings under consideration to find the appropriate offset and timings for each internal phase. Fortunately, when choosing a phasing plan without the aid of optimization tools such as PASSER III or a similar computer program, it is almost always a safe decision to use the "Figure 4" phasing plan. Other patterns can be used, but they are hardly ever optimal unless the intersection has unusual volume characteristics and/or wide spacing, or unless a different plan must be chosen to provide arterial progression.

Phase Numbering Schemes: Assignment of Traffic Phases to Controller Phases

Type 170 (California) Diamond Controller. Regardless of the type and manufacturer of controller, the operation of all diamond phasing patterns is always the same. Differences exist, though, in the phase numbering scheme for diamond interchanges, depending on the type of controller,

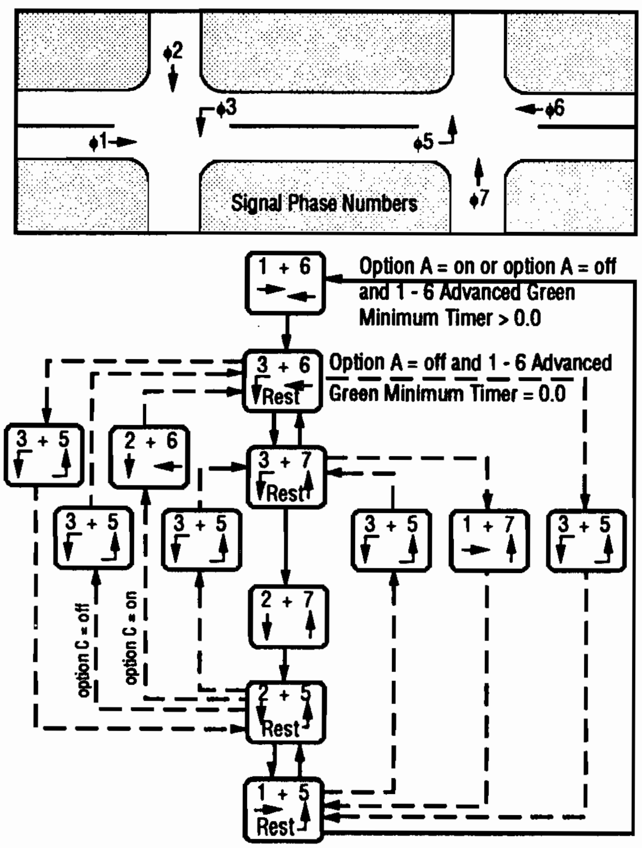

Fig 2-5. Operation of the "Figure 7" signal controller pattern.

controlling agency, designer, etc. It must be emphasized that phase and detector numbering can be completely arbitrary; the schemes presented here are simply two of the most common in use.

The origin of the California Type 170 actuated controller design is apparent in its configuration as a pair of dual ring, four-phase controllers (Fig 2-6). The eight phases operate together in "leading left" mode as a pair of dual-ring four-phase controllers. Each separate controller is assigned phases for one intersection of the diamond interchange. The two controllers operate on a common cycle length, and the desired diamond interchange phasing and timing plan is implemented by application of the proper splits and offset between the two controllers. The 170 controller phases are assigned to traffic movements as shown in Fig 2-7.

Normally, the two four-phase controllers are operated in lagging left turn mode with zero offset, in which "Figure 3" phasing is obtained, or in leading left turn mode with about a 50 percent offset, in which "Figure 4" phasing results. For other patterns, phase force offs and skips generated by the special diamond interchange control software are used to invoke the proper phase sequence at each intersection.

The concept of the 170 phasing arrangement is easy to apply; by varying phase lengths, offsets, and lead-lag left turn modes, any arrangement of diamond phases can be developed. The original 170 controller concept provided the following features:

- Fully actuated control in isolated operation.
- A traffic responsive control program which calls into effect any of nine preprogrammed patterns based on data obtained from detectors located at the interchange.
- Interconnection with adjacent controllers to provide arterial street progression.

Detector Placement

The schematic in Fig 2-8, based on the "Texas Diamond" phase numbering scheme, is characteristic of the fully actuated diamond. This is the typical detector numbering scheme as preferred by the cities of Dallas and Fort Worth. Detectors are associated with controller phases by using the same number as the associated controller phase.

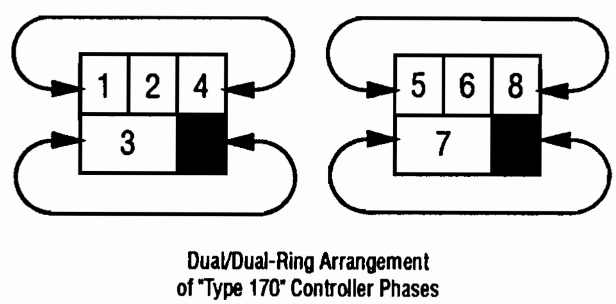

Fig 2-6. Type "170" diamond dual ring controller arrangement.

Where more than one detector is connected to a phase, the detectors are assigned a following letter in addition.

The variables under consideration in the optimization of a detector scheme are numerous, and their interaction is complex. Some of the areas being investigated by current research include the following:

- Location of the loop, whether at the stop line or set back.
- Operation of multiple loops to improve detection of high speed vehicles.
- Modification of the detector output, whether by presence/pulse mode, stretching, or delaying the output signal. Delay timing is usually adjustable from 0 to 10 seconds, and is the time which the detector amplifier waits after the passage of a vehicle before outputting a signal. Stretch timing is an amount of time adjustable from 0 to 10 seconds that the output signal remains on after a vehicle passage has quit triggering the loop. This is different in concept from a "continuous presence mode" selection because without stretch timing, the output signal does not continue beyond vehicle passage; with stretch timing the output signal will remain on even when a vehicle is not in the loop.

Some controllers modify detector operation depending on which phasing pattern is in effect. For example, for one manufacturer of actuated diamond controller, the following rules apply to detector operation during "Figure 3" operation [Ref 10]. The location of the detectors is as shown in Fig 2-8:

- Detectors D1, D2, D3, D5, D6, and D7 call and extend Phases 1, 2, 3, 5, 6, 7 respectively in the normal manner.
- Detector D13: During Phase 2, this detector calls Phase 1. During Phase 3, this detector extends Phase 3 until a call is received for Phase 1. This detector is disconnected during Phase 1. Likewise, D56 calls Phase 6 during Phase 7, extends Phase 5 during Phase 5, and is disconnected during Phase 6.
- Some jurisdictions implement the following rules to insure that Phases 2 and 7 and Phases 1 and 6 are serviced simultaneously: If Phase 2 and 7 are not being serviced and a call is received for Phase 2 or Phase 7, the other phase is called also. In the same manner, if Phase 1 and 6 are not being serviced and a call is received for Phase 1 or Phase 6, the other phase is called also. This option is selected by means of an external logic input, usually controlled by a time clock.

The following rules apply to detector operation during "Figure 4" operation:

- All detectors function in the normal manner, calling their respective phases when the phase is not active, and extending them when the phase is active.
- The extension of the frontage road/ramp movements, in which Phases 3 and 7, or 2 and 5 are green, may be controlled by detectors on the interior approaches as well as on the frontage road/ramps. To illustrate, either detector D13 or D3, or both, in addition to the detectors on the approach to Phase 7, may be used to extend Phase 3+7 when that movement is active. The decision is left to the designer.
- Detectors D2A and D7A: These alternate detectors are used to extend Phase 2 and Phase 7 respectively. Detectors D2 and D7 are used to call Phase 2 and Phase 7 when the phases are not active.

Current Research in Detector Placement

Some research is currently being conducted in the area of detector placement. Messer et al [Ref 11] conducted a factorial experiment investigating the relative performance of setback and stop-line detectors in both "Figure 3" and "Figure 4" operation at four diamond interchanges in Fort Worth, Texas. Because of the large expense of collecting real-world traffic data, the sample size was small, but the experiment indicated that setback detection probably reduced queue lengths and delays at the intersections under study. The TEXAS Model Version 3.0 (Diamond Interchanges) will permit investigators to easily replicate experiments such as this, reducing variances inherent in real-world traffic and allowing the true effects of detector designs to be evaluated.

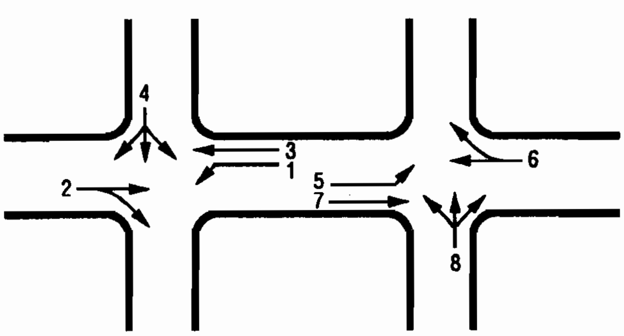

Fig 2-7. Type "170" diamond controller phase arrangement.

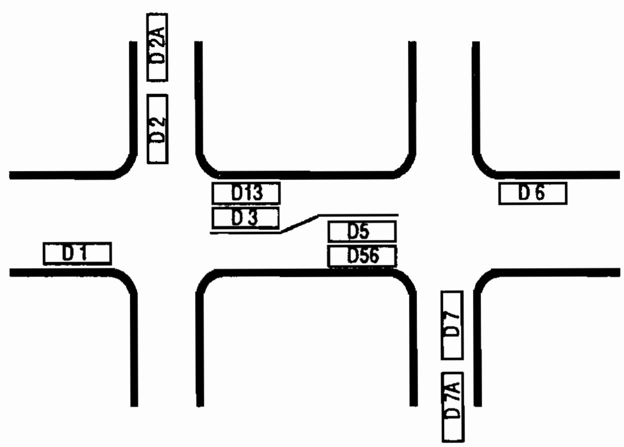

Fig 2-8. Typical detection placement and numbering scheme.

CHAPTER 3. VALIDATION OF TEXAS MODEL, VERSION 3.0

DEFINITION OF VALIDATION

This part of the report describes the procedure that has been used for validating the TEXAS Model, Version 3.0 (Diamond Interchanges). Validation is the process of proving that a model operates in the same way as the real-world system it is trying to represent, or "building an acceptable level of confidence that an inference about a simulated process is a correct or valid inference for the process" itself [Ref 12]. No model can represent the real world with complete accuracy. In fact, validation will almost never result in the absolute proof of truth or correctness of a model, because the equivalence of two systems, in this case a simulation model and a real-world diamond interchange, cannot be demonstrated just by comparing inputs and outputs of the two systems. The inputs and outputs may be the same, but the internal mechanisms may be completely different. In order to prove their equivalence, all the internal numeric states of the two systems must be compared. Since the number of internal states of a complex system such as a diamond interchange is practically infinite, it would be impossible to exhaustively check all the possible states.

Therefore, attention must be given only to certain measurable *responses* of a model to defined input conditions. Validation, then, consists of comparing these selected responses to the same responses that occur in a real-world system as a result of the same inputs.

A synonym for response is *measure of effectiveness.* So, validation makes sure that selected measures of effectiveness (MOEs) of the model are approximately the same as corresponding ones in the real world. The question of which MOEs are selected is largely a question of judgment: what features are prominent in the model? If the model has already been constructed, this is an easy task. If not, it is one of the fundamental problems in the design of a simulation model. Since the TEXAS Model, Version 3.0 (Diamond Interchanges) is a descendant of the original TEXAS Model of Intersection Traffic [Ref 1], the measures of effectiveness of interest are already well-defined by the architecture and features of the model.

DESIGNING THE VALIDATION EXPERIMENT

Like the original TEXAS Model program, the purpose of the TEXAS Model, Version 3.0 program is to allow the evaluation of the effects of different geometric configurations and traffic-control strategies on driver-vehicle units at an intersection [Ref 1]. The use of the program follows the

"design -> simulate -> evaluate -> redesign"

feedback loop familiar to the engineer. In other words, the TEXAS Model is not an optimization tool; it is a tool for evaluating an intersection design. At the evaluation stage, some MOEs of interest to the interchange designer include:

- delay to vehicles,
- queue lengths,
- probability of clearing a queue in one signal cycle, and
- vehicle travel times.

All the above measurements, which are available either directly from the TEXAS Model printout or from post-processor analysis of output data files, serve as indicators of the effects of different design alternatives.

The purpose of the validation procedure, therefore, is to compare real-world MOEs with simulated MOEs to such a degree that a user can be reasonably confident that the TEXAS Model, Version 3.0 actually approximates real-world conditions. This is done by comparing MOEs obtained from real-world film observations to the corresponding MOEs obtained from the simulation model.

Validation of the Original TEXAS Model

Validation of the original TEXAS Model was made using a combination of several techniques. First, qualitative examinations were made of printouts of intermediate output files and the position, velocity, and acceleration histories of vehicles. No quantitative tests were performed at this stage; engineering judgment was applied, and a determination was made as to whether the output seemed reasonable.

Next, the same type of test was applied to the viewing of intersection operation on an animated-graphics display terminal. Again the criterion applied was whether the display of traffic flow appeared the same as would be expected at a comparable real-world intersection.

Finally, quantitative validation of the model was made by comparing observed queue-discharge headways at signalized intersections with those collected from the model, and by comparing queue delay on approaches at five non-signalized intersections in Austin to those produced by the model [Ref 1].

Field-Data Sample Size

How much real-world data should be collected? The answer to this question depends on the definition of *sample space* for this experiment. The sample space is the range of conditions over which the results of an experiment are expected to be valid. The ideal sample space for the TEXAS Model, Version 3.0 validation procedure would consist of all urban diamond interchanges in Texas. To validate the model for this sample space, a list of all urban diamond interchanges in the state would be created, and then a number of interchange locations would be selected randomly from the list. This ideal procedure was not possible for several reasons.

The most pressing constraint was due to the use of time-lapse photography for field-data collection. This required that the interchanges under study be located within 300 to 600 feet of a 10 to 20-story building or other structure able to serve as a platform for the camera equipment. This significantly reduced the body of diamond interchanges available for study.

Next, various factors prevented building managers from allowing study personnel access to building rooftops. On inside floors, access was considered too disruptive for tenants, and was limited to unoccupied spaces. Therefore, filming was restricted to buildings with either very cooperative building managers, empty floor space facing a diamond interchange, or both.

No location in Austin was found that was accessible for study. Eventually two locations were found in San Antonio that satisfied these criteria. These locations were the diamond interchanges at the intersections of Interstate Highway (IH) 410 at Nacogdoches Road, and IH-410 at McCullough Avenue. Shown in the location map in Fig 3-1, both locations are full diamonds in urbanized areas. Nacogdoches is a major arterial street serving northeast San Antonio, with moderate to heavy traffic on all movements. McCullough is a minor arterial street. Since a major retail shopping center is located on the southwest corner of the McCullough interchange, turning movements servicing this retail area were heavy. Other pertinent information includes:

- Both intersections are signalized, with actuated traffic signal controller equipment. Both intersections operate on the "Figure 4" phasing plan with approximately a 50 percent offset, resulting in the "4-phase" type of timing plan; however, only the Nacogdoches interchange operates with the "overlap" phases generally characteristic of this plan.
- The IH-410/Nacogdoches site is equipped with free U-turn lanes; IH-410/McCullough is not.
- Figures 3-2 and 3-3 are schematic interpretations of the geometric conditions found at the two intersections. Supplementary data for these figures are included in Tables 3-1 and 3-2.

THE VALIDATION PROCEDURE

Validation of TEXAS Model, Version 3.0 Submodels

The structured design of the TEXAS Model, Version 3.0 suggests conceptually the testing of its individual submodels. In addition, the validity of the original TEXAS Model can be extended to Version 3.0 since many of the submodels of the original TEXAS Model are used in the diamond-interchange version without modification.

The TEXAS Model, Version 3.0, like the TEXAS Model, includes three principal submodels: the Geometry processor (GEOPRO), the Driver-Vehicle Processor (DVPRO), and the Simulation Processor (SIMPRO). GEOPRO and DVPRO generate inputs files for the third submodel, SIMPRO. Each of the submodels can be tested separately by gleaning the proper measurements from corresponding real-world data sets.

Geometry Processor Validation

Validation of the geometry processor is a simple task. Since the geometry processor is capable of producing plotted output, as with the original TEXAS Model, plans of the interchange under study can be compared directly with the plotted output from GEOPRO.

Login Distributions

Login headways generated by the driver-vehicle processor are probably not appropriate for use in the validation tests. Instead, the actual login times of the real-world vehicles should be used. This serves as a variance reduction technique and will reduce or eliminate the effects of differences between the real-world and generated login distributions.

Another reason why actual login times should be used is due to the relatively short length of the approach lanes in the validation data sets. With long approach lanes, the TEXAS Model is relatively insensitive to the login distribution of vehicles [Ref 13]. Car-following and traffic-control effects dominate the effects of login distribution at the intersection, given that approach lanes are more than about 400 to 500 feet long. However, approach lanes in the field data sets collected for validation of the TEXAS Model, Version 3.0 were rather short (less than 300 feet) in some cases. Therefore, it was desirable to recreate as closely as possible the login headways observed in the field. Files of observed headways were developed.

SIMPRO Validity Extended to TEXAS Model, Version 3.0

The simulation processor, SIMPRO, includes the car-following, vehicle-acceleration and deceleration, lane-choice, and lane-change submodels. These submodels are closely interconnected within the operations of the simulation processor and cannot be tested independently.

However, these submodels, which have to do with the interaction among vehicles and the interaction of the driver and vehicle, are not expected to differ in the case of a diamond interchange from that at a regular intersection. With the previous validity of the TEXAS Model established, it is reasonable to assume that these submodels will remain valid in the TEXAS Model, Version 3.0. Review of the animated-graphics screen display showing driver-vehicle units traversing various diamond-interchange configurations confirmed the orderly and reasonable behavior of traffic and traffic-control devices simulated by SIMPRO.

Traffic Signal Controller Submodel Validation

Perhaps the most significant difference between the TEXAS Model and the TEXAS Model, Version 3.0 is in the traffic signal controller submodel. A traffic signal controller responds dynamically to a limited number of discrete inputs — traffic detectors — and thus can be tested to see if its response is the same as that of a real-world controller. The

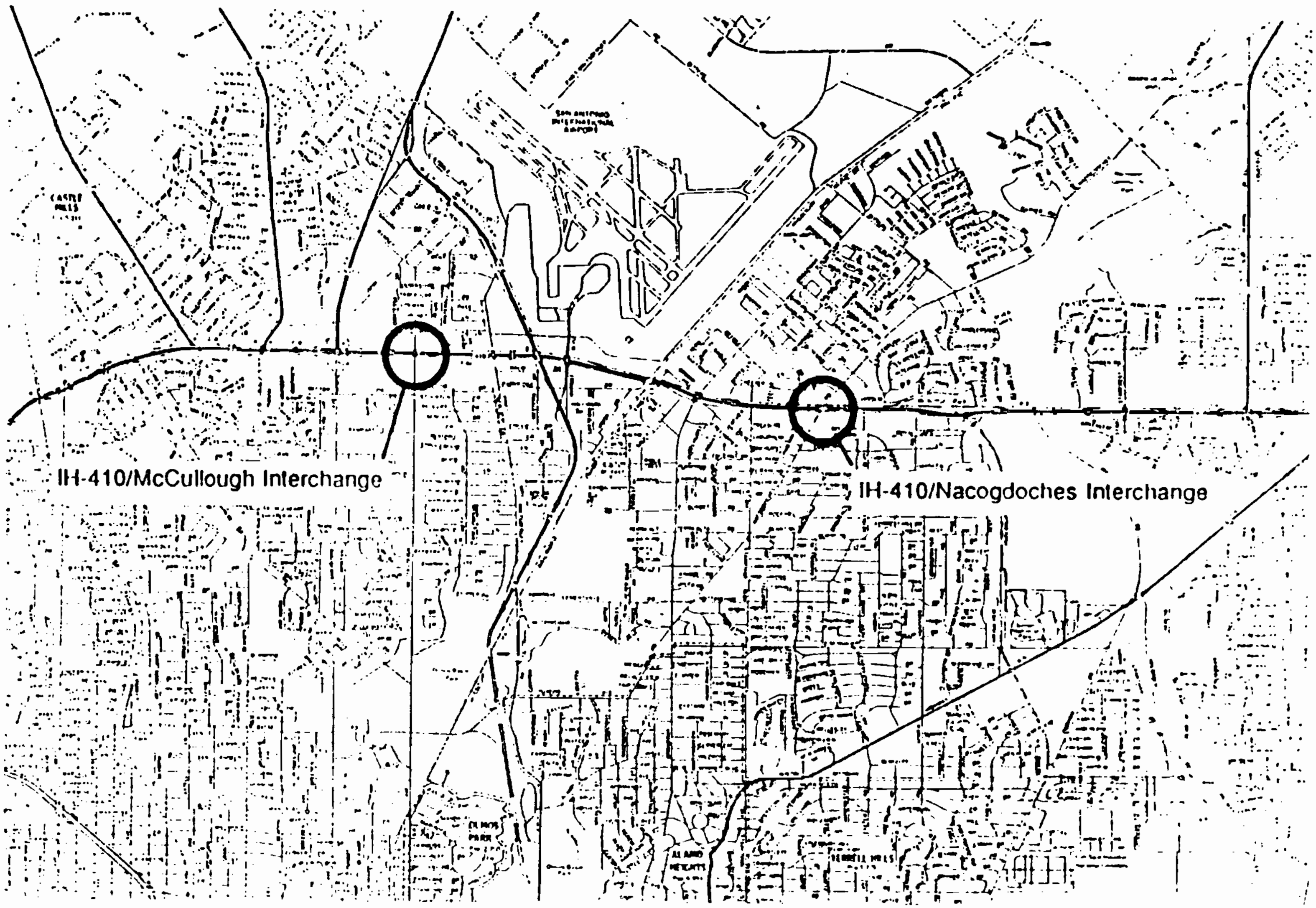

Fig 3-1. Study location map.

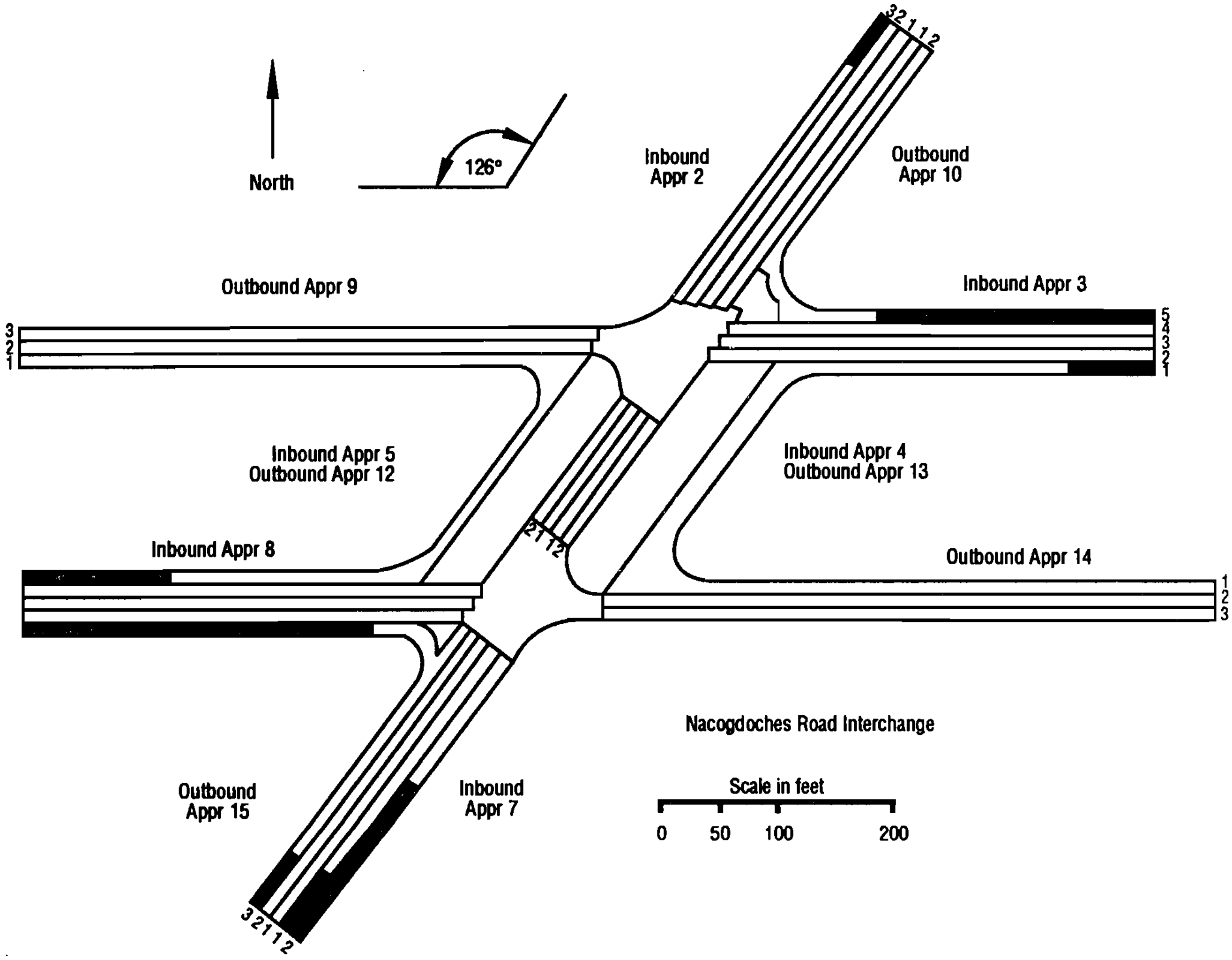

Fig 3-2. IH 410 at Nacogdoches diamond interchange, San Antonio.

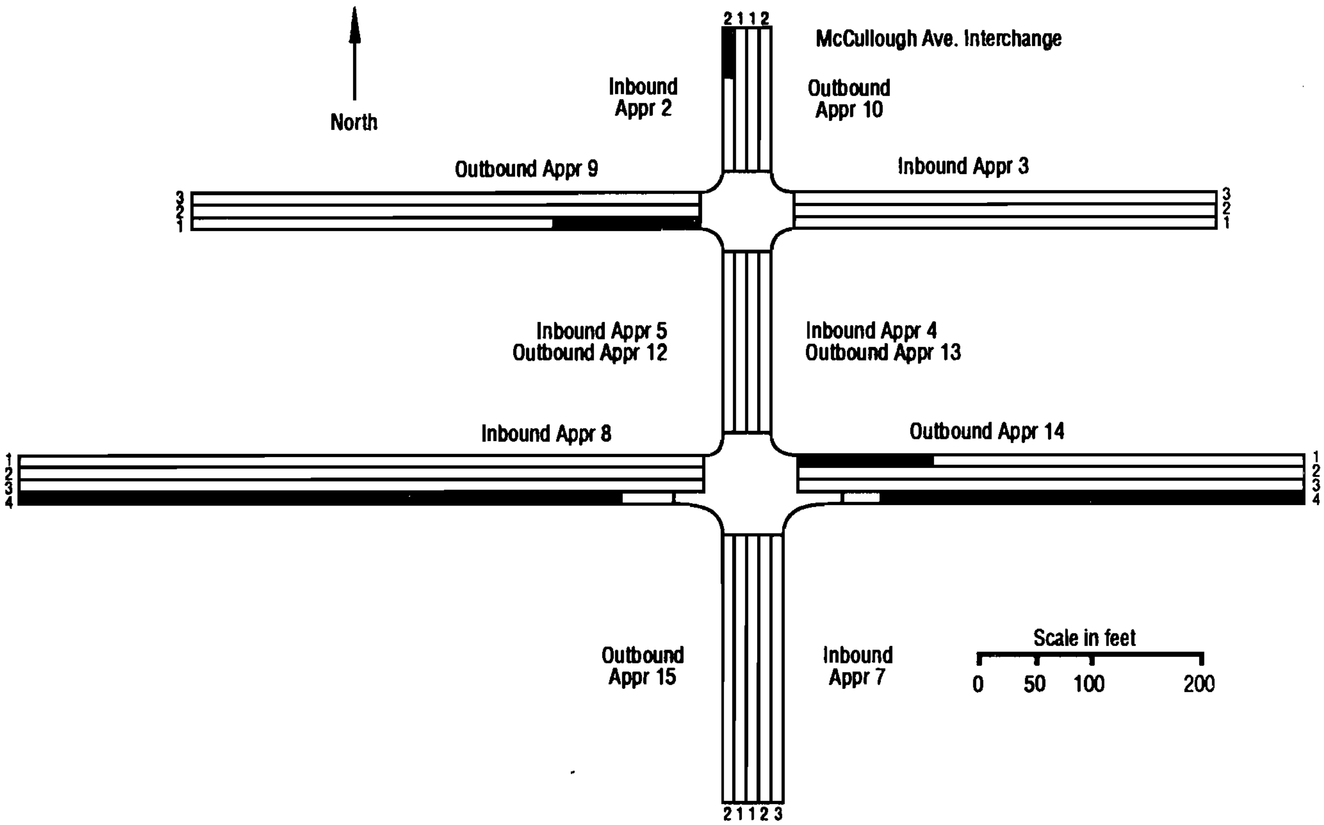

Fig 3-3. IH 410 at McCullough diamond interchange, San Antonio.

TABLE 3-1. NACOGDOCHES INTERCHANGE: GEOMETRIC DATA

Inbound Approach	Lane Number	Width, ft	Begin 1, ft	End 1, ft	Begin 2, ft	End 2, ft	Permitted Turn Movements
2	1	11	0	0	0	230	S
2	2	10	0	0	0	230	S
2	3	10	0	0	50	230	R
3	1	12	0	0	80	387	U
3	2	10	0	0	0	387	L
3	3	10	0	0	0	387	L,S
3	4	10	0	0	0	387	S
3	5	11	0	0	240	387	R
7	1	11	0	0	0	303	S
7	2	11	0	0	60	303	S
7	3	11	0	0	160	303	R
8	1	12	0	0	120	478	U
8	2	10	0	0	0	478	L
8	3	10	0	0	0	478	L,S
8	4	10	0	0	0	478	S
8	5	11	0	0	428	478	R

Inbound Approach	Lane Number	Width, ft	Begin 1, ft	End 1, ft	Begin 2, ft	End 2, ft	Permitted Turn Movements
4/13	1	11	0	0	0	130	L
4/13	2	11	0	0	0	130	L,S
5/12	1	11	0	0	0	130	L
5/12	2	11	0	0	0	130	L,S

Outbound Approach	Lane Number	Width, ft	Begin 1, ft	End 1, ft	Begin 2, ft	End 2, ft
9	1	11	0	0	0	500
9	2	11	0	0	0	500
9	3	11	0	0	0	500
10	1	11	0	0	0	300
10	2	11	0	0	0	300
14	1	11	0	0	0	550
14	2	11	0	0	0	550
14	3	11	0	0	0	550
15	1	11	0	0	0	300
15	2	11	0	250	300	300

TABLE 3-2. McCULLOUGH INTERCHANGE: GEOMETRIC DATA

Inbound Approach	Lane Number	Width, ft	Begin 1, ft	End 1, ft	Begin 2, ft	End 2, ft	Permitted Turn Movements
2	1	10	0	0	0	122	S
2	2	10	0	0	40	122	S,R
3	1	10	0	0	0	384	L
3	2	11	0	0	0	384	L,S
3	3	11	0	0	0	384	S,R
7	1	10	0	0	0	235	S
7	2	10	0	0	0	235	S
7	3	13	0	0	0	235	SR
8	1	10	0	0	0	624	L
8	2	11	0	0	0	624	L,S
8	3	11	0	0	0	624	S
8	4	11	0	0	550	624	R

Inbound Approach	Lane Number	Width, ft	Begin 1, ft	End 1, ft	Begin 2, ft	End 2, ft	Permitted Turn Movements
4	1	11	0	0	0	162	L
4	2	11	0	0	0	162	L,S
5	1	11	0	0	0	162	L
5	2	11	0	0	0	162	S

Outbound Approach	Lane Number	Width, ft	Begin 1, ft	End 1, ft	Begin 2, ft	End 2, ft
9	1	11	0	0	140	470
9	2	11	0	0	0	470
9	3	11	0	0	0	470
10	1	11	0	0	0	130
10	2	11	0	0	0	130
14	1	11	0	0	110	460
14	2	11	0	0	0	4560
14	3	11	0	0	0	460
14	4	11	0	40	460	460
15	1	11	0	0	0	220
15	2	11	0	0	0	220

simulated controller can be made to reproduce real-world responses exactly in response to specific detector inputs.

To validate the performance of the traffic signal controller module developed for the TEXAS Model, Version 3.0, a signal-controller tester software program was written. This tester runs on an IBM (or compatible) microcomputer. It is desirable, but not mandatory, that the computer have a color display monitor.

The tester displays both preset and dynamic data. The preset data that are displayed include controller settings for each phase, the settings for the 12 special timers, the state (ON or OFF) of the 10 options, and the numbers of the phases in each of the two controller rings. Displayed dynamic data includes the state of each of the active special timers, the currently-active phase in each ring, the indication (green, yellow-change, red-clearance) for each active phase, and time-into and the time-remaining-before-gapout for each active phase. The tester also shows which phases have calls, are in a hold condition, are in a select condition, or have been chosen to be the next active phase. The list of detectors that is currently connected for each phase is also shown on the display.

The tester works with normal SIMPRO input data. Vehicle actuations (calls) are entered manually from the computer keyboard. During testing, the program pauses at the start of each simulation time-step (DT), waits for entry of traffic actuations, processes these actuations, and displays the new signal controller data which are generated in response to the actuations.

In validating the Version 3.0 traffic signal controller submodel, many different scenarios were tried for each of the phasing-plan "Figures" that are used for diamond interchanges. Modifications to the software were made as necessary to cause the simulated controller to respond correctly to the input information. An almost infinite number of conditions and combinations of conditions can exist for the diamond interchange signal controller. A wide range was tried, and the latest version of the traffic signal controller was found to respond correctly to all conditions that were tried.

VALIDATION DATA

Field Data Collection

Super 8 millimeter motion picture film was chosen as the medium for field data collection. After locations were selected based on accessibility and proximity to a diamond interchange, two cameras were set up, one covering each intersection of the diamond interchange and that intersection's exterior approaches. The fields of view of the cameras overlapped slightly, but not enough to follow all vehicles completely through both intersections of the diamond. At the Nacogdoches Road interchange, the freeway passed over Nacogdoches Road, so the interior lanes were not visible. At the McCullough Avenue interchange, the freeway is depressed below the street level, so interior approaches were visible.

Cameras were set for single-frame exposure mode. An external intervalometer was connected to both cameras through a Y-connector, triggering both cameras simultaneously at a preset time interval. A special device was used to hold a stopwatch at the proper orientation in the foreground of the field of view of each camera. The stopwatches were synchronized to display the same time; in this manner the exact exposure time of each frame of film in each camera could be ascertained. The intervalometer was started, and filming commenced at the rate of approximately two frames per second. At 3600 frames per roll of Super 8 film, 30 minutes of data could be collected on each roll.

The filming rate of one-half second per frame was selected because the intervalometer was only capable of operating at two speeds; the other available speed of two seconds per frame was too "coarse" for the purposes of this validation.

Data Reduction: Vehicle Counts

The first step in reducing the film data was to obtain vehicle counts for the 30-minute period to be recreated in the simulations. Vehicles on each approach lane of each intersection were counted from the film individually. In addition, counts for each available origin-destination route through the interchange were made.

The two-camera filming technique meant that the paths of most vehicles could not be traced all the way through the interchange in a single camera's field of view. However, accurate counts for each origin-destination route could be obtained since a time display was visible in each of the two fields of view, and since distinct platoons of traffic were formed by the discharge of each traffic signal phase at each intersection.

Data Reduction: Measurement of Delays on Approaches

Delay was determined from the film data sets by sampling queue lengths at a regular interval. This interval varied between data sets, but was between six and eight seconds. Queue lengths were sampled for most lanes on every approach; however, in some cases approach lanes were pooled together due to poor visibility or low traffic volumes. The average delay was then calculated by multiplying the sum of all the queue length measurements by the time interval between measurements for that data set.

The TEXAS Model recognizes four different types of delay: 1) queue delay, 2) stopped delay, 3) "delay below N miles per hour" (the value of N is set by the user but defaults to 10.0 mph), and 4) total delay. Queue delay is defined as the time a driver-vehicle unit spends in a queue waiting to enter the intersection. A driver-vehicle unit is considered in a queue when it is on an inbound lane (includes internal lanes in Version 3.0), is traveling less than 3.0 ft/sec, and is less than some specified distance (user-specified, defaulting to 30 feet) from the vehicle ahead. Once a driver-vehicle unit begins accumulating queue delay, it accumulates queue delay until it enters the intersection. Queue delay, therefore, includes time spent "moving up" in the queue.

Data collected from the film was in the form of queue lengths, and the definition of a queue as observed on the film was made as close as possible to that specified by the TEXAS Model, Version 3.0's definition of queue delay. Precise distance measurement from the film was not possible (or necessary). For the purposes of determining whether an observed vehicle was in a queue, a rough estimate of 1/2 car length (about 10 feet) from the rear of the vehicle ahead was used as the criteria for approximating the TEXAS Model's condition of traveling less than 3.0 ft/sec to join a queue. Because of this interpretation of the filmed field data, it is Version 3.0's queue delay output statistic that should be compared to the delays measured from the film data sets.

Stopped delay is similar to queue delay, but does not include move-up time in the queue. Stopped delay is defined as delay incurred by a driver-vehicle unit any time the vehicle is in a queue and traveling less than 3.0 ft/sec. Usually queue delay and stopped delay will be nearly equal at a signalized intersection. It is very difficult to determine on a frame-by-frame basis whether a vehicle is moving up in the queue or not; therefore, this delay statistic was not measured from the film data sets.

The definition of "delay below N miles per hour" (also known as "special delay statistic") is apparent from its name. This type of delay may occur anywhere in the intersection. This statistic is also very difficult to measure from film because it is very hard to measure vehicle speeds on a frame-by-frame basis.

Total delay is defined in the TEXAS Model as the difference between the actual travel time of a vehicle through the intersection and the travel time through the intersection had the vehicle been able to maintain its desired speed at all times. It is possible to compute this quantity from the display/emissions output file of the TEXAS Model, Version 3.0, which contains the travel-time history of each vehicle processed through the system.

Data Reduction: Exact Login Times

Because of limitations in the field of view, inbound approach lanes of the validation model runs are shorter than the desired length of 600 feet or more. This has an effect on vehicle login headways such that variance between real-world and model login headways is not damped out by car following behavior, as would happen with longer approach lanes. Thus vehicles are logged in at the exact times they pass an inbound login reference point on the film.

Suitable login reference points were selected on each approach to the diamond interchanges, and the passage time of each vehicle past these points was measured. Vehicles were classified on login as either passenger cars or heavy vehicles, corresponding to TEXAS Model vehicle types three and twelve (Medium Passenger Car and Loaded Diesel Semi-Trailer.)

Data Reduction: Assignment of Destination Legs

Direct observation of the route of each individual vehicle through the interchange on the film from system login to logout was prohibitive. Inbound vehicle counts were obtained from the intersection-entry headway data, and the number of vehicles in each vehicle class was recorded by lane at this location. However, since the inbound vehicle counts were observed at the intersection and not at the inbound system login point, these counts did not identify the lane on which vehicles were logged into the system. Input to the TEXAS Model, Version 3.0 requires the user to specify the percent of vehicles with a destination on each leg of the interchange at the time of login to the system. It was impossible to determine such information from the filmed data, as the first indication of the driver's destination on the film came when the vehicle chose a path through the first intersection; an additional choice was made at the second intersection if both intersections were used. Counts of entering vehicles from each lane at the first intersection as well as counts for each route (inbound-outbound lane pair) through the diamond were obtained from the film. Therefore, destinations for individual vehicles could feasibly be assigned by randomly associating destination legs to incoming vehicles in a manner to minimize lane changes on the inbound lanes approaching the first intersection.

The solution to the problem of linking the number of vehicles entering the system on a particular leg with the number of vehicles with a final destination on a particular leg of the interchange was to formulate the assignment of vehicles entering the system to a destination leg as a transportation linear program. The number of vehicles entering the intersection on each inbound lane of each leg was known, as was also the count of vehicles using each available route through the interchange to a final destination. The objective was to minimize the "cost" of lane changing, whereby each lane-change across one lane was assigned a cost of one, each change over two lanes was assigned a cost of two, and so on. The minimization was subject to the constraints that the counts on each inbound lane and the counts on each destination leg retain their correct values as obtained from the film data. A different, small linear program was created for the inbound lanes on each leg; the input consisted of lane counts, and the outputs consisted of destination-leg counts.

These transportation linear programs were easily solved manually by using the transportation simplex method described in most operation research textbooks. Where discrepancies existed between inbound and destination counts, the destination count was adjusted rather than the inbound count, since the inbound count was considered more accurate, and also because preservation of the inbound count would affect the inbound headway distribution. In some cases the solution to the transportation linear program was not unique. Lack of uniqueness will not affect the simulation model operation since the same number of lane changes will occur in each solution.

The result of the transportation linear program solution was a matrix of vehicle counts with a row for each inbound lane and a column for each destination leg. These counts were then used to randomly assign destination legs to vehicles in the files of inbound-lane login times obtained from the film data in the same proportion as obtained in the linear program solution.

Data Reduction: Signal Change Times

Although the signal heads could not be observed directly on the film (they were too far away), movement of the first few vehicles in queues at the signal approaches was visible. Since the traffic signals at both locations under study were actuated, no traffic signal phase began without a vehicle being in place from which to detect movement. The time recorded for the beginning of the phase was the time at which the first vehicle in the queue was observed to move.

This procedure does not take into account vehicle startup time. Because this startup time is not observable on the film, it cannot be measured. If it is assumed that vehicle startup time is constant for all the queues photographed, then it can be ignored, due to the cyclical nature of traffic signal timing.

Preparation of Validation Input Data Files

The objective of this task was to prepare files in the appropriate input formats for the TEXAS Model, Version 3.0. Data files were prepared corresponding to each of the 30-minute filmed segments of real-world data, and consisted of a geometric data file and a number of driver-vehicle input files. The driver-vehicle input files were developed in a format compatible with input to the simulation processor, i.e., in the same format as driver-vehicle processor, DVPRO, output files. Replicate files were prepared with a special data-processing program.

Multiple driver-vehicle unit files were provided to eliminate the need for resolving individual vehicle destinations from each data set. Determining the desired destination leg for each vehicle in the film data files would be prohibitively time-consuming. Instead, the destination leg for each vehicle is chosen in a random order and assigned to the individual driver-vehicle files. Randomization is made with respect to the 30-minute lane and route counts, so those counts remain the same from file to file; only the order of vehicles is changed. The special data-processing program also randomizes driver types according to the default parameters as used in the TEXAS Model, Version 3.0.

In addition, the program randomizes desired driver-vehicle speeds by sampling from a normal distribution with mean equal to the speed limit, and a standard deviation of three to five mph. A discrete approximation to the normal distribution was used to prevent selection of a speed more than three standard deviations (15 mph) above or below the mean speed. The technique is the additive convolution technique for selecting normally-distributed random variates in the development of the original TEXAS Model. Vehicle speeds were not sampled in the field.

Startup and Equilibration Using Estimated Parameters

Equilibration for the Version 3.0 model takes slightly longer than for the original TEXAS Model because it takes more time for vehicles to travel completely through the interchange. A shifted negative exponential frequency distribution was used to generate driver-vehicle unit headways during the startup period for some simulation runs used for validation, and a duplicate segment from the field data files prepended to the file was used for other runs. Other parameters for the startup period were those determined from the filmed data.

Comparison of Simulation Results With Field Data

The TEXAS Model, Version 3.0 was configured to simulate the geometry and traffic-signal control at the IH-410 at McCullough Avenue diamond interchange. Two traffic data files prepared from the field data observed on two different days were used as input to the model. Each file included thirty minutes of real-time data. One day, the total volume of traffic was approximately three times as much as on the other day.

The measures of effectiveness (MOEs) used for comparison of simulation results with field data were: 1) total number of vehicles processed, 2) queue delay, 3) overall average queue delay, and 4) queue length. None of the simulation results was more than 10 percent different from the field data gleaned from the film. Some of the simulation runs yielded overall average queue delays that were virtually the same as those observed in the field. The model handled both light and heavy traffic very satisfactorily.

Observing the animated-graphics display of traffic moving through the diamond interchange in response to the actuated signal controller indications confirmed the reasonableness of the simulation and the resulting summary statistics that were used as MOEs. By this technique the behavior of each individual driver-vehicle unit and the associated traffic signal indications at each increment of time could be evaluated for accuracy. Queue buildup and dissipation followed normal patterns and thus indicated that no unusual events adversely affected the summary statistics. Performance of the diamond-interchange simulation model was judged to be quite adequate for application as a traffic engineering tool.

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APPENDIX A
THE TEXAS MODEL VERSION 3.0 [Diamond Interchanges]
Guide to Data Entry

The TEXAS Model for Intersection Traffic [Refs 1-3] is a powerful computer simulation tool which allows the user to evaluate in detail the complex interaction among individually-characterized driver-vehicle units as they operate in a defined intersection environment under a specified type of traffic control. Prior to Version 3.0 the model could be used for simulating only single at-grade intersections. Significant modifications implemented through Version 3.0 extend the package to include diamond interchanges. The new version includes both the single and diamond interchange simulation capabilities inside a user-friendly operating environment which will be very familiar to current TEXAS Model users. This guide describes procedures for using the new Version 3.0 of the TEXAS Model.

STRUCTURE OF THE TEXAS MODEL FOR INTERSECTION TRAFFIC VERSION 3.0

The TEXAS Model for Intersection Traffic includes four data processors: GEOPRO (Geometry), DVPRO (Driver-Vehicle), SIMPRO (Simulation), and EMPRO (Emissions) for describing, respectively, the geometric configurations, the stochastically arriving traffic, the behavior of traffic in response to the applicable traffic controls, and the emissions generated by the traffic.

GEOPRO develops a geometric definition of the intersection or interchange in response to user specifications. DVPRO utilizes assigned characteristics for each class of driver and vehicle and generates attributes for each individual driver-vehicle unit; thus, each unit is characterized by inputs concerning driver class, vehicle class, desired speed, desired outbound intersection leg, and lateral inbound lane position. SIMPRO simulates the traffic behavior of each driver-vehicle unit according to the momentary surrounding conditions including traffic control device indications, surrounding traffic, and geometric features which might be applicable. Delay statistics are collected and include the average of total delay and the average of stop delay incurred by each vehicle processed. Each delay is summarized by tum and straight movements and by the total of the permitted directional movements on each inbound approach. Total delay is the difference between travel time for a vehicle through the system and the time it would have taken the vehicle at its desired speed. Stop delay is the time spent by a vehicle which has a velocity less than 3 feet/second. Delay statistics show the overall influence of the intersection environment on traffic passing through the intersection. Comparison of the delays experienced by traffic making various directional movements indicates the interaction among traffic flows on the intersecting streets. Queue length statistics include average queue length and maximum queue length. Both are measured in units of vehicles, not feet. EMPRO, the emissions processor, (actually a post-processor) incorporates models to predict the instantaneous vehicle emissions of Carbon Monoxide (CO), Hydrocarbons (HC), Oxides of Nitrogen (NO_x), and fuel flow (FF) for both light-duty vehicles and heavy-duty vehicles.

Data Entry to the TEXAS Model Version 3.0

Data required for running the TEXAS Model are entered by the user through two computer data-entry programs called GDVDATA (Geometry, Driver, Vehicle) and SIMDATA (Simulation). Data that are needed for defining the geometric features of the intersection area in terms that are acceptable to the geometry processor (GEOPRO) of the TEXAS Model is incorporated into GDVDATA. In addition to the geometric data needed by the model, the user must enter data to characterize the drivers and vehicles which make up the traffic stream passing through a simulated intersection. The data-entry program GDVDATA includes user aids for entering the data needed by the driver-vehicle processor (DVPRO) of the TEXAS Model.

For efficiency and for the convenience of the user, a permanent library, which contains 20 typical intersection configurations including one diamond interchange, has been created and stored within GDVDATA. Each of these configurations, along with a defined traffic pattern, is described in detail in Appendix B of this guide. Instructions for using and modifying data files copied from the permanent library are given through prompts on the screen and in the section of this report entitled USING THE DATA-ENTRY PROGRAM GDVDATA. A user-group library is also provided to allow users to develop, store, index, and retrieve conveniently their own data files for modification or for repeated use without modification.

Data that are needed by the simulation processor, SIMPRO, are entered through the data-entry program called SIMDATA. This program pairs the entered data required by SIMPRO with data previously defined by using GDVDATA or with data contained in a permanent library file within GDVDATA. Use of SIMDATA is described in the section of this guide entitled CONCEPTS AND USE OF THE DATA-ENTRY PROGRAM SIMDATA and through prompts and instructions on the screen.

Animated Graphics Display of TEXAS Model Output

Output from the TEXAS Model includes the instantaneous speed, location, and time relationship for every simulated vehicle. These data are routinely written to a file for use by the emissions processor, EMPRO, or for other applications. The TEXAS Model Version 3.0 provides a feature whereby this information can be displayed graphically in real-time, or in stop action, on a screen driven by an IBM or compatible micro-computer. Intersection geometry is extracted from the files created by GDVDATA and displayed on the screen, first. Then, the position of each simulated vehicle is represented on the screen by an outline of the vehicle, scaled to size and color coded according to performance capability, with respect to time.

With this animated graphics display the user can study overall traffic performance of an intersection or interchange or examine in great detail the behavior of an individual vehicle in the traffic stream. This is a unique capability which permits the user to examine easily several alternative solutions to a problem by simulation without the time and expense of cut-and-try experimentation in the field. A wide range of conditions can be defined and evaluated visually on the screen as well as in the form of tabular listings that give summary statistics about traffic and signal-control performance.

CONCEPTS AND TERMINOLOGY USED IN THE DATA-ENTRY PROGRAM GDVDATA

The TEXAS Model Version 3.0 utilizes two pre-processor packages to arrange the required data concerning intersection geometric features and driver-vehicle traffic characteristics into a format that is acceptable for use in the actual simulation process. The user must specify all geometric and traffic data that are needed by the model to describe <u>accurately</u> and <u>completely</u> the particular intersection/interchange situation which will be simulated in a given run of the program. Once the geometric and traffic features have been entered properly, they can be used repeatedly by the simulation processor without change. These data are entered via a program called GDVDATA. This program utilizes a series of screen prompts guiding the user in entering all required geometric and traffic data.

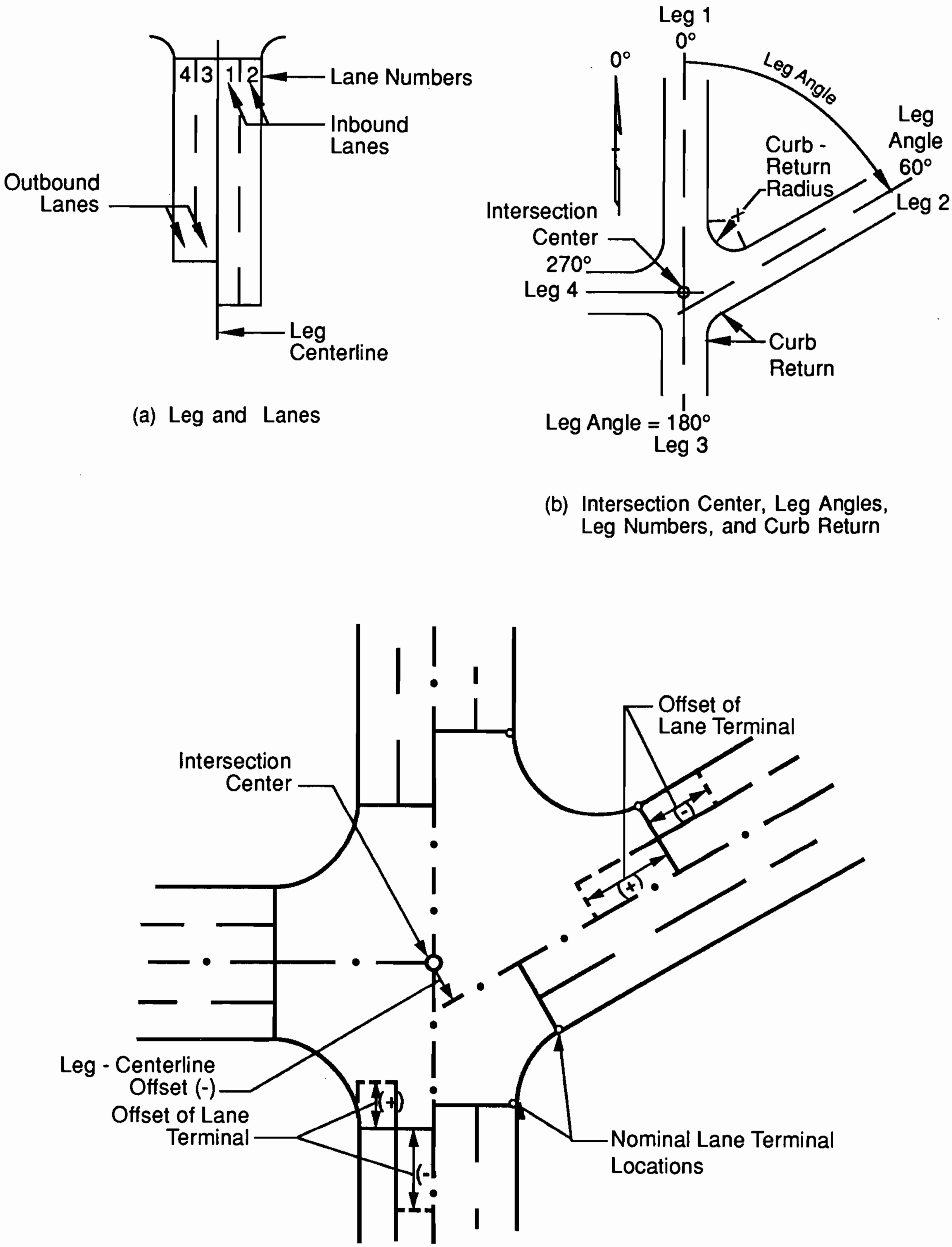
Geometry Data

Experience has shown that the first-time user as well as the frequent user of the TEXAS Model must have a plan-view drawing or sketch of the intersection area that is to be simulated available for immediate reference before attempting to enter the geometric data required by the model. Details shown on the plan should permit determination of dimensions to within one foot and angles to within one degree.

The concept of modular construction is used to configure a digital representation of the intersection geometric features which are to be simulated. Terminology associated with geometry of single intersections and diamond interchanges as used in this guide is shown in Figure A-1, and defined in Table A-1 which follow. The arrangement of the various elements of intersection geometry and the descriptive data required by the TEXAS Model is also discussed below.

Single Intersections

The LANE is the basic element that is used to form the geometry of an intersection. Each lane has a finite width and length, is oriented in a particular way with respect to the intersection center, and carries traffic either inbound toward the intersection or outbound away from the intersection. One or more parallel lanes form a LEG. Inbound lanes lie to the right-hand side of the leg centerline and outbound lanes to the left-hand side. Lanes on each leg are numbered starting with the inbound lane nearest the leg centerline as No. 1, the next adjacent inbound lane to the right-hand side as No. 2, etc. until all inbound lanes on the leg are numbered. Then, the next sequential number is given to the outbound lane nearest the leg centerline, and the numbering sequence is continued for each adjacent outbound lane until all lanes on the leg are numbered. A new sequence of numbers starting with 1 is used to number the

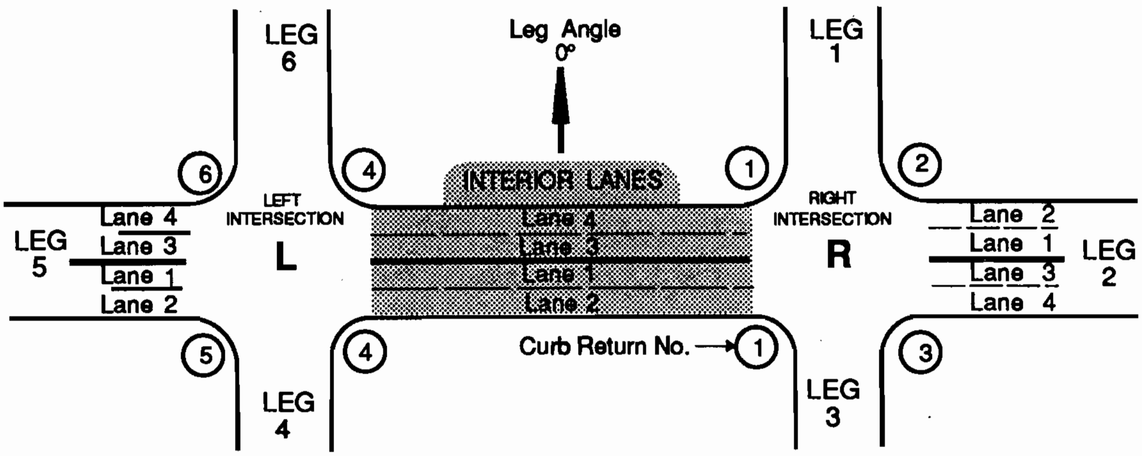


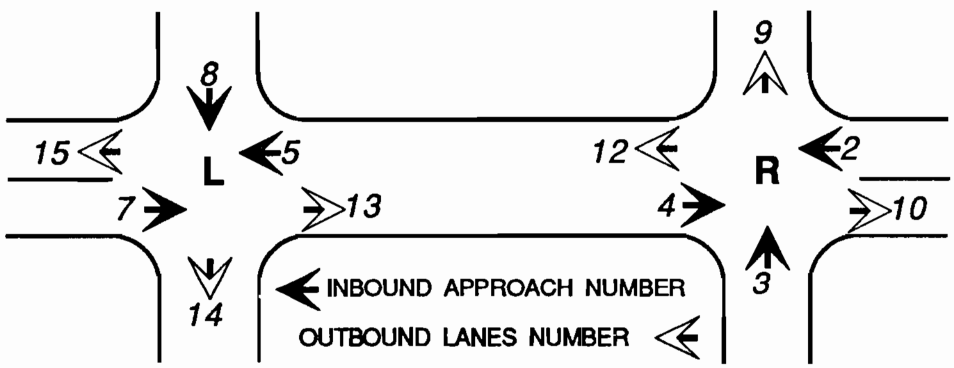
(a) Leg and Lanes

(b) Intersection Center, Leg Angles, Leg Numbers, and Curb Return

(c) Leg Terminal and Leg-Centerline Offsets

Figure A-1. Elements of intersection geometry.





(d) Terminology Used in Diamond Interchanges

Figure A-1. Continued.

TABLE A-1. DEFINITIONS

	Term	Definition
1.	Lane	An area of the traveled way designated for one-way use by vehicles entering or leaving an intersection. Each lane has a user-specified width and length and interfaces with the intersection at the lane terminal. Inbound lanes carry vehicles toward the intersection, and outbound lanes take vehicles away from the intersection.
2.	Leg	A set of 1 to 12 lanes with no more than 6 inbound lanes and no more than 6 outbound lanes.
3.	Leg Centerline	An imaginary straight line that separates inbound lanes from outbound lanes on a leg. It need not be at the geometrical center of the leg. When looking toward the intersection, inbound lanes are on the right-hand side, and outbound lanes are on the left-hand side of the leg centerline. The leg centerline is equidistant between the edges of a median. On legs which carry only one-way traffic, the leg centerline is at the leftmost lane edge when viewed along the leg centerline in the direction of traffic movement.
4.	Median	An area of a divided highway which separates inbound and outbound lanes and which is not designated for regular vehicular use.
5.	Leg Angle	The angle, measured clockwise, from a 0 degree reference line (usually north or toward the top of a drawing) to the leg centerline. It may have any value from 0 through 359 degrees.
6.	Curb Return	A circular arc which is tangent to the outermost edges of the lanes on two adjacent legs of an intersection. It defines the edge of the traveled way for vehicles using these lanes.

TABLE A-1. CONTINUED

	Term	Definition
7.	Lane Terminal	A real or imaginary straight line, perpendicular to the leg centerline, which designates the interface between a lane and the intersection. On each inbound lane, it locates the position where simulated vehicles will stop, if necessary, before entering the intersection. It is nominally located at the point of tangency of the curb return with the outside lane edge for all lanes on the same side of the leg centerline.
8.	Offset of Lane Terminal	The distance that the lane terminal is shifted along a lane from its nominal location. Positive values indicate movement toward the intersection center; negative values away.
9.	Intersection Center	A selected reference point in the intersection where two or more leg centerlines cross. The location of all leg centerlines is referred to this point by a user-defined leg angle and a leg-centerline offset.
10.	Intersection	The area into which the centerlines of 3 to 6 legs extend, and which is bounded by the lanes, medians, and curb returns of all legs.
11.	Leg-Centerline Offset	The perpendicular distance from the centerline to the intersection center. Positive values indicate that the leg centerline is to the right of intersection center when looking along the centerline toward the intersection; negative values indicate that it is to the left.
12.	Turning Movement Code	A set of letters that describe the type of movement made by a vehicle in the intersection while going from an inbound lane to an outbound lane(s). "U" (U-Turn), "L" (Left-Turn), "S" (Straight Through), and, "R" (Right Turn).

TABLE A-1. CONTINUED

	Term	Definition
13.	Data Field	A single item of data that either specifies a numerical value (e.g., "4", "6.1", "-40") or is text (e.g., "YES", "MAIN STREET AT LAKE DRIVE").
14.	Data Line	An ordered set of data fields, arranged in a specific way. Example of a data line with 5 fields: "4 29 3.1 -3YES".
15.	File	An ordered set of data lines.
16.	Default Value	A pre-selected value which will be supplied by the program to fill a DATA FIELD for which the user has not specified a value.

lanes on each succeeding leg. Legs are numbered beginning with No. 1 for the leg with the smallest leg angle, with successive leg numbers increasing in a clockwise direction.

The LEG CENTERLINE separates the inbound and outbound lanes directionally and provides a means for orienting the legs with respect to the intersection center. If a MEDIAN separates the inbound and outbound lanes, the leg centerline is coincident with the median centerline. The user specifies the width of the median. All leg centerlines intersect at least one other leg centerline in the INTERSECTION. A chosen point of crossing of two or more leg centerlines is called the INTERSECTION CENTER. Data entry will be facilitated if this point is chosen as the common point of intersection of the largest number of leg centerlines, but the program allows any point in the intersection where at least two leg centerlines cross to be called the intersection center. All leg centerlines are located with respect to the intersection center by the user's specification of a leg angle and a leg-centerline offset.

The LEG ANGLE is measured in a clockwise direction from a 0-degree reference line, which must pass through the intersection center, to each leg centerline. It may have any whole-degree value from 0 through 359 degrees. The LEG-CENTERLINE OFFSET is the perpendicular distance from a point on the leg centerline to the intersection center. This distance must be determined by the user from the plan-view drawings of the intersection. Positive values of offset indicate a leg-centerline location to the right of the intersection center, and negative values locate the leg centerline to the left when looking along the leg centerline toward the intersection.

A CURB RETURN is used to join the edges of the outermost lanes on adjacent legs of the intersection and to define the edge of the traveled way. The user specifies the radius of this circular arc which is tangent to two intersecting lane edges. A LANE TERMINAL, which defines the interfaces between each lane and the intersection, is nominally located by the program for all lanes on the same side of the leg centerline at the point of tangency of the curb return with the outside lane edge. The lane terminal may be shifted from this nominal location by the user's entering a value of OFFSET OF LANE TERMINAL for each lane. A positive value for this offset shifts the lane terminal toward the intersection center, and negative value moves it away from the intersection. On each inbound lane, the lane terminal locates the position where simulated vehicles will stop, if necessary, before entering the intersection. In special cases when two adjacent lanes are parallel, or nearly parallel i.e., within + 20.05 degrees, the LANE TERMINALS for all lanes on the same side of the leg centerline are not located by the program at the nominal location described above. Rather, the program automatically locates them at a perpendicular distance equal to the curb-return radius from the lane terminals to the intersection center. This technique of locating the lane terminals can be used for other cases by entering a negative value for the curb-return radius. The program will utilize the absolute value of the negative curb-return radius to position the lane terminals with respect to the intersection center.

The geometry processor in the TEXAS Model automatically generates a geometric path through the intersection from the center of each inbound lane terminal to the center of each outbound lane terminal which can be accessed legally by a vehicle passing through the Intersection. Each path is made up of segments of straight lines and circular arcs of maximum radius which will fit at the center of the lane terminals being connected. The user must specify a TURNING MOVEMENT CODE which describes the type of movement which will be made by a vehicle in the Intersection as it uses one of the available paths. Prohibited movements from any lane may be simulated by omitting letters from the turning movement code. Permitted movements include: U-turn, U; left-turn, L; straight, S; and right-turn, R. The computer works with exact angles and dimensions; therefore, zones must be specified by a range of angles within which the destination of each simulated turning movement can fall. Provisions are made through the leg geometry data prompts for entering angles that define the U-TURN ZONE and the STRAIGHT ZONE. These angles are measured from the centerline of the leg on which the movement originates to the limiting angle within which the centerline of the leg where the movement has its destination may fall. The remaining zone on the right-hand side of the centerline of the leg from which the movement originates accommodates right-turn movements, and the remaining zone on the left-hand side handles left-turn movements. Figure A-2 illustrates conceptually the four zones which may contain the centerlines of legs on which the respective turning movements have destinations. Default values for the zone angles are set in the program at 20 and 10 degrees, respectively, for straight movements and for U-turn movements.

A SPEED LIMIT is specified for inbound lanes and for outbound lanes on each leg. The range is from 10 to 80 mph, and default values in the program are 30 mph for both inbound and outbound lanes. Prompts permit the user to enter a separate, chosen value within this range for each set of inbound and each set of outbound lanes on each leg. Speed limit information is taken from the geometry processor in the actual simulation process and provided to each simulated driver on each intersection leg.

Partially-blocked lanes can be specified by the user. For example, channelization might block part of a lane to form a left-turn bay that would be much shorter than the other inbound lanes on a leg, or a bus stop might block the portion of either an inbound or an outbound lane nearest the lane terminal. Construction barricades or a loading zone might block part of the length of a lane somewhere between the lane terminal and the outer end of the lane while leaving lengths of the lane at both ends open for use. Prompts in the program allow the user to specify the USABLE LENGTH OF LANE at either or both ends of each inbound and outbound lanes on a leg. Simulated vehicles move into and out of the usable portions of partially-blocked lanes by executing lane-changing maneuvers to or from an adjacent lane along a half-wavelength cosine curve path. Figure A-3 illustrates the three partially-blocked lane configurations that can be simulated and shows the dimensions which must be specified by the user.

Diamond Interchanges

Specifications for diamond interchanges require several additional or different items compared to single intersections. Each of the two intersections composing the diamond is composed of three external legs as well as several internal lanes which connect them as shown in Figure A-1. The terminology which

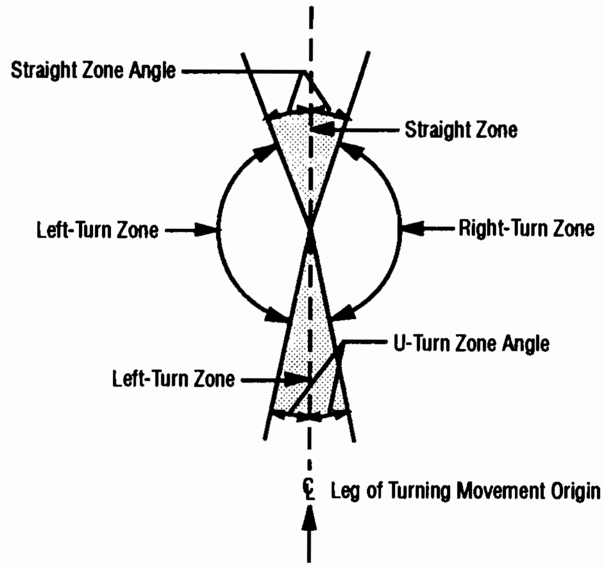


Figure A-2. Turning movement zones.

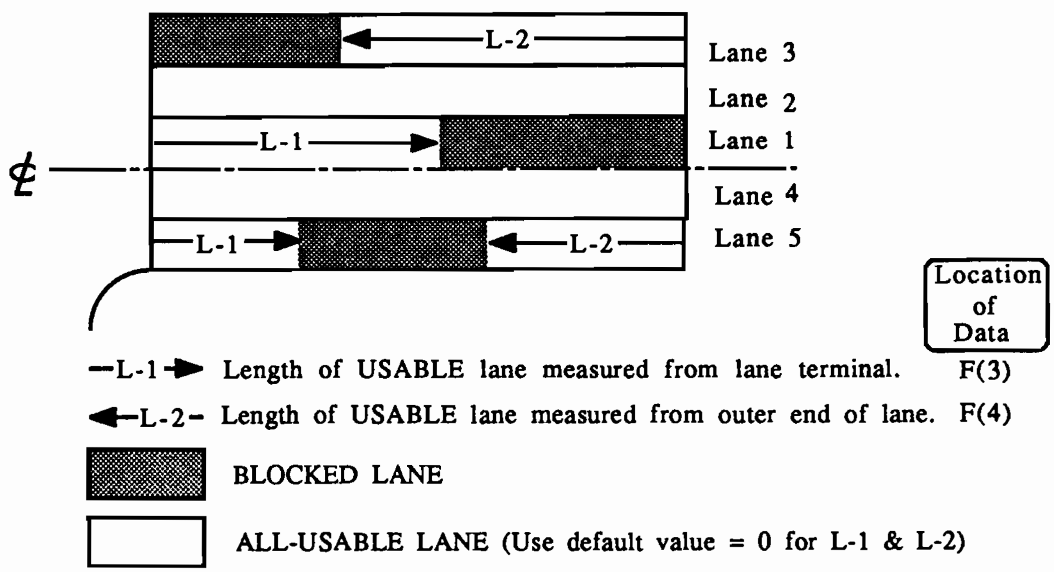


Figure A-3. Partially-blocked lane configurations.

refers to the connection between the intersections as internal lanes is basic to the diamond interchange description and data entry process. As with the single intersections, users specify the orientation of external legs with an angle measured clockwise from a north pointing reference to the centerline of the leg. Internal lanes, however, have a fixed orientation of 90 - 270 degrees or east-west. Therefore, for any interchange, but particularly for a skewed diamond (where leg angles are not all increments of 90 degrees), the recommended means of determining the leg angles for external legs is the following. Orient the interchange sketch from which leg angles are to be computed with the centerline of the internal lanes on a 90 - 270 degree (east - west) line. Measure or compute the leg angles for external legs with the sketch oriented in this manner and enter these in response to the screen prompts. As shown in Figure A-1(d), eight possible curb return radii connect external legs to internal lanes, however, only six are required as user specifications. The two interior curb returns on the left and right sides, respectively, of the interchange are equivalent. Depending upon orientation of the interchange only one of the two interior radius values on each side is critical to right turn operations while the other has minimal impact. Therefore, the user is prompted for only one of the two internal radius values on each side.

Driver-Vehicle Data

The driver-vehicle processor in the TEXAS Model arranges all data that are needed by the model to characterize driver and vehicle behavior into a format that is suitable for use in the actual simulation process. The data which can be defined by the user for each run through the current version of the data-entry program is listed in Table A-2 and discussed below.

MINIMUM HEADWAY is used in the simulation process to define the minimum time in seconds which will be allowed between the fronts of successive vehicles passing a point. A range from 1.0 to 3.0 seconds is permitted, and the default value is set in the program at 1.0 seconds.

The TEXAS Model allows up to 15 vehicle classes to be characterized by the user, but in the current version of GDVDATA, the NUMBER OF VEHICLE CLASSES is set to the default value of exactly 12 classes. In using this data-entry program, a value for all of these vehicle classes must be used in the traffic mix, but the proportions of each class may be changed by specifying percentage values for the MIX OF VEHICLE CLASSES IN INBOUND TRAFFIC in response to prompts in the program. The sum of the percentages for the 12 classes must equal 100 percent. The user may elect to use the default percentages which provide a preset mix of the 12 vehicle classes in the inbound traffic stream on each leg. These default values are shown in Table A-2.

The NUMBER OF DRIVER CLASSES may range from 1 to 5 in the TEXAS Model, but the present GDVDATA program always uses three of these classes. The percentage of each driver class is automatically set to the default value that is embedded in the driver-vehicle processor. It is anticipated that GDVDATA will be modified at a later time to allow the user to enter the number of driver classes and specify

TABLE A-2. USER-SPECIFIED DRIVER VEHICLE DATA

Data Item	Function	Range	Default Value
Minimum Headway	Minimum time in seconds between the fronts of successive vehicles passing a point	1.0-3.0 sec	1.0 sec
Number of Vehicle Classes	Defines the number of classes of vehicles which will be in the simulated traffic mix. (The data-entry program presently provides only for a standard traffic mix with 10 classes.)	1-15	10
Number of Driver Classes	Defines the number of different driver types which will be included in the simulation. (The data-entry program presently provides only for a standard driver mix with 3 classes.)	1-5	3
Percent of Left-Turning Vehicles Entering in Median Lane	Allows user to place left-turning vehicles in an appropriate lateral position upon entering the simulated system.	50-100	80
Percent of Right-Turning Vehicles Entering in Curb Lane	Allows user to place right-turning vehicles in an appropriate lateral position upon entering the simulated system.	50-100	80
Percent of Inbound Traffic to this Lane	Gives lanewise distribution of inbound vehicles entering the system. Sum of lane percentages on a leg must equal 100.	0-100	(Varies)
Distribution Name for Inbound Traffic Headway Frequency Distribution	Allows user to select a descriptive frequency distribution for headways of vehicles entering the system.	See Table 2.2	SNEGEXP
Total Hourly Volume Inbound on Leg	Gives total inbound traffic volume on the leg in vehicles per hour.	0-4000 vph	200 vph/ Inbound Lane
Parameter for Headway Frequency Distribution	Defines the character of the selected headway frequency distribution.	See Table 2.2	2 sec
Mean Speed of Vehicles Entering the System	Defines a mean speed for vehicles entering the inbound lanes in mph.	1-80 mph	29 mph

TABLE A-2. CONTINUED

Data Item	Function	Range	Default Value
85-Percentile Speed of Vehicles Entering the System	Defines the 85th-percentile speed of vehicles entering the inbound lanes in mph.	1-80 mph	31 mph
Mix of Vehicle Classes in Inbound Traffic	Allows the user to set the percentage of vehicles of each class which make-up the inbound traffic. (The data-entry program presently provides for 10 classes.) Sum of perecentages must equal 100.	0-100	"NO" (Preset Mix)
Percent of Inbound Traffic to Leg Destinations	User must specify the percentage of vehicles which enter the intersection from a given leg that have a destination on the outbound lanes of every leg, including the leg of entry (i.e., U-turns). Sum of percentages must equal 100.	0-100	(Varies)

TABLE A-2. CONTINUED

Program-Supplied (Default) Values for Driver and Vehicle Class Data

	Vehicle Type											
					Trucks							
					Single-Unit				Tractor Semi-Trailer			
	Passenger Cars				Gasoline		Diesel		Gasoline		Diesel	
Vehicle Characteristic	**Sports**	**Compact**	**Medium**	**Large**	**PL***	**FL#**	**PL**	**FL**	**PL**	**FL**	**PL**	**FL**
Class	1	2	3	4	5	6	7	8	9	10	11	12
Operating Characteristics Factor	115	90	100	110	85	80	80	75	70	65	75	70
Maximum Deceleration, ft/sec/sec	14	13	13	8	7	5	7	5	6	4	6	4
Maximum Acceleration, ft/sec/sec	14	8	9	11	7	6	6	5	4	3	5	4
Maximum Velocity, ft/sec	205	120	135	150	100	85	100	85	95	75	100	80
Minimum Turning Radius, ft	20	20	22	24	42	42	42	42	45	45	45	45
Length	14	15	16	18	32	32	32	32	60	60	60	60
Percentage in Traffic Stream, %	1.5	22.5	23.3	44.7	2.6	2.6	0.2	0.2	0.2	0.2	1.0	1.0

				Percentage of Driver Class in Each Vehicle Type											
								Trucks							
								Single-Unit				Tractor Semi-Trailer			
				Passenger Cars				Gasoline		Diesel		Gasoline		Diesel	
Driver				**Sports**	**Compact**	**Medium**	**Large**	**PL***	**FL#**	**PL**	**FL**	**PL**	**FL**	**PL**	**FL**
Type	**Class**	**P-R Time**	**Factor**												
Aggressive	1	0.5	110	50	30	35	25	40	40	40	40	40	40	40	40
Average	2	1.0	100	40	40	35	45	40	40	40	40	40	40	40	40
Slow	3	1.5	85	10	30	30	30	20	20	20	20	20	20	20	20

* Partially-loaded truck
# Fully-loaded truck

the mix of driver classes in response to a series of prompts. The embedded default values (shown in Table A-2) are thought to be representative of usual driver characteristics.

In order to simulate actual traffic behavior on inbound lanes of reasonable length, the PERCENT OF LEFT-TURNING VEHICLES ENTERING IN THE MEDIAN LANE and the PERCENT OF RIGHT-TURNING VEHICLES ENTERING IN THE CURB LANE must be specified by the user. These percentages may range from 50 to 100 percent, and a default value has been set in the program at 80 percent for each of the respective lanes. Normally, a simulated vehicle will be able to make only one lane-change maneuver on the inbound leg. The user should therefore exercise good judgment in specifying reasonable percentages of turning movements in relation to the percentage of the total inbound traffic which will be entering the system in that lane.

The user must specify the lanewise distribution of traffic that enters the system on the available inbound lanes at the outer end of each leg. Prompts in the GDVDATA request PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE. The percent of traffic in each lane may range from 0 through 100 percent, but the sum must be 100 percent. Various default values are set in the permanent library files of GDVDATA for these percentages.

A frequency distribution for the time headways between successive vehicles entering the simulated intersection system on the inbound lanes must be specified by the user. Table A-3 gives the NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION which may be chosen by the user and also shows the PARAMETER FOR HEADWAY FREQUENCY DISTRIBUTION that must be specified by the user in response to a prompt in the GDVDATA. This parameter defines the shape of the frequency distribution. Default values in GDVDATA are a shifted negative exponential type frequency distribution (SNEGEXP) with a parameter of two seconds.

The TOTAL HOURLY VOLUME INBOUND ON LEG may range from 0 through 4,000 vehicles per hour (vph) and must be specified by the user. Default values in the permanent library files correspond to a volume of 200 vph in each inbound lane.

In order for each simulated vehicle to enter the system at an appropriate speed for the intersection situation, a MEAN SPEED OF VEHICLES ENTERING THE SYSTEM ON THIS LEG must be specified by the user. This mean speed may range from 1 to 80 mph. A default value of 28 mph is used in GDVDATA. An 85-PERCENTILE SPEED OF VEHICLES ENTERING THE SYSTEM ON THIS LEG must also be given to define the scatter of entry speeds about the mean. This speed should be higher than the mean speed and may range from 1 to 80 mph. The default value in GDVDATA is 31 mph.

Every vehicle that enters the simulated intersection system on the inbound lanes of a leg has a destination to the outbound lanes of some leg. The user must specify PERCENT OF INBOUND TRAFFIC TO LEG DESTINATIONS by defining the percentage of all entering traffic on the leg which has a destination on every leg in the system, including the leg from which the traffic entered. The percentage to a leg destination may range from 0 through 100 percent, but the sum of all specified percentages must

TABLE A-3. FREQUENCY DISTRIBUTIONS FOR HEADWAYS

Name of Distribution	Distribution Parameter
U N I F O R M	Standard Deviation
L O G N R M L	Standard Deviation
N E G E X P	-
S N E G E X P	Minimum Headway
G A M M A	$\text{Mean}^2/\text{Variance}$
E R L A N G	Integer Value of Parameter for Gamma (can be rounded up or down)
C O N S T A N	-

equal 100 percent. Various default values have been set for each intersection type in the permanent library files.

Libraries

The geometric arrangements of many intersections of practical interest fall into a few basic patterns according to the number of legs and lanes, the leg angles, and size. Similarly, traffic patterns can be characterized by representative parameters such as volume, speed, and direction of travel.

For the convenience of the users of the TEXAS Model, a series of 20 typical geometric arrangements and traffic patterns have been configured and stored for use in GDVDATA. These files, which cannot be changed by the user, are called the PERMANENT LIBRARY. Each file in the permanent library contains all the geometric and traffic data that are needed for simulating the conditions described by the data in the file. Appendix A illustrates the contents of each file in the permanent library. A plot of the important geometric features of each intersection that can be generated from the data is shown along with a simplified, preconstructed diagram which can be displayed on the screen of an alphanumeric terminal. A listing of the alphanumeric data needed by the geometry processor and the driver-vehicle processor is also included in this appendix for each permanent library file. The user can study the appendix to determine whether or not one of the files in the permanent library contains data which define an intersection situation of interest. If one of the files describes the situation exactly and the user wants to utilize the data contained in the permanent library file without modification, prompts in GDVDATA will guide the user through this process.

If one of the files in the permanent library can be used after modification, prompts in GDVDATA will guide the user in making the desired changes. Once the decision has been made to change the data copied from a permanent library file, the user must also decide whether to use the modified data file only once and then automatically eradicate it or to save it for reuse at some later time.

A unique name must be assigned to any data file that is to be saved. Checks are built into GDVDATA to warn the user about possible file name duplication. Many computer systems automatically store named data files permanently, but some systems eradicate these files when the user logs off the system or the job ends. In order to assure that a named data file is saved, the user of GDVDATA must make certain that the named data files will be written to permanent storage on the computer system being used.

The USER-GROUP LIBRARY is a special feature of GDVDATA which provides convenient access to previously-used files that have been saved. This feature is particularly efficient when the same intersection geometry and traffic are to be used repeatedly in several simulation runs as it will not be necessary to rerun the geometry and driver vehicle processors each time. The user-group library consists of the names of up to 17 data files that have been (1) saved on a permanent file, and (2) entered into the user-group library. This library serves as a cross-reference, or an index, to data files which have been previously prepared and saved by users on the same computer system.

When a user of GDVDATA names a data file and requests that it be saved, the program will begin constructing a data file and attempt to add the name of the file to the user-group library. If there is space in the library, the name will be added immediately, and a confirmation message will be displayed on the screen. If the library is already full, prompts will state this fact, display the names of the 16 files currently contained in the library, and ask the user whether to (1) delete a name and replace it with the new file name, or (2) leave the library intact and save the named data file without adding it to the library. If the user choses to delete a file name from the user-group library, the name to be deleted must be indicated.

When the data in a file that is named in the user-group library is first processed by the geometry processor and/or the driver-vehicle processor, the output from these processors is written to permanent files and indexed to the related file name in the library. At any later time, a user can utilize the previously-constructed geometry and driver-vehicle processor output files simply by defining a file in the user-group library. Prompts in GDVDATA advise the user as to which processor output files are already available. The important function of the user-group library is to provide users with convenient access to previously-constructed geometry and driver-vehicle processor output files through a name that is listed in the library.

USING THE DATA-ENTRY PROGRAM GDVDATA

The purpose of the data-entry program, GDVDATA, is to make communication between the user and the TEXAS Model as easy as possible. In this section, the technique for using the program in an interactive mode through an alphanumeric terminal is described and illustrated with examples. The current version of the program takes information that is entered by the user via a terminal and converts it into a format which is suitable for input to the geometry processor (GEOPRO) and the driver-vehicle processor (DVPRO) of the TEXAS Model.

In utilizing GDVDATA, the user either manipulates data files which have been prepared previously and stored in the computer or creates new files. For convenience, sets of data files and lists of data file names, called libraries, have been incorporated into GDVDATA. These libraries are described in the previous section. Data files in the PERMANENT LIBRARY may be copied, but not changed, by the user. The names of the data files that are listed in the USER-GROUP LIBRARY provide a cross-reference, or an index, to data files which have been previously prepared and saved by users on the same computer system. This list of names, and the associated data files, can be changed by any GDVDATA user who is operating on the same computer system.

Notation Used In This Guide

The following symbols and characters are utilized in this guide.

☐ This symbol indicates that the user should press the specified key on the alphanumeric terminal keyboard. Use only uppercase characters.

C/R The RETURN or CARRIAGE-RETURN key. This may be the ENTER key on some keyboards.

space The SPACE BAR or SPACE KEY. This key is used to enter a blank character.

[ ] This box is used in the examples contained in the guide to show data items that were entered by the user. They were entered by pressing, in sequence, the keys that correspond to each item in the box, and then pressing C/R .

Prompts

Communication between the program and the user is through prompts displayed by the program and through keyboard entries (also called keyins) made by the user. Program prompts may be in the form of questions or requests that require a user response, or they may be informative prompts that display information which is needed by the user. Other prompts report action that has been taken by the program.

The prompts which require user response can be considered in three distinct categories. First, there are prompts that advise the user about how a desired data file can be obtained. The second type of prompt requests that the user enter specific data for inclusion in the data file. The third type of prompt will include a display of data that are in the file and request that the displayed data be reviewed and, if desired, revised by the user.

Prompts are intended to provide sufficient guidance to enable the user to respond in a manner that will result in successful communication with the program. If the prompts, which are displayed in abbreviated form, are not understood, the user can press

H E L P C/R

to request the program to display any additional information related to the prompt that is available. The "HELP" keyin is sometimes useful to redisplay information that has been displaced from the display screen.

Notation Used in Prompts

The following symbols and characters appear in the prompts on the screen and in hard copy.

(1) SQUARE BRACKETS, [ ], indicate default values.

(2) ANGLE BRACKETS, < >, indicate constraints on data.

(3) BRACES, { }, indicate optional elements.

(4) DOUBLE QUOTES, " ", appear in prompts to identify the exact information that currently exists in a file, e.g., ID = "4X4" means that the identification name for the subject file is 4X4.

(5) PERIODS, ..., when included in a data specification prompt, a string of periods indicates that the preceding element may be repeated one or more times. The number of periods in the string has no meaning.

(6) A QUESTION MARK, ?, indicates that the user can always respond to the prompt by pressing [Y] [C/R] for yes, or [N] [C/R] for no.

Retrieving, Revising, Saving, and Building Files

A file which is needed for input to the geometry processor (GEOPRO) and/or the driver-vehicle processor (DVPRO) may be obtained in one of several ways. Three different situations, or cases, can exist under which a user might want to utilize GDVDATA to prepare such input. These cases are described below along with possible alternative actions that the user might desire. Each of these actions can apply to simulation of a diamond interchange as well as a single intersection.

Case 1. Use a File From the Permanent Library (see Appendix A)

One may select either a diamond or single intersection from the permanent library by selecting the appropriate file name as indicated in Appendix A.

(1) Action 1a. Choose a file from the permanent library and use the file as is.

(2) Action 1b. Copy a file from the permanent library, revise it, name the revised file, add the name to the USER-GROUP LIBRARY and save the new file for future use.

(3) Action 1c. Copy a file from the permanent library, revise it, use it once, and eradicate it.

Case 2. Use a File Which Has Been Previously Prepared, Named, and Saved

(1) Action 2a. Use a previously-prepared file as is. If this data file is named in the user-group library and has already been processed by GEOPRO and/or DVPRO, output from these processors will also be on file. Availability of these output files will be made known to the user by prompts.

(2) Action 2b. Revise the previously-prepared data file and use the revised file. The name of the file will remain the same, but the data in the file will be permanently changed by the revision and cross-references in the user-group library will be corrected.

(3) Action 2c. Copy a previously-prepared data file, revise the copied data, name the revised file, add the name of the revised file to the user-group library, and save the new file for future use. The original data file will remain intact.

(4) Action 2d. Copy a previously-prepared data file, revise the copied data file, use the revised data file once, and eradicate it.

Case 3. Build a New File By Keying In Data Through the Terminal

One may elect to key in data for a diamond or single intersection by responding appropriately to a prompt which asks if modeling of a diamond is desired.

(1) Action 3a. Name the newly-built file, add its name to those already listed in the user-group library, and save the file for future use.

(2) Action 3b. Use the newly-built file only once and eradicate it.

The process of using GDVDATA interactively to deal with these various situations is illustrated in the following series of examples.

Examples

The first-time user of GDVDATA is encouraged to first read the preceding sections of the GUIDE and then actually go through the steps outlined below to exercise the program for a CASE 1 situation, as previously defined. This will familiarize the user with the terminology and notation which appear in the GUIDE and in the prompts on the screen. Other examples follow the same basic format.

Case 1. Action 1a. Using a data file from the PERMANENT LIBRARY without change. The information which will appear on the screen while executing this example is shown in Figure A-4.

To select a file from the permanent library and use it unchanged, first log onto the computer and start the program. The log-on procedure depends on the type of computer being used. If you are not familiar with this procedure, ask the System Manager of the site for assistance or see the manual for your computer. The program name is "GDVDATA". To start the program, press

[G] [D] [V] [D] [A] [T] [A] [C/R]

NOTE: Some computers may require that a prefix such as

[R] [U] [N] [space]

precede the program name. The program will display:

GEOMETRY AND DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED.

DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY?

Press [Y] [E] [S] [C/R] . The program will display:

KEYIN A PERMANENT LIBRARY FILE ID:

```
(1)    (2)
$ GDVDATA
GEOMETRY & DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED.
DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY ? -(3)
YES -(4)
KEYIN A PERMANENT LIBRARY FILE ID: -(5)
4X4 -(6)
LEG 4  LENGTH 800                  | LEG 1 (0,0) |             LEG 1  LENGTH 800
 LANE   1    2                     |   |   *   |  |              LANE   1    2
 MVMT  LS   SR                     |   |   *   |  |              MVMT  LS   SR
                                   | 12| 12*12 |12|
                    (7)            |   |   *   |  |
                                   | 2 | 1 * 3 | 4|
-------------------------------20``````` |       20--------------------------------
                          12  4          |        :2  12
---------------------------------   4X4  |        :--------------------------------
                          12  3          |        :1  12
LEG 4 *************************---------0---------************************* LEG 2
(270,0)                   12  1:         |         3  12                  (90,0)
-------------------------------:         |         --------------------------------
                          12  2:         |         4  12
-------------------------------20        |.......20--------------------------------
                                   | 4 | 3 * 1 | 2|
                                   |   |   *   |  |
                                   | 12| 12*12 |12|
LEG 3  LENGTH 800                  |   |   *   |  |             LEG 2  LENGTH 800
 LANE   1    2                     |   |   *   |  |              LANE   1    2
 MVMT  LS   SR                     |   |   *   |  |              MVMT  LS   SR
                                   | LEG 3 (180,0)|
DO YOU WANT TO USE THIS PERMANENT LIBRARY FILE (ID="4X4") ?
YES -(8)
DO YOU WANT TO COPY AND REVISE THIS FILE FROM THE PERMANENT LIBRARY ?
NO
INPUT DATA FOR GEOMETRY & DRIVER-VEHICLE PROCESSORS ARE NOW ON:
    "QSA2:[055100.TEXAS]GDV4X4.DAT;1" -(9)
GEOMETRY AND DRIVER-VEHICLE DATA FOR TEXAS MODEL HAS BEEN DEFINED.
```

NOTES:

1. Prompt from computer. May be different for your computer.
2. User entry to start the geometry and driver-vehicle data-entry program. Every user entry (keyin) is ended by pressing [C/R] .
3. Program prompt. Any prompt that ends with a question mark can be answered by pressing [Y] [E] [S] [C/R] or [N] [O] [C/R] . Entry of [Y] [E] [S] [C/R] can be shortened to [Y] [C/R] and entry of [N] [O] [C/R] can be shortened to [N] [C/R] . (continued)

Figure A-4. Example of CASE 1, Action 1a - Choosing a file from the permanent library and using it without revisions.

NOTES (continued):

(4) For display of a list of permanent library file ID's, press [H] [E] [L] [P] [C/R] .

(5) Prompt for library file ID.

(6) User response.

(7) Sketch of selected permanent library file intersection geometry. See Appendix A.

(8) Press [N] [O] [C/R] to receive prompt (5) again and enter a different ID.

(9) This is the name of the file that holds data for the library file with an ID of "4X4".

Figure A-4. Continued.

The 20 permanent library files are described in Appendix A. The identification name, ID, of the data file for a symmetric, 4-leg intersection with 2 inbound and 2 outbound lanes on each leg is "4X4". To use this file, press

[4] [X] [4] [C/R].

The program will display a sketch showing the geometry of the selected intersection followed by:

DO YOU WANT TO USE THIS PERMANENT LIBRARY FILE (ID="4X4")?

Press [Y] [E] [S] [C/R]. The program will display:

DO YOU WANT TO COPY AND REVISE THIS FILE FROM THE PERMANENT LIBRARY?

Press [N] [O] [C/R]. The program will display:

INPUT DATA FOR GEOMETRY AND DRIVER-VEHICLE PROCESSORS ARE NOW ON "GDV4X4"

This indicates to the user that the required geometry and driver-vehicle input data have been stored on the indicated file. **NOTE:** The file-naming convention depends on the computer being used; therefore, the file name might be somewhat different than shown. No matter what computer is used, the name of each file in the permanent library will contain "GDV", followed by the 3-character identification, ID, that is in the permanent library file.

If GEOPRO and/or DVPRO have already been run using file "GDV4X4", their output may already be saved. If so, this will be reported here by an appropriate message. The program will display:

TEXAS MODEL GEOMETRY AND DRIVER-VEHICLE DATA HAVE BEEN DEFINED.

This message indicates that the data-entry program GDVDATA has ended.

Five more examples are presented in Appendix B. These examples show the flow of the data-entry process and illustrate various features of GDVDATA.

Keying In Data Fields Requested by Prompts

The data-entry program GDVDATA provides the user with prompts for entering data into a series of data fields which are later encoded automatically by the program into a group of data lines that are needed by the geometry and driver-vehicle processors of the TEXAS Model. The prompt-requested data are entered sequentially in a free-field format through the keyboard. During keyboard data entry, all data fields must be separated by commas.

If data for a prompt-requested field are not specified by the user, values will be set automatically by the program to the appropriate default value. Also, keying in an empty field (i.e., pressing [,] [,]) causes the field to be set to the default value. Keying in a blank field (i.e., pressing , [space] ,) will cause the field to be left blank. For example, pressing

[,] [8] [0] [,] [space] [,] [,] [3] [,] [2] [C/R]

will set Field 1 to the default value (the first comma denotes the <u>end</u> of the first field), set Field 2 to 80, leave Field 3 blank, set Field 4 to the default value, set Field 5 to 3, and set Field 6 to 2. All other fields (if any) requested by the prompt will be set to the respective default values.

One of three formats is used for entering prompt-requested data into each field. Specifications for these field formats are described below.

(1) AX - The letter A designates the type of field as alphanumeric. Data entered into this type of field can include any conventional alphanumeric character (i.e., A-Z and 0-9) and any other character that is defined in the character set of the host computer. The number which appears at location X gives the maximum number of characters which can be accommodated in the alphanumeric data field. After data entry and pressing [C/R] , the data will be left-justified and any blank spaces will be filled automatically.

(2) IX - The letter I designates the type of field as integer. Only integer values (i.e., 0-9) can be used. A minus sign may precede the integers to indicate negative numbers. It is not necessary to enter + signs. The number which appears at location X in this format gives the maximum number of characters, including signs which may be used in the data field. The entered data will be right-justified after pressing [C/R] . If more than X characters are entered, only the rightmost of those entered will be used.

(3) FX.Y - The letter F designates the type of field as floating point, thereby indicating that entered data can include integers (i.e., 0-9) and an optional decimal point. A minus sign may proceed the number to designate negative values, but the + sign need not be entered. The number which appears at location X in the prompt shows the maximum number of characters, including the decimal point and the minus sign, which can be used in the field, and the number which appears at location Y gives the number of characters which will be used to the right of the decimal point after rounding. The rounded data will be entered and right-justified automatically after pressing [C/R] .

Figure A-5 shows an example of the information which will be displayed as the program prompts the user to enter INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA. This prompt is displayed as part of the sequence of building a file by keying in data. Items ① through ⑥ will be displayed, then the program will wait for the user response, ⑦. By pressing the sequence of keys shown at ⑦. followed by pressing [C/R] the user will specify an ERLANG headway frequency distribution, an hourly volume of inbound vehicles of 400 vph, an ERLANG distribution parameter of 3, a mean speed of 29.0 mph, an 85-percentile speed of 34.3 mph and a standard mix of vehicle classes in the inbound traffic.

```
(1) INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA:
    F(1) - NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION:
           "CONSTAN", "ERLANG", "GAMMA", "LOGNRML", "NEGEXP","SNEGEXP" OR "UNIFORM"
           MAY BE ABBREVIATED TO THE FIRST CHARACTER. (3)                    (4)
    F(2) - TOTAL HOURLY VOLUME ON LEG, VPH. <0 TO 4000> [200 PER INBOUND LANE]
    F(3) - PARAMETER FOR HEADWAY FREQUENCY DISTRIBUTION:
             CONSTANT - NONE.
(2)          ERLANG - INTEGER VALUE (ROUNDED) FOR MEAN**2/VARIANCE.<GREATER THAN 1>
             GAMMA - MEAN**2/VARIANCE. <GREATER THAN 1>
             LOGNORMAL - STANDARD DEVIATION.
             NEGATIVE EXPONENTIAL - NONE.
             SHIFTED NEGATIVE EXPONENTIAL - MINIMUM HEADWAY IN SECONDS. <LESS THAN
                                            OR EQUAL MEAN HEADWAY>
             UNIFORM - STANDARD DEVIATION
    F(4),F(5)- MEAN,85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH.<10 TO 80>[29,31]
    F(6) - TRAFFIC MIX DATA TO FOLLOW ? <"YES" OR "NO">  ["NO"]
    F(7) - SEED FOR RANDOM NUMBERS (0 FOR AUTO. SELECTION).  <0 TO 99999> [0]
    EDIT EXAMPLE: "F(4)=28,32" CHANGES FIELD 4 TO "28.0" AND FIELD 5 TO "32.0"
    KEYIN "HELP" FOR ADDITIONAL ASSISTANCE

(5) KEYIN INBOUND HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1           (6)
    1 TO 7 FIELDS, SEPARATED BY COMMAS.  DATA FORMAT: (A7,I5,F6.2,F5.1,F5.1,A3,I5)
    ERLANG,400,3,29,34.28 (7)

    INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA:

(8)  DATA FIELDS:  ERLANG    400   3.00  29.0   34.3 NO      0
    FIELD NUMBERS:  \..1../ \.2./ \..3./ \.4./ \ .5./ \6/ \.7./ (9)
```

NOTES:

(1) Data to be entered.

(2) Date field numbers and descriptions for each field.

(3) Expected range for data is shown in <angle brackets>.

(4) Default values are shown in [square brackets].

(5) Prompt requesting user to keyin data.

(6) Specifications for data field formats.

(continued)

Figure A-5. Example of prompts and keying in requested data.

NOTES:

(7) User keyin. To make the keyin, press the keys that correspond to each character in the [BOX] , from left to right. End the keyin by pressing [C/R] .

(8) Data fields as automatically encoded according to format specifications (6). From the user keyin (7) , "ERLANG" was left justified into field 1 per spec. A7, "400" was right justified into field 2 per spec. I5, "3" was placed into field 3 with 2 digits to the right of the decimal point per spec. F6.2, "29" was placed in field 4 with 1 digit to the right of the decimal point per spec. F51, "34.28" was rounded to have 1 digit to the right of the decimal point and placed in fild 5 per spec. F5.1 and the default of "NO" was left justified into field 6 per spec. A3 and the default of "0" for field 7 per spec. I5.

(9) Data field numbers with field delimiters. For example: "\..1../" shows that the size of field 1 is 7 characters, per spec. A7.

Figure A-5. Continued.

Figure A-6 shows a description of the data fields that are contained in each of the data lines required to complete a data file. This information is included in the prompts as needed. Keying in

[H] [E] [L] [P] [C/R]

will permit the user to redisplay the information at any time.

Keying In Data Specifications

In lieu of using data in a library file for intersection geometry, the user may enter the required data via the keyboard. To relieve the user of part of the tedious and repetitions task of keying in every data item that is required for defining the geometry of each leg and lane, the data-entry program allows the user to describe a desired leg or lane arrangement simply by specifying the values for only those data items which are different from the built-in configuration. A prompt in the program will request LEG SPECS and display the format for the number of inbound lanes, the number of outbound lanes, the existence of an exclusive left-turn lane, the length of the exclusive left-turn lane, the leg angle, and the leg centerline offset. Keying in

[H] [E] [L] [P] [C/R]

will bring up a description of the items on the display. Only the number of inbound lanes and the number of outbound lanes must be included in the specification. Each of the other four items is optional, as the program will set them to a default value if not included. By placing data from the specification in the appropriate data fields and using default values for all other fields, data lines that describe the geometry of a leg and the associated lanes are completed by GDVDATA. These data lines will then be displayed for the user to review and, if desired, revise.

When prompted to enter leg or lane specifications, the user may choose to enter individual data fields instead of the specifications. This can be indicated to the program by pressing

[D] [A] [T] [A] [=] [,]

followed by data fields as described previously, e.g. pressing

[D] [A] [T] [A] [=] [,] [2] [7] [0] [,] [,] [ ] [3] [,] [2] [C/R]

will describe a leg with a leg angle of 270, 3 inbound lanes, 2 outbound lanes, and default values for all other fields in the leg-geometry data line. The data line will then be displayed for the user to review and possibly revise.

TITLE TEXT (UP TO 79 ALPHANUMERIC CHARACTERS)

PARAMETER-OPTION DATA:
F(1) - TOTAL NUMBER OF LEGS. <3 TO 6> [4]
F(2) - TOTAL (STARTUP + SIMULATION) TIME IN MINUTES. <12 TO 70> [20]
F(3) - MINIMUM HEADWAY IN SECONDS. <1.0 TO 3.0> [1.0]
F(4) - NUMBER OF VEHICLE CLASSES. <12> [12]
F(5) - NUMBER OF DRIVER CLASSES. <3> [3]
F(6) - PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE.<50 TO 100>[80]
F(7) - PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. <50 TO 100>[80]

CURB RETURN RADII:
EACH FIELD - CURB RETURN RADIUS BETWEEN OUTERMOST INBOUND LANE AND THE ADJACENT
(COUNTERCLOCKWISE) LEG. <INTEGER, 0 TO 200> [20]

LEG GEOMETRY DATA:
F(1) - LEG NUMBER. WILL BE RESET TO THE NUMBER OF THE LEG BEING PROCESSED.
F(2) - LEG ANGLE. POSITIVE IS CLOCKWISE FROM NORTH = 0 (ZERO) DEGREES.
<0 TO 359, IN INCREASING ORDER> [EQUAL ANGLES]
F(3) - LENGTH OF INBOUND LANES. <600 TO 1000> [800]
F(4) - LENGTH OF OUTBOUND LANES. [250] (SUGGEST 250 FOR LOW TRAFFIC VOLUME,
400 FOR HIGH VOLUME. FOR EMISSIONS, MUST BE SAME AS INBOUND LANE LENGTH)
F(5) - NUMBER OF INBOUND LANES. <0 TO 6> [2]
F(6) - NUMBER OF OUTBOUND LANES. <0 TO 6> [2]
F(7) - SPEED LIMIT ON INBOUND LANES IN MPH. <10 TO 80> [30]
F(8) - SPEED LIMIT ON OUTBOUND LANES IN MPH. <10 TO 80> [30]
F(9) - LEG CENTERLINE OFFSET FROM INTERSECTION CENTER. POSITIVE IS TO THE RIGHT
WHEN FACING IN DIRECTION OF INBOUND TRAFFIC. <-200 TO 200> [0]
F(10) - MEDIAN WIDTH, WILL BE CENTERED ON INT. CL. <0 TO 100> [0]
F(11) - LIMITING ANGLE FOR STRAIGHT MOVEMENT. <0 TO 45 DEGREES> [20]
F(12) - LIMITING ANGLE FOR U-TURN. <0 TO 45 DEGREES> [10]

LANE DATA:
F(1) - WIDTH OF LANE. <8 TO 15> [12]
F(2) - MOVEMENT CODE. ANY OF"U"(U-TURN),"L"(LEFT),"S"(STRAIGHT) AND "R"(RIGHT).
F(3) - LENGTH OF USABLE LANE FROM LANE TERMINAL. [0, FOR OPEN LANE]
F(4) - LENGTH OF USABLE LANE FROM OUTER END. [0, FOR OPEN LANE]
F(5) - OFFSET OF LANE TERMINAL. POS. IS TOWARD INTERSECTION. <-200 TO 100> [0]
F(6) - PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE.
<0 TO 100, SUM FOR LEG = 100, 0 FOR LANE NOT USABLE AT OUTER END>

(continued)

Figure A-6. Description of data fields as displayed in prompts by GDVDATA.

```
INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA:
F(1) - NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION:
       "CONSTAN", "ERLANG", "GAMMA", "LOGNRML", "NEGEXP","SNEGEXP" OR "UNIFORM"
       MAY BE ABBREVIATED TO THE FIRST CHARACTER.
F(2) - TOTAL HOURLY VOLUME ON LEG, VPH. <0 TO 4000> [200 PER INBOUND LANE]
F(3) - PARAMETER FOR HEADWAY FREQUENCY DISTRIBUTION:
         CONSTANT - NONE.
         ERLANG - INTEGER VALUE (ROUNDED) FOR MEAN**2/VARIANCE.<GREATER THAN 1>
         GAMMA - MEAN**2/VARIANCE. <GREATER THAN 1>
         LOGNORMAL - STANDARD DEVIATION.
         NEGATIVE EXPONENTIAL - NONE.
         SHIFTED NEGATIVE EXPONENTIAL - MINIMUM HEADWAY IN SECONDS. <LESS THAN
                                        OR EQUAL MEAN HEADWAY>
         UNIFORM - STANDARD DEVIATION
F(4),F(5)- MEAN,85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH.<10 TO 80>[29,31]
F(6) - TRAFFIC MIX DATA TO FOLLOW ? <"YES" OR "NO">  ["NO"]
F(7) - SEED FOR RANDOM NUMBERS (0 FOR AUTO. SELECTION).  <0 TO 99999> [0]


MIX (PERCENTAGES) OF VEHICLE CLASSES IN INBOUND TRAFFIC:
EACH FIELD - PERCENT OF INBOUND VEHICLES IN THE SPECIFIED (BY FIELD NUMBER)
             VEHICLE CLASS.  <0 TO 100 AND SUM = 100>


OUTBOUND TRAFFIC DESTINATION DATA:
EACH FIELD - PERCENT OF VEHICLES FROM THE LEG UNDER CONSIDERATION WITH A
             DESTINATION ON THE SPECIFIED LEG.  FIELD NUMBERS AND DESTINATION
             LEG NUMBERS ARE THE SAME. <0 TO 100 AND SUM = 100>
```

Figure A-6. Continued.

After the leg data have been accepted by the user, the program will prompt for the appropriate number of lane specifications. If the user chooses to enter lane data fields instead of lane specifications, the "DATA=...." keyin may be used. As usual, the data will be displayed for the user to review and possibly revise.

The form of the leg and lane specifications is shown in Figure A-8. Similar information will be displayed if the user presses

[H] [E] [L] [P] [C/R]

in response to a prompt to enter a lane or leg specification.

Diamond Interchange Specifications

When describing a diamond interchange, the user will be prompted for specifications of the internal lanes connecting the two intersections (See Figure A-1(d)) in addition to the external legs. The display which will be provided is illustrated in Figure A-7. As noted earlier, the user is assumed to have a sketch of the interchange oriented with the internal lanes on a 90 - 270 degree or east-west direction. Referring to this sketch, the user enters the number of internal lanes which permit traffic to move toward the right intersection, the number permitting movement toward the left intersection and the distance between the centers of the two intersections.

The "Similar-To" leg specification shown in Figure A-7 can be very helpful to users describing a diamond interchange. After describing any of the external legs of an interchange, that specification can be essentially reflected for a diagonally opposite leg using this statement. For example, legs 1 and 4 (Figure A-1(d)) might be exactly alike except for orientation. Instead of providing a complete specification for leg 4 after describing leg 1, the "Similar To" statement could be used to replicate leg 1 as leg 4 with only a change in the leg angle or orientation.

Editing Data Fields

Data that have been entered as part of a file may be edited by entering an edit request in response to a prompt. This prompt will be displayed in two different ways. First, when the user is keying in data for a new file,the prompt will be displayed after each data line has been entered. This will permit the user to immediately review and, if desired, revise the data. Second, when the user is revising data from an existing file, each line of data will be displayed in the same sequence in which it was originally entered, and the user will be prompted to either edit the data or accept it unchanged.

There are four distinct forms of edit requests: 1) the text-edit request, 2) the data-field edit request, 3) the lane-data edit request, and 4) the field column data edit request. The text-edit request is useful for editing title text and permits substitution, deletion, and insertion of characters in the title. The lane-data edit request and the field column data edit requests allow editing of lane data-fields. The data-field edit request permits editing of data in all other types of data lines.

```
LEG SPECIFICATION: [n*]Ia[L[b]]Oc[([ang][,off])]
   ITEMS BETWEEN BRACKETS ("[...]") ARE OPTIONAL AND MAY BE OMITTED.
   SEPARATE MULTIPLE SPECIFICATIONS WITH A COMMA.
   SUBSTITUTE NUMERIC VALUES FOR LOWERCASE ITEMS, AS DESCRIBED BELOW.
n - DUPLICATION FACTOR, USE FOR n ADJACENT IDENTICAL LEGS.
a - THE NUMBER OF INBOUND LANES. <0 TO 6> [2]
L - SPECIFIES THAT INBOUND LANE 1 IS AN EXCLUSIVE LEFT TURN LANE.
b - LENGTH OF LEFT TURN LANE, USE ONLY IF LEFT TURN LANE IS SHORTER THAN LEG.
c - THE NUMBER OF OUTBOUND LANES. <0 TO 6> [2]
ang - LEG ANGLE, USE ONLY IF ANGLES BETWEEN LEGS ARE NOT EQUAL.<0 TO 359>
      ang IS POSITIVE CLOCKWISE FROM NORTH = 0.
off - LEG CENTERLINE OFFSET, USE IF CL DOESN'T PASS THROUGH INTERSECTION CNTR.
      off IS POSITIVE TO RIGHT WHEN FACING IN THE DIRECTION OF INBOUND TRAFFIC.
EXAMPLES:
   "I3O2" - LEG WITH 3 INBOUND AND 2 OUTBOUND LANES,DEFAULTS FOR ALL OTHER DATA
   "I3L95O2" - AS ABOVE, EXCEPT LANE 1 IS EXCLUSIVE LEFT TURN LANE, LENGTH = 95
   "I2O3(85,6)" - LEG WITH 2 INBOUND AND 3 OUTBOUND LANES, LEG ANGLE = 85,
                  LEG CENTERLINE OFFSET = 6 AND DEFAULTS FOR ALL OTHER DATA
   "4*I3O2" - 4 SEQUENTIAL LEGS, EACH AS IN FIRST EXAMPLE


LANE SPECIFICATION: [n*][w][a][b]
   ITEMS BETWEEN BRACKETS ("[...]") ARE OPTIONAL AND MAY BE OMITTED.
   SEPARATE MULTIPLE SPECIFICATIONS WITH COMMAS.
   SUBSTITUTE NUMERIC VALUES OR CHARACTERS FOR LOWERCASE ITEMS,DESCRIBED BELOW.
n - DUPLICATION FACTOR, USE FOR n SEQUENTIAL IDENTICAL LANES.
w - LANE WIDTH.  [12]
a - ONE OF "U", "L,, "R" OR "-".
    "U" - U-TURNS ARE ALLOWED FROM/TO THIS LANE.
    "L" - INDICATES AN EXCLUSIVE LEFT TURN LANE.
    "R" - INDICATES AN EXCLUSIVE RIGHT TURN LANE.
    "-" - USE TO SEPARATE w and b WHEN "U", "L" OR "R" ISN'T APPLICABLE.
b - LANE LENGTH, USE ONLY IF LANE IS SHORTER THAN LEG.
      (TRAFFIC CAN'T ENTER ON A SHORTER LANE)
EXAMPLES:
   "10" - LANE WITH A WIDTH OF 10 AND DEFAULTS FOR ALL OTHER DATA
   "3*10" - THREE LANES, AS ABOVE
   "9L120" - A 9 FOOT WIDE EXCLUSIVE LEFT TURN LANE WITH USEABLE LENGTH OF 120
```

Figure A-7. Leg and lane specifications.

```
INTERNAL LANES SPECIFICATION: IR{a}IL{b}{(dist)}
   ITEMS BETWEEN BRACKETS ("{...}") ARE OPTIONAL AND MAY BE OMITTED.
   SEPARATE MULTIPLE SPECIFICATIONS WITH A COMMA.
   SUBSTITUTE NUMERIC VALUES FOR LOWERCASE ITEMS, AS DESCRIBED BELOW.
a - THE NUMBER OF LANES INBOUND TO CENTER R. <0 TO 6> [2]
b - THE NUMBER OF LANES INBOUND TO CENTER L. <0 TO 6> [2]
dist - DISTANCE BETWEEN INTERSECTION CENTERS <100 TO 1000> [300]
EXAMPLES:
   "IR3IL2" - 3 LANES INBOUND TO CENTER R, 2 TO CENTER L & DEFAULTS FOR OTHER
   "IR2IL3(500)" - 2 LANES INBOUND TO CENTER R, 3 LANES INBOUND TO CENTER L,
                A DISTANCE BETWEEN INTERSECTION CENTER R AND INTERSECTION
                CENTER L OF 500 AND DEFAULTS FOR ALL OTHER DATA
```

Internal Lane Specification

```
SIMILAR-TO LEG SPECIFICATION: {n*}ST{a}{(ang)}
   ITEMS BETWEEN BRACKETS ("{...}") ARE OPTIONAL AND MAY BE OMITTED.
   SEPARATE MULTIPLE SPECIFICATIONS WITH A COMMA.
   SUBSTITUTE NUMERIC VALUES FOR LOWERCASE ITEMS, AS DESCRIBED BELOW.
n - DUPLICATION FACTOR, USE FOR n IDENTICAL REFERENCES.
a - LEG FOR THIS LEG TO BE SIMILAR TO. [DIAGONALLY OPPOSITE LEG]
ang - LEG ANGLE. [REFERENCE LEG ANGLE + 180] <0 TO 359>
EXAMPLES:
   "ST" - LEG WILL BE SIMILAR TO THE DIAGONALLY OPPOSITE LEG, WITH LEG ANGLE
          ADJUSTED.
   "ST1" - LEG WILL BE SIMILAR TO LEG 1, WITH LEG ANGLE ADJUSTED.
   "ST1(190) - LEG WILL BE SIMILAR TO LEG 1, BUT WITH LEG ANGLE = 190.
```

Similar-to Leg Specification

Figure A-7. Continued.

```
TEXT EDIT REQUEST: T(i[,[j][,k]])=text
   ITEMS BETWEEN BRACKETS ("[...]") ARE OPTIONAL AND MAY BE OMITTED.
i - COLUMN NUMBER OF THE FIRST CHARACTER TO BE REPLACED. [1]
j - COLUMN NUMBER OF THE LAST CHARACTER TO BE REPLACED.  MUST BE EQUAL TO OR
    GREATER THAN i.  [i].
k - NUMBER OF CHARACTERS OF text TO SUBSTITUTE FOR THE TEXT CURRENTLY IN
    COLUMNS i THROUGH j.  [THE NUMBER OF CHARACTERS IN text]
text - TEXT TO SUBSTITUTE FOR THE TEXT CURRENTLY IN COLUMNS i THROUGH j.
"T(3)"    EDITS "ABCDE" TO "ABDE"       "T(3,4)=X"   EDITS "ABCDE" TO "ABXE"
"T(3,4)"  EDITS "ABCDE" TO "ABE"        "T(3,4,2)=X" EDITS "ABCDE" TO "ABX E"
"T(3)=X"  EDITS "ABCDE" TO "ABXDE"      "T(2,3)=XYZ" EDITS "ABCDE" TO "AXYZDE"
"T(3)=XY" EDITS "ABCDE" TO "ABXYDE"


DATA FIELD EDIT REQUEST: F[(i)]=[n*]fi[,...]
   ITEMS BETWEEN BRACKETS ("[...]") ARE OPTIONAL AND MAY BE OMITED.
i - THE NUMBER OF THE FIRST FIELD TO BE EDITED.<INTEGER, 1 TO NO. OF FIELDS>[1]
n - DUPLICATION FACTOR.  USE FOR n SEQUENTIAL IDENTICAL FIELDS.
fi - DATA TO REPLACE DATA THAT IS CURRENTLY IN THE FIRST FIELD TO BE EDITED.
     ADDITIONAL REPLACEMENT DATA FIELDS MAY FOLLOW, SEPARATED BY COMMAS.
     USE MULTIPLE COMMAS TO SKIP FIELDS, FOR EXAMPLE: "F(2)=6,,,4" WILL CHANGE
     FIELD 2 TO "6" AND FIELD 5 TO "4" AND LEAVE ALL OTHER FIELDS UNCHANGED.


LANE DATA FIELD EDIT REQUEST: L(i[,j])= fj[,fj+1,...]
   ITEMS BETWEEN BRACKETS ("[...]") ARE OPTIONAL AND MAY BE OMITTED.
i - THE NUMBER OF THE LANE FOR WHICH DATA IS TO BE EDITED.
j - THE NUMBER OF THE FIRST FIELD TO BE EDITED.  MUST BE AN INTEGER FROM 1 TO
    THE NUMBER OF FIELDS.  [1]
fj - DATA TO REPLACE DATA THAT IS CURRENTLY IN THE FIRST FIELD TO BE EDITED.
     ADDITIONAL REPLACEMENT DATA FIELDS MAY FOLLOW fj, SEPARATED BY COMMAS.
     USE MULTIPLE COMMAS TO SKIP FIELDS, FOR EXAMPLE: "L(3,2)=ULS,,,20" WILL
     CHANGE (FOR LANE 3) FIELD 2 TO "ULS" AND FIELD 5 TO "20" AND LEAVE ALL
     OTHER FIELDS UNCHANGED.


SPECIFIC DATA EDIT REQUEST: sp[(i)]=spi[,spi+1,...]
   ITEMS BETWEEN BRACKETS ("[...]") ARE OPTIONAL AND MAY BE OMITTED.
sp - ONE OF "WIDTH", "MOVE" ("MVMT"), "OFFSET" ("OFF") OR "PERCENT" ("PER"),
     USED TO EDIT LANE WIDTHS (FIELD 1), MOVEMENT CODES(FIELD 2), LANE TERMINAL
     OFFSETS (FIELD 5) AND PERCENT OF ENTERING TRAFFIC IN LANES (FIELD 6).
i - LANE NUMBER OF THE FIRST SPECIFIC DATA FIELD TO BE EDITED. [1]
spi - DATA TO REPLACE DATA THAT IS CURRENTLY IN THE FIRST FIELD TO BE EDITED.
EXAMPLES: "MOVE=ULS" CHANGES THE MOVEMENT CODE FOR LANE 1 (INBOUND 1) TO "ULS".
"WIDTH(2)=10,2*9" CHANGES THE LANE WIDTH FOR LANE 2 TO "10" AND CHANGES WIDTHS
FOR LANES 3 AND 4 TO "9".
```

Figure A-8. Four forms of data edit requests.

```
FC
FIELD COLUMN DATA EDIT REQUEST: FC{({i}{,j})}=fj{,fj+1,...}
   ITEMS BETWEEN BRACKETS ("{...}") ARE OPTIONAL AND MAY BE OMITTED.
i - THE NUMBER OF THE FIELD FOR WHICH DATA IS TO BE EDITED. [1]
j - THE NUMBER OF THE FIRST LANE TO BE EDITED.  MUST BE AN INTEGER FROM 1 TO
    THE NUMBER OF LANES. [1]
fj - DATA TO REPLACE DATA THAT IS CURRENTLY IN THE FIRST LANE TO BE EDITED.
     ADDITIONAL REPLACEMENT DATA ITEMS MAY FOLLOW fj, SEPARATED BY COMMAS.
     USE MULTIPLE COMMAS TO SKIP LANES, FOR EXAMPLE: "FC(6,2)=20,,,25" WILL
     CHANGE (FOR FIELD 6) LANE 2 TO "20" AND LANE 5 TO "25" AND LEAVE ALL
     OTHER DATA UNCHANGED.
```

Figure A-8. Continued.

Figure A-8 shows the form of each of the four edit requests. Similar information will be displayed in response to an entry of

[H] [E] [L] [P] [C/R]

whenever a data line is displayed for user review and revision. This displayed information will aid the user in entering edit requests.

CONCEPTS AND USE OF THE DATA-ENTRY PROGRAM SIMDATA

The simulation processor, SIMPRO, in the TEXAS Model utilizes the output from two pre-simulation data processors, GEOPRO and DVPRO, to define the geometric features of the intersection and the operational characteristics of each simulated driver-vehicle unit respectively. In the Version 3.0 of the TEXAS Model, the user communicates with the model concerning these parameters via the data-entry program called GDVDATA as described in the previous sections of this report. Another data-entry program, SIMDATA, is also provided to aid the user in defining the additional simulation and traffic-control parameters that are needed by SIMPRO. A series of prompt and instructions are utilized in SIMDATA, as in GDVDATA, to guide the user through this remaining part of the data-entry process.

SIMULATION PARAMETERS

The prompts issued by SIMDATA follow closely the order in which they would be coded in an original SIMPRO input "deck", or card image file. The first items requested by SIMDATA are basic simulation parameters: the length of start-up and simulation time, the time increment or "DT" for the simulation, output listing options, and parameters for car following, conflict checking, queuing, and delay statistics. These items are described in detail below.

Start-Up and Simulation Time

Prior to data entry with SIMDATA, GDVDATA will have been used to specify a total time for the TEXAS Model run. This time is further divided into start-up time and simulation time in SIMDATA.

The start-up time is used to allow the model to achieve steady-state conditions before traffic statistics are taken from the model. A time of 5 minutes is suggested, and this is the default value supplied by the program.

To speed data entry, the simulation time will be automatically calculated by SIMDATA as the length of run time entered in GDVDATA minus the start-up time. For example, if a 30-minute run is specified in GDVDATA, a 5 minute start-up time is entered in SIMDATA, a simulation-time value of 25 minutes will be supplied to SIMPRO by SIMDATA.

The run time specified to GDVDATA is used by the driver-vehicle preprocessor, DVPRO to generate a list of simulated driver-vehicle units and their headways. These driver-vehicle units and headways are supplied to SIMPRO for both start-up and actual simulation. Thus, if the start-up time specified is 5 minutes, and the simulation time specified is 15 minutes, the list of driver-vehicle units and headways supplied by DVPRO must be at least 20 minutes long. SIMDATA ensures that the start-up and simulation times entered are compatible with the run time specified in GDVDATA.

Time Increment "DT" for the Simulation Process

The time increment for simulation, "DT', is the time step interval used in updating the status of each driver-vehicle unit in the simulation process. Although the default value of this parameter in SIMDATA is 0.5 second, an increment of 1.0 second will normally provide sufficient resolution for most signalized intersection studies. The longer time increment means that fewer calculations are required and that actual computation time needed for the simulation will be reduced.

Output Listing Options

The user can specify printing of statistical summaries of each inbound approach flow and individual turning movement, or can request output in an abbreviated, summary format. In addition, data files of individual vehicle information can be generated for further processing by the emissions analysis program, EMPRO, or for graphics display on an IBM-PC.

These options can be selected by keying in "YES" or "NO" for the desired approach or turning-movement statistical summaries, and for abbreviated summary output format and the emissions analysis/display tape. Default values set in SIMDATA are "YES" for the statistical summaries and "NO" for the abbreviated output and emissions tape.

Parameters for Car Following

Parameters for the car-following model used in the TEXAS Model can be modified by the user by changing the default values of lambda = 2.800, alpha = 4000, and mu = 0.800 which are supplied automatically by SIMDATA. The user is referred to Reference 1 for detailed discussion of the application of these parameters.

Conflict Checking

Lead and lag zones for the conflict checking procedure used by the TEXAS Model can be entered by the user via SIMDATA. Default values of 1.3 seconds lead and .5 seconds lag are provided by SIMDATA. The user is referred to Reference 1 for a detailed discussion of the application of these parameters.

Queueing

This parameter directs the TEXAS Model to assume that a vehicle is in a queue when it is closer than a given distance to the vehicle ahead or to the stop line and traveling less than 2 mph. The vehicle ahead must also be in a queue. A default value of 30 feet is supplied by SIMDATA for the given distance.

Special Delay Statistics

Special delay statistics for vehicles operating below a given speed can be collected and summarized separately in the output from the TEXAS Model. This parameter specifies the speed below which these special statistics are collected. The default value in SIMDATA is 10 miles per hour.

INTERSECTION AND LANE-CONTROL DATA

Intersection control data can be entered into SIMDATA for one of three different types of traffic control:

(1) Uncontrolled approaches.

(2) Stop or yield-controlled approaches.

(3) Signal-controlled approaches

Non-Signalized Control

In the TEXAS Model, it is possible to specify four different types of intersection control for unsignalized intersections. These types are:

(1) uncontrolled,

(2) yield,

(3) stop, less than all-way, and

(4) stop, all-way.

In addition, with each of these types of intersection control, it is possible to specify the type of traffic control for each lane of each approach. These choices are termed "lane control" in SIMDATA, and are allowable for various types of intersection control according to Table A-4.

It can be seen that the variety of lane-control specifications that are available makes it possible to describe situations in which different types of lane-control exist on a single approach. For example, at an intersection where a separate right-turn lane is provided, "stop" control can be specified for the main traffic lanes, and "yield" control can be specified for the right-turn lane.

Signalized Control

Signalized control of an intersection is specified in much the same way as non-signalized control, with the type of "intersection control" entered for the whole intersection, and "lane control" entered for each lane of each approach. The possible types of control for a signalized intersection are:

(1) "Pretimed signal",

(2) "Semi-actual signal",

(3) "Full-actuated signal", and

(4) "Texas Diamond" for actuated diamond interchanges.

For all these intersection control types, it is possible to specify lane control of any of the following types for each individual lane:

(1) "Blocked" (specified in GDVDATA entry),

TABLE A-4. LANE-CONTROL OPTIONS

For Type of Intersection Control	The Following Lane Controls May Be Specified
Uncontrolled	Blocked* or Uncontrolled
Yield	Blocked*, Uncontrolled, or Yield
Less than All-way Stop	Blocked*, Uncontrolled, Yield, or Stop
All-way Stop	Blocked*, Yield, or Stop

* "Blocked" lane control is specified in the entry process for GDVDATA and cannot be changed with SIMDATA. If "blocked" lane control has been previously specified with GDVDATA, SIMDATA will automatically provide "blocked" lane control in the proper lanes.

(2) "Yield",

(3) "Signal without left or right-turn-on-red",

(4) "Signal with left-turn-on-red", and

(5) "Signal with right-turn-on-red".

As with the non-signalized case of an approach with a right-turn lane mentioned in the previous section , it is possible to specify a yield-controlled right-turn lane on a signalized approach. If the intention is to install yield control on a right-turn lane, the "yield" lane-control specification automatically supersedes a "right-turn-on-red" specification. In either case, entry of a "yield" or "right-turn-on-red" control should be made only on the extreme right-hand-lane of an approach (or in the far left lane of a one-way approach).

The specification of lane control should not be confused with the type of signal indication that is visible to each lane. The lane-control specification simply shows whether a sign or traffic signal controls movement on that lane, and whether turns on red are allowed. The actual signal indications that will be presented to each lane are entered in the section of SIMDATA called "Green Interval Sequence Data".

SIGNAL PHASING

In addition to the type of lane control, the signal phasing and associated signal indications must be specified through SIMDATA. The type of intersection control is established via the keyin of the intersection-control and lane-control data. SIMDATA then takes the proper action to prompt for data about phase sequences, signal indications, timing data, and for actuated signals, detector placement and connection. Definitions used in SIMDATA relative to signal phasing are shown in Table A-5.

Controller and Traffic Phases

After lane-control data have been entered, SIMDATA prompts for the entry of phase-sequence data. Phase-sequence data are entered in the same way for both pretimed and actuated signals at both single intersections and diamond interchanges. Simulated controller operation for both pretimed and actuated types of single intersection control is based on a "camstack" model that is analogous to the operation of a camstack in an electromechanical controller. The simulated controller for diamond interchanges is based upon a dual ring, six phase scheme which under actuated operation has full phase skipping capability.

For single intersections controller phases are referred to by letters and consist of combinations of concurrent traffic phases. Traffic phases are designated by NEMA standard phase numbers and consist of intervals during which specified traffic movements may occur (See Figure A-9a). Timing and detector data are input for controller phases, not traffic phases.

For diamond interchanges, traffic and controller phases are identical, therefore the prompts for diamond interchange specifications merely use the term phase and use NEMA numbers for identification (See Figure A-9b). The procedure for specifying pretimed signal control for a diamond interchange is the

TABLE A-5. DEFINITIONS FOR SIGNALIZATION

Signalization	Definition
Signal Indication	The presentation of traffic control information by the illumination of a signal lens whereby the movement of vehicles in a lane(s) is controlled.
Interval	The part or parts of the signal cycle during which signal indications do not change.
Green Interval	An interval during which one or more lanes is given a signal indication that permits vehicles in the lane(s) to enter the intersection.
Yellow – Change Interval	The interval during which a yellow signal indication following each terminated green signal indication is displayed.
Red – Clearance Interval	The interval before the next green interval and following a yellow-change interval, during which red signal indications are displayed to traffic.
Traffic Phase	The series of green, yellow-change, and red-clearance intervals in a cycle that controls the entry of certain specified traffic movements into the intersection. (designated by a number)
Controller Phase	The time during which one or more traffic phase(s) are in effect. (designated by a letter)

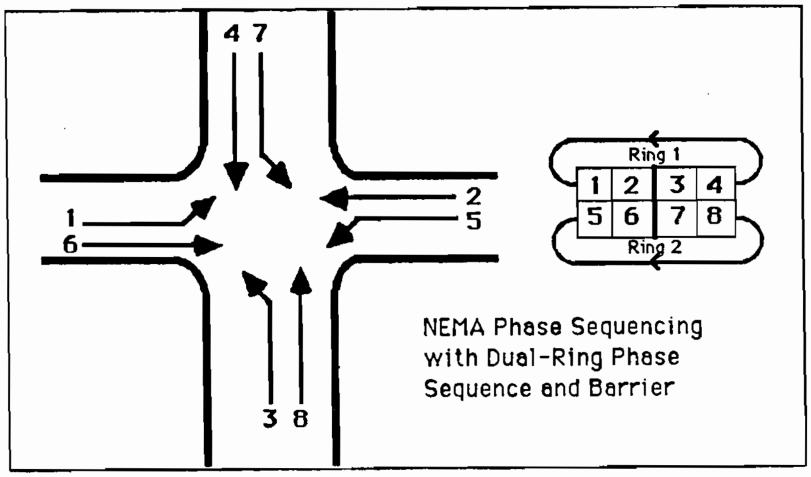


Figure A-9a. Traffic (NEMA) phases for single intersection.

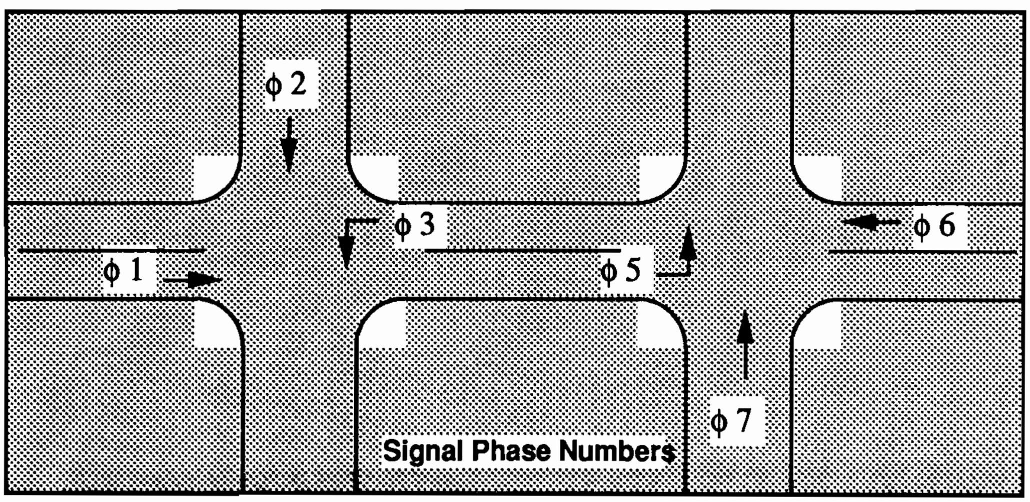


Figure A-9b. Phases for diamond intersection.

same as that for a single intersection. However, if actuated control is to be used for a diamond, and has been appropriately specified in the Parameter-Option Data, the user is prompted to select one of four available phase sequence patterns. These are referred to as "Figure 3", "Figure 4", "Figure 6" or "Figure 7" and are illustrated in Figures A-10 through A-13.

When describing signalized control for a single intersection or a diamond under pretimed control, SIMDATA first prompts for the desired number of controller phases. This is the number of green intervals possible during the signal cycle. The number of phases can vary from 2 to 8.

Once the number of controller phases for an intersection has been set, it cannot be changed; a new SIMDATA data file must be entered from the beginning of the data-entry sequence for SIMDATA.

For each controller phase, SIMDATA then prompts for which traffic (NEMA) phase(s) should be green during that controller phase. In the single intersection mode, up to two traffic phases can be assigned to each controller phase, and a given traffic phase can be assigned more than once, to more than one controller phase. Once the controller phases have been defined, SIMDATA prompts for timing information.

The TEXAS Model simulates the operation of pretimed and actuated single intersection signals, as well as pretimed diamonds in the same manner as a "camstack"-based electromechanical controller. However, controller phases can be skipped, and can "clear to" any other controller phase. In addition, certain controller phases can be specified as "minor movement" phases, and tied to the clearance of a particular parent phase in the manner of an electromechanical minor-movement controller. These features allow the TEXAS Model, when desired, to closely model the operation of a modern quad-left controller.

Simulating a Eight-Phase Controller for a Single Intersection

To model an eight-phase quad-left controller operating in a "leading left turn" manner on all approaches, the set of controller phases entered into SIMDATA would be as follows:

Controller Phase	Traffic (NEMA) Phase
A	1 and 5
B	1 and 6
C	5 and 2
D	2 and 6
E	3 and 7
F	3 and 8
G	7 and 4
H	6 and 8

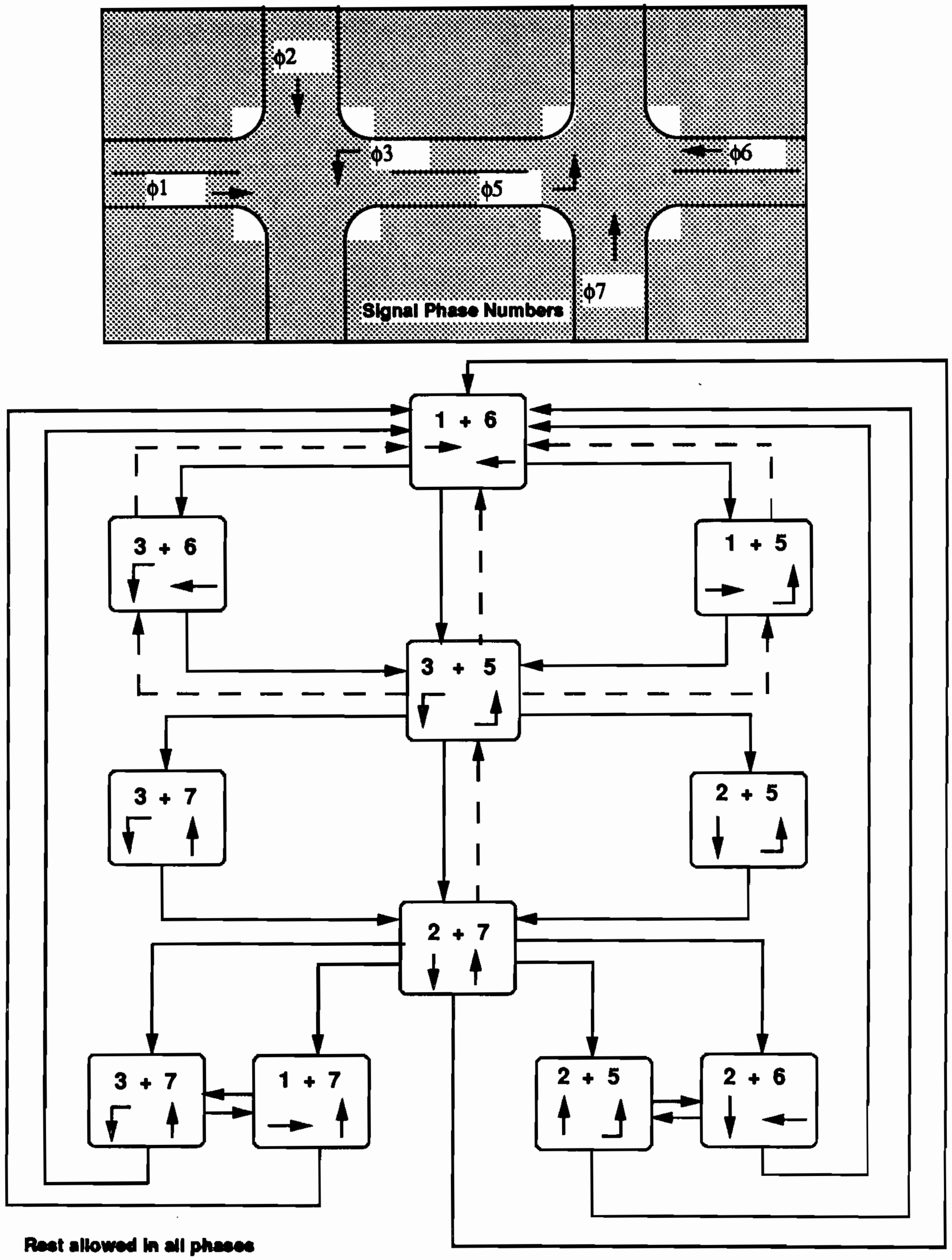


Figure A-10. Phase sequence diagram for "Figure 3" operation.

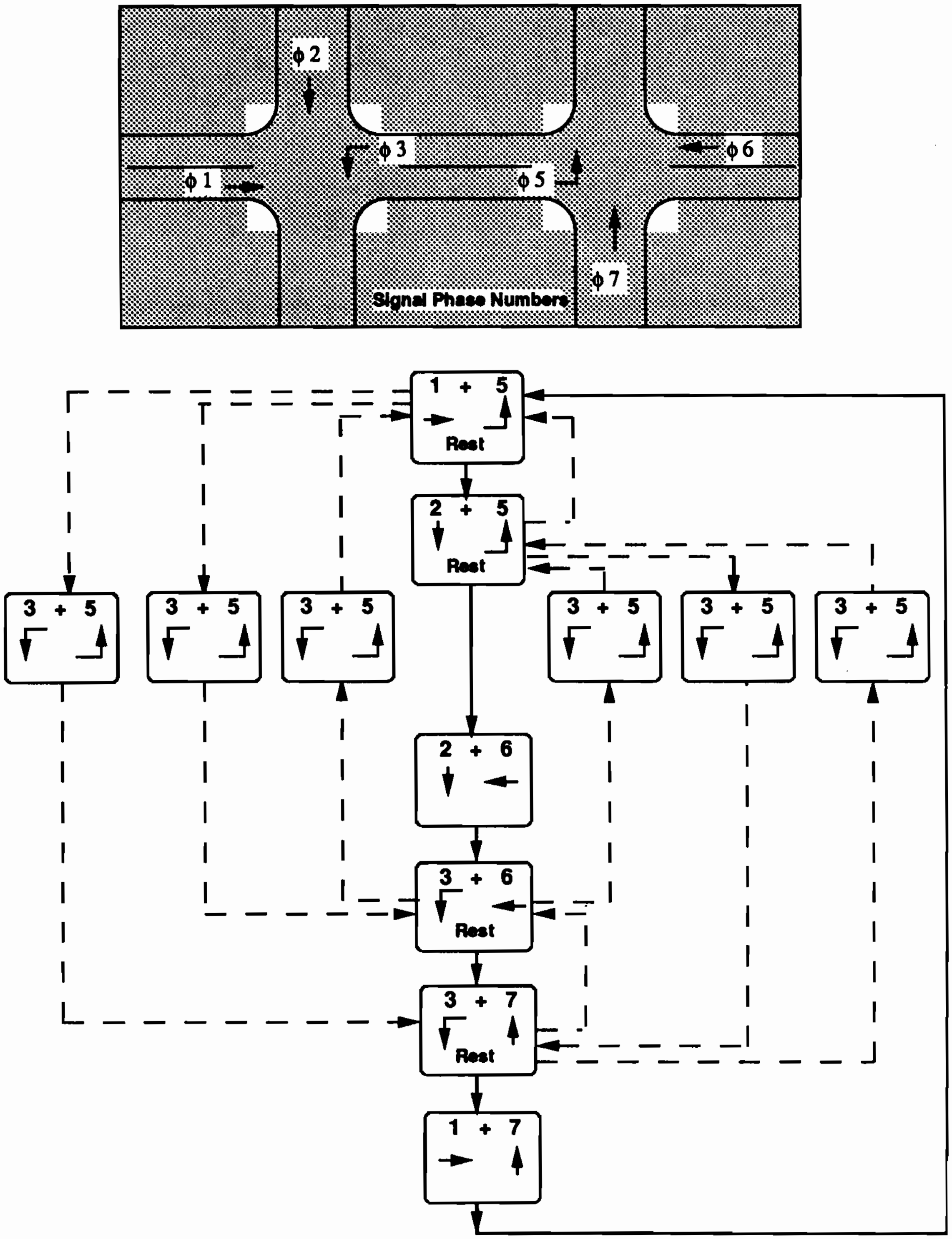


Figure A-11. Phase sequence diagram for "Figure 4" operation.

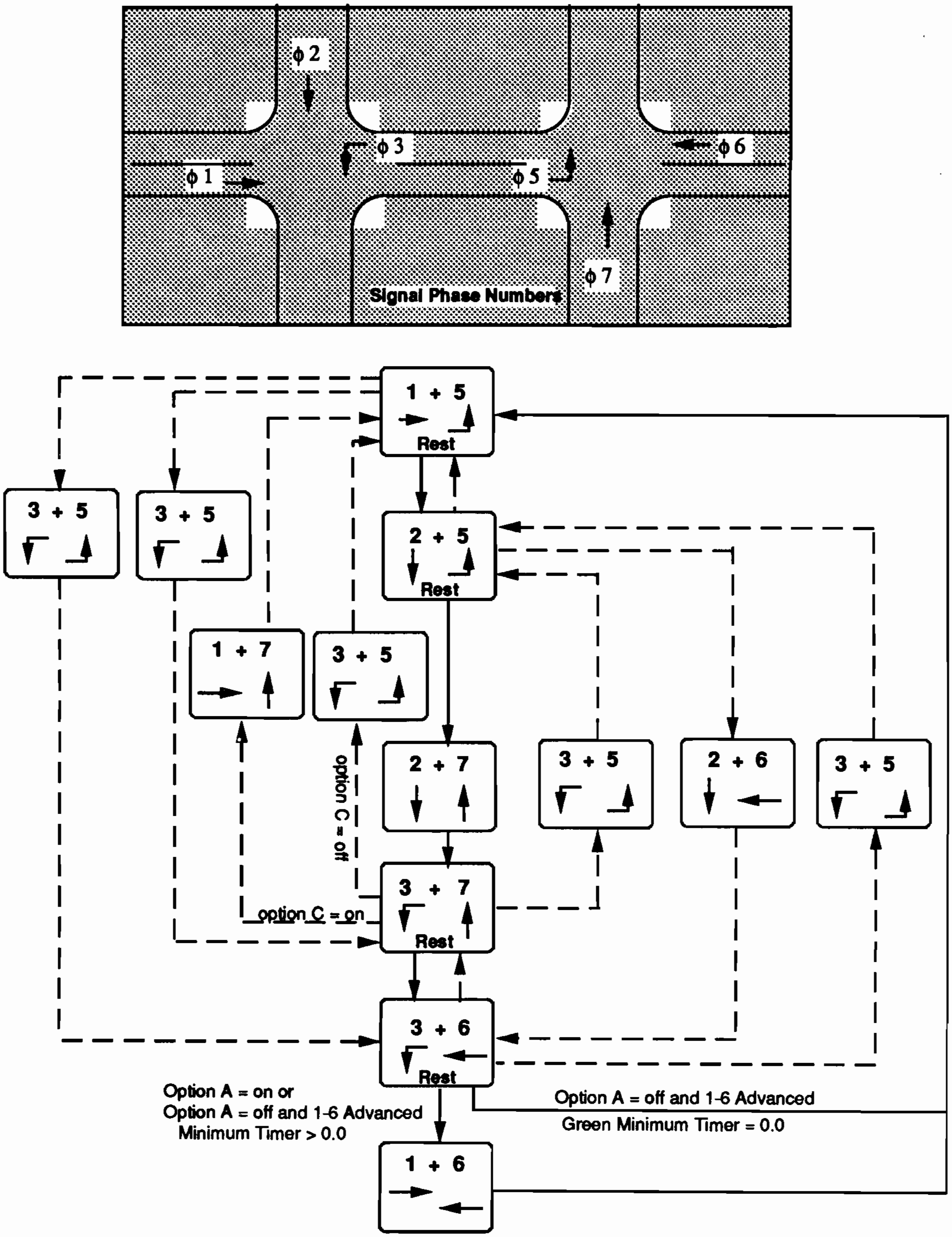


Figure A-12. Phase sequence diagram for "Figure 6" operation.

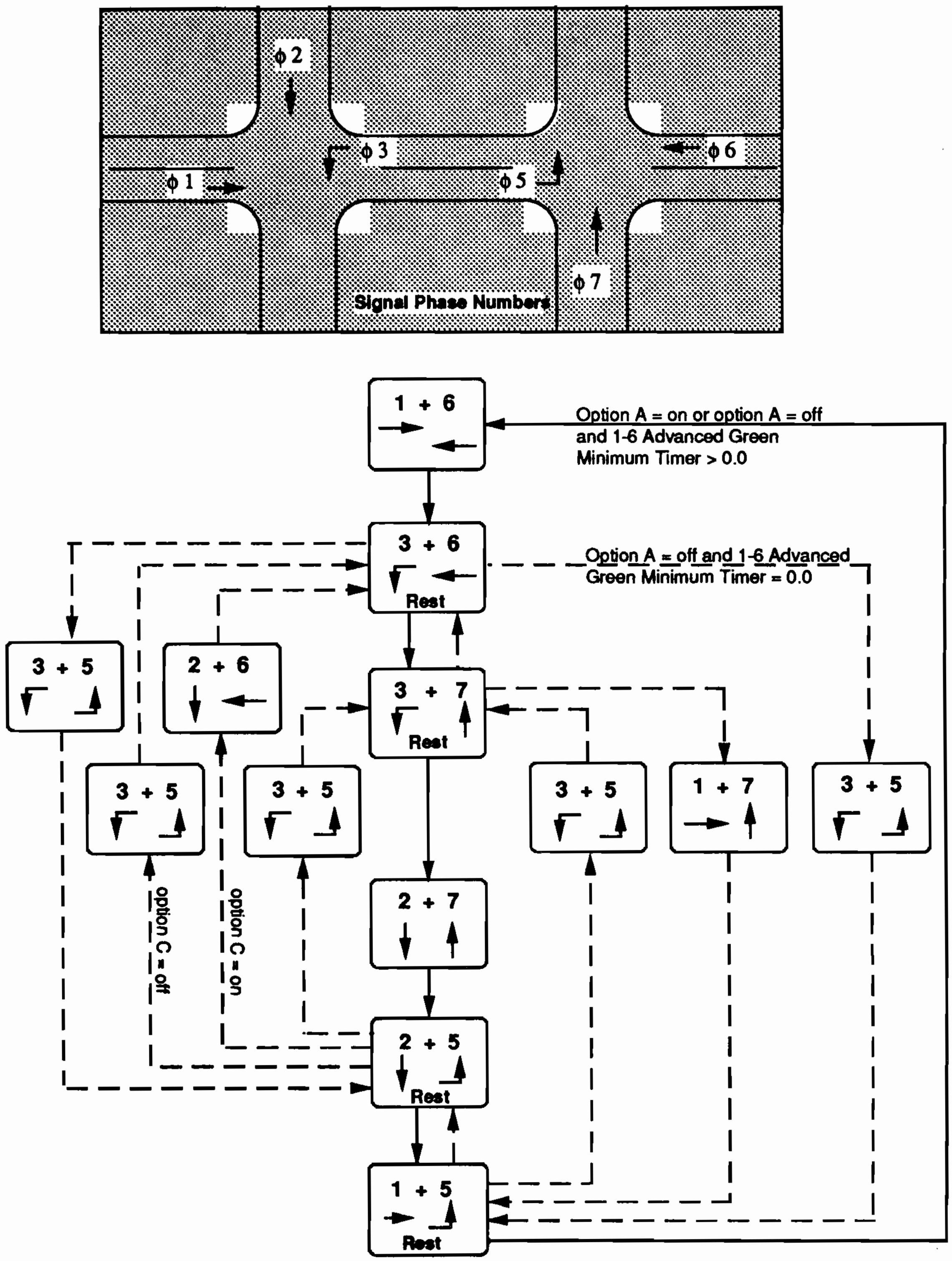


Figure A-13. Phase sequence diagram for "Figure 7" operation.

Any controller phase may clear to any other controller phase in any order. However, a priority must be set up so that certain controller phases are called in a logical order when more than one controller phase has a call active. The TEXAS Model always moves forward in the specified phase sequence, skipping phases as appropriate. For example, say the controller is in controller phase D and receives calls to controller phase B and then controller phase H. The TEXAS Model will service controller phase H first regardless of whether controller phase B or H received the call first.

SIGNAL TIMING FOR ALL CASES EXCEPT ACTUATED DIAMOND INTERCHANGES

Pretimed Signals

Timing data for pretimed signals can be entered in seconds, or as a percentage of a fixed cycle length. When entering data as a percent of cycle length, SIMDATA first prompts for a cycle length in seconds, then for percents for each of the green, yellow, and red intervals. SIMDATA checks to see whether the entered percents sum to 100.

Actuated Signals - Single Intersections

The timing of actuated signals is prompted for by SIMDATA after the designation of controller phases has been completed. SIMDATA prompts for initial, vehicle, yellow-change, and all-red intervals, then prompts for the maximum extension allowable for each phase (this is not the NEMA standard "maximum" but rather the maximum extension allowed past the initial interval after a call has been registered on another controller phase). SIMDATA also prompts for "skip phase switch position", whether the phase is a minor movement, and whether the phase is a dual-left followed by two single lefts.

Green Interval Sequence Data

Once controller phasing and timing have been established, SIMDATA prompts for "green interval sequence data". This information, in the form of a table (see Table A-6), gives the type of signal indication that will be presented to each lane for each controller phase. From the green interval sequence data, the timing data, and the controller phase assignment data, SIMDATA automatically builds the list of camstack card images that define the exact sequence of signal intervals.

The green interval sequence table lists, for each phase and each lane, which of the following green signal indications will be displayed to each lane during that phase:

(1) "C" - Circular green - all permitted movements may enter the intersection subject to appropriate conflict checking.

(2) "L" - Left green arrow - protected left turn.

(3) "S" - Straight green arrow - through movements only.

(4) "R" - Right green arrow - protected right turn.

TABLE A-6. GREEN INTERVAL SEQUENCING DATA

GREEN INTERVAL SEQUENCE DATA:
EACH FIELD -GREEN SIGNAL INDICATION FOR THE CONTROLLER PHASE AND LANE:
"C" - CIRCULAR GREEN. ALL PERMITTED MOVEMENTS MAY MOVE.
"L" - LEFT GREEN ARROW, PROTECTED LEFT TURN.
"S" - STRAIGHT GREEN ARROW. "R" - RIGHT GREEN ARROW.
*** ANY TWO OF THE ABOVE MAY BE USED TOGETHER, EXCEPT "LS" OR "LR".
"UN" - UNSIGNALIZED, SIGN CONTROL OR BLOCKED LANE, PER LANE CONTROL DATA.
BLANK - IMPLIED RED.
*** "LC" IS LANE CONTROL DATA. "MC" IS MOVEMENT CODE FROM GEOMETRY REF. DATA.

LEG:	/----1			----\	/---2		--\	/----3			----\	/---4		--\
LANE:	1	2	3	4	1	2	3	1	2	3	4	1	2	3
MC:	L	LS	S	SR	LS	S	SR	L	S	S	SR	L	S	SR
LC:	SI	SI	SI	RT	SI	SI	RT	SI	SI	SI	RT	SI	SI	RT
P(A):	L	L						L						
(B):								L	C	C	C			
(C):	L	LC	C	C										
(D):		C	C	C					C	C	C			
(E):					C	C	C					C	C	C
FLD:	\1	\2	\3	\4	\5	\6	\7	\8	\9	10	11	12	13	14

Any of the above indications can appear together, except "LS" and "LR". All other (blank) entries in the table can be assumed to be red. SIMDATA automatically assigns unsignalized, sign-controlled, and blocked lanes the code "UN".

SIMDATA automatically prepares major portions of the green interval table by assigning values based on the allowable movement codes from GDVDATA and the lane-control data entered previously. For example, if the movement code for the center lane of a three-lane approach is specified with a movement code of "S" and a lane-control code of "SI", SIMDATA supplies a green interval table entry of "C". If indicated by the controller phasing specifications, SIMDATA will supply "L" for each left-turn lane with a movement code of "L" and a lane-control code of "LT". Thus, modification of the green interval sequence table by the user is necessary only when special signal indications exist, such as green right-turn arrows and overlaps.

Yellow and all-red change intervals are supplied automatically by SIMDATA. The assignment of yellow and all-red phasing is based on change interval specifications in the Texas Manual of Uniform Traffic Control Devices.

Permissive Left-Turn Phases

Permissive left-turn phases are entered into SIMDATA by editing the green interval sequence data in such a manner that a "C" (circular green) signal indication appears to traffic in a left-turn lane (movement code = "MC").

Overlaps

Strictly speaking, overlaps are not handled in the TEXAS Model. However, by individually editing the green interval sequence data, and adding additional controller phases, operation of certain overlap phases can be simulated effectively.

CONTROLLER PHASE CLEAR-TO DATA

In a pretimed controller configuration, each controller phase will automatically clear to the next controller phase in the sequence; therefore, entry of controller phase clear-to data is unnecessary. In a semi-actuated controller, the same rule applies, but the actuated phases can be skipped in the phasing sequence.

In a full-actuated controller, any controller phase can clear to any other controller phase. If full-actuated control has been specified, for each controller phase, SIMDATA will prompt for a list of other controller phases that can be cleared to directly from that controller phase.

The TEXAS Model does not currently model a NEMA standard controller; phases can be skipped, but the order of phase sequence must remain constant. The TEXAS Model does not now model the operation of other NEMA functions such as hold or force off.

DETECTORS FOR ACTUATED SIGNALS

SIMDATA prompts for the number of vehicle detectors to be utilized. Up to 20 detectors can be specified; once the number of detectors has been set in SIMDATA, it can be increased but not decreased. In practice, however, detectors can be deleted as described in the section below, "Detector Connection".

For a typical quad-left controller with one detector for each through approach, and one detector for each left-turn pocket, eight detectors must be described. For easy reference, it is recommended that detectors be numbered accordingly to their corresponding traffic (NEMA) phase numbers.

Detector Location

This data item expresses the location, placement, and type of detection (presence or pulse) of each detector. The leg number, setback, length of loop, and type (presence/pulse) of detector is entered, along with a description of which lanes on the approach are covered by the detector (see Figure A-14) for the nomenclature of detector placement used in SIMDATA.

Detector Connection

Once detectors have been located on the approaches, the detectors are assigned to call various controller phases. More than one detector may be assigned to call a single controller phase. Detectors are connected to a controller phase by using "And" or "Or" logic. In addition, including a minus sign ("-") in front of a detector number will cause a logical "Not" condition. For example, if the detector connection data line is filled in to say "OR 1 2" for a particular controller phase, that controller phase will be called when a call exists on either detector 1 or 2. Likewise, if "AND 6 - 7" is specified, the controller phase will be called only when detector 6, and not detector 7 are actuated. A detector may be connected to more than one controller phase; but "And" and "Or" connection logic cannot be mixed on input to the same controller phase.

As mentioned in "phase sequences", controller phases cannot be serviced in reverse order. For example, assuming each detector to be in pulse mode, if all detectors for phases H, E, D, and A, are actuated in that order, calls will be placed to controller phases A, D, E, and H, which will then be executed in that order starting with the phases after the phase currently in effect, regardless of the order in which calls were received.

Detectors can be effectively deleted by changing the detector type to "INACTIVE".

SIGNAL TIMING FOR ACTUATED DIAMOND INTERCHANGES

Many of the specifications for actuated signal control of diamond interchanges follows the same format and terminology as that described in the previous paragraphs. The user is prompted for the basic five items of timing data for each phase in the same manner as that for a single intersection. However, the Texas Diamond controller operating under one of the four sequence patterns shown in Figures A-10 through A-13 requires additional specifications for a some of as many as 12 special controller intervals. These are listed in Figure A-15 with the particular sequence patterns to which they apply. The terminology used is taken directly from the Texas Standard Specifications for each of the respective sequence patterns.

Users are also prompted for specifications regarding the state of 12 options which are provided for this control type. Descriptions of the user prompts and possible responses are provided in Figure A-16. The sequence pattern diagrams of Figures A-10 through A-13 provide information regarding the effects upon the basic patterns produced by these options.

The Texas Standard Specifications for these control schemes provide for 10 detectors to be located adjacent to a diamond interchange operating under "Figure 3, 4, 6, or 7" control patterns. The external leg or internal lanes upon which each detector is installed and the numbering system is fixed by the standard specification, and therefore, these are fixed in the simulation. The user is prompted however, for the number of lanes covered, location relative to the lane terminal, detector length and mode of operation. The user prompt for these data is shown in Figure A-17.

USING THE DATA-ENTRY PROGRAM SIMDATA

Use of the data-entry program, SIMDATA, has been designed to provide an easy means for entering the simulation and traffic control data that are needed by the TEXAS Model. Prompts and instructions in the program guide the user through each required step of data entry. This program automatically derives many of the logical connections and sequences for signal control that formerly made data entry excessively cumbersome. Entries are quite similar in form to those made with GDVDATA, and most are simpler.

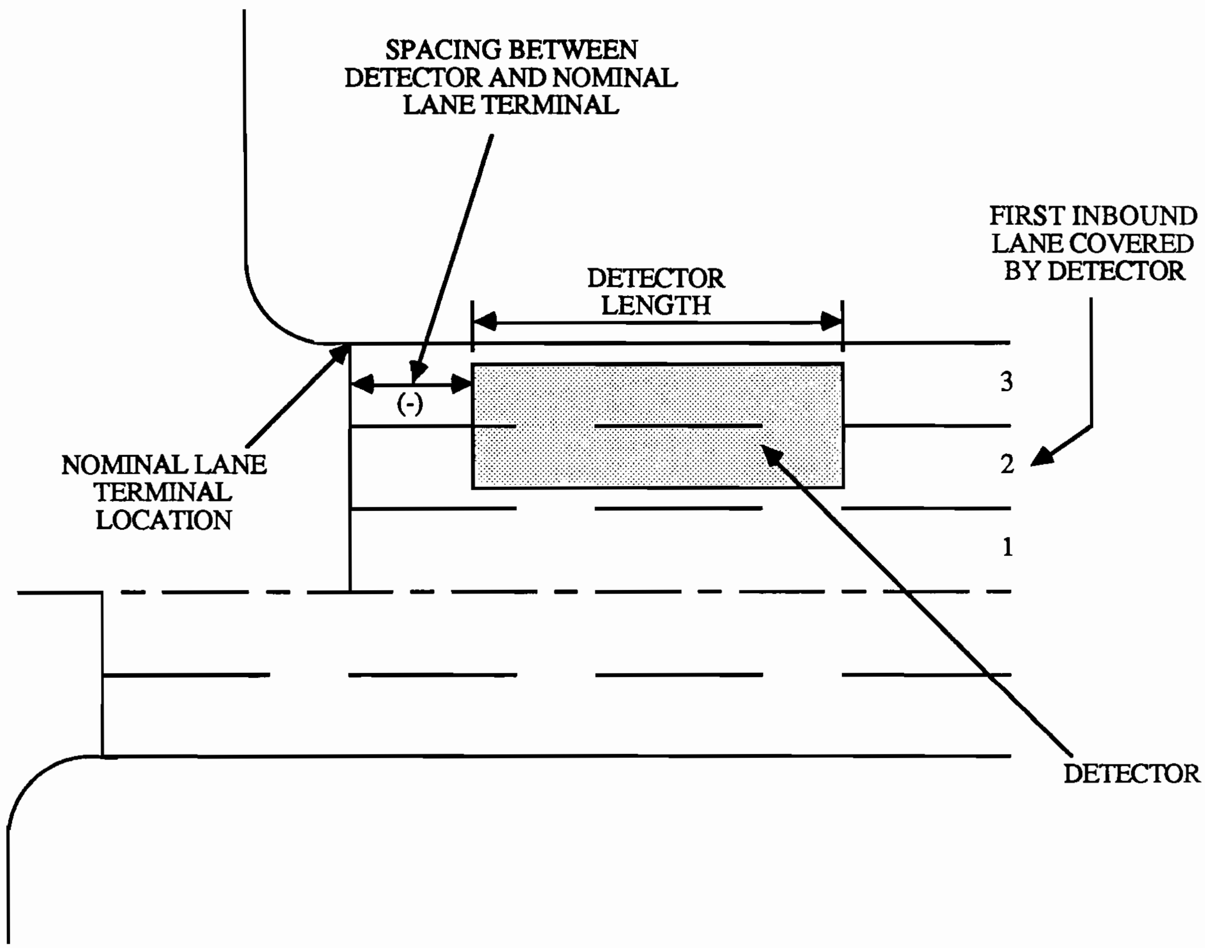


Figure A-14. Nomenclature for detector placement.

```
TEXAS DIAMOND CONTROLLER SPECIAL INTERVALS:
F(1) - PHASES 3-5 CLEARANCE GREEN. <0 TO 99>                (FIG 4)
F(2) - PHASES 1-7 ADVANCE GREEN. <0 TO 99>              (FIG 3 & 4)
F(3) - PHASES 2-6 ADVANCE GREEN. <0 TO 99>              (FIG 3 & 4)
F(4) - PHASE 2 TRANSFER GAP. <0 TO 9.9>                     (FIG 4)
F(5) - PHASE 7 TRANSFER GAP. <0 TO 9.9>                     (FIG 4)
F(6) - PHASES 1-6 ADVANCE GREEN MINIMUM. <0 TO 99>          (FIG 6)
F(7) - PHASES 1-6 ADVANCE GREEN MAXIMUM. <0 TO 99>          (FIG 6)
F(8) - PHASES 2-7 ADVANCE GREEN. <0 TO 99>                  (FIG 6)
F(9) - PHASES 1-6 ADVANCE GREEN MINIMUM. <0 TO 99>          (FIG 7)
F(10) - PHASES 1-6 ADVANCE GREEN MAXIMUM. <0 TO 99>         (FIG 7)
F(11) - PHASES 2-7 ADVANCE GREEN. <0 TO 99>                 (FIG 7)
F(12) - PHASES 3-5 CLEARANCE GREEN. <0 TO 99>               (FIG 3)
KEYIN "HELP" FOR ADDITIONAL ASSISTANCE.

KEYIN TEXAS DIAMOND CONTROLLER SPECIAL INTERVALS.
1 TO 12 FIELDS, SEPARATED BY COMMAS.
DATA FORMAT:(F4.1,F4.1,F4.1,F3.1,F3.1,F4.1,F4.1,F4.1,F4.1,F4.1,F4.1,F4.1)
```

Figure A-15. Screen prompts for Texas Diamond controller special intervals.

```
TEXAS DIAMOND CONTROLLER OPTIONS:
F(1) - ENABLE D3 DURING PHASES 3-7.
F(2) - ENABLE D13 DURING PHASES 3-7.
F(3) - ENABLE D5 DURING PHASES 2-5 .
F(4) - ENABLE D13 DURING PHASES 2-5.
F(5) - TERMINATE LOGIC FOR PHASES 2-7.
F(6) - TERMINATE LOGIC FOR PHASES 2-7.
F(7) - FIGURE 6 OPTION A (1-6 TIMING).
F(8) - FIGURE 6 OPTION B (2-7 TIMING).
F(9) - FIGURE 6 OPTION C (PHASE 6 SKIPPING).
F(10) - FIGURE 7 OPTION A (1-6 TIMING).
F(11) - FIGURE 7 OPTION B (2-7 TIMING).
F(12) - FIGURE 7 OPTION C (PHASE 1 SKIPPING).
KEYIN "HELP" FOR ADDITIONAL ASSISTANCE.

KEYIN TEXAS DIAMOND CONTROLLER OPTIONS.
1 TO 12 FIELDS, SEPARATED BY COMMAS.
DATA FORMAT:(A3,A3,A3,A3,A3,A3,A3,A3,A3,A3,A3,A3)
```

Figure A-16. Texas Diamond controller screen prompts for controller options.

```
DATA FOR DETECTORS:
F(1) - LEG WHERE DETECTOR IS LOCATED. (FOR REFERENCE ONLY)
F(2) - FIRST INBOUND LANE COVERED BY DETECTOR. <1 TO NUMBER OF LANES ON LEG>
F(3) - NUMBER OF INBOUND LANES COVERED BY DETECTOR. <0 TO LANES ON LEG>
F(4) - SPACING BETWEEN DETECTOR AND NOMINAL LANE TERMINAL.  <-1000 TO 100>
F(5) - DETECTOR LENGTH.  <1 TO 100>
F(6) - TYPE OF DETECTOR.<"PU" (PULSE),"PR" (PRESENCE) OR "IN" (INACTIVE)>["PR"]

                           LEG: /IR /2\ /3\ /5\ /6\ /IL
                          LANE: 1 2 1 2 1 2 1 2 1 2 1 2
D(1):  5 1 2   -10  30 PR                   X X
 (2):  6 1 2   -10  30 PR                       X X
(2A):  6 1 2   -50  10 PR                       X X
 (3): IL 1 1   -10  30 PR                           X
(13): IL 2 1   -10  30 PR                             X
 (5): IR 1 1   -10  30 PR       X
(56): IR 2 1   -10  30 PR         X
 (6):  2 1 2   -10  30 PR           X X
 (7):  3 1 2   -10  30 PR               X X
(7A):  3 1 2   -50  10 PR               X X
 FLD: \1 2 3 \.4./ \5/ \6

IS DATA FOR DETECTORS OK ?
```

Figure A-17. Screen display for detector data input.

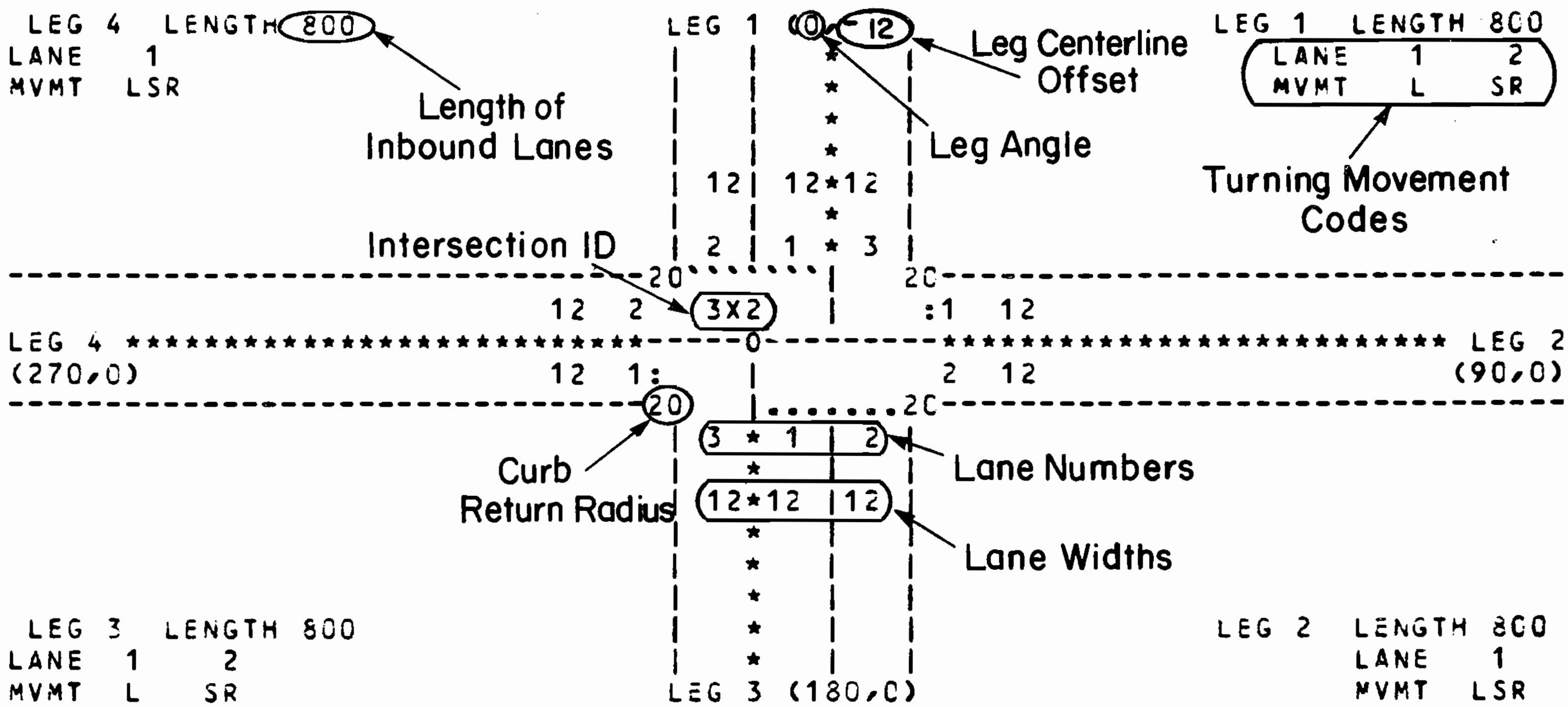
APPENDIX A.1

FILES IN THE PERMANENT LIBRARY

* Six-Points Intersection (6 legs with 4 lanes each)

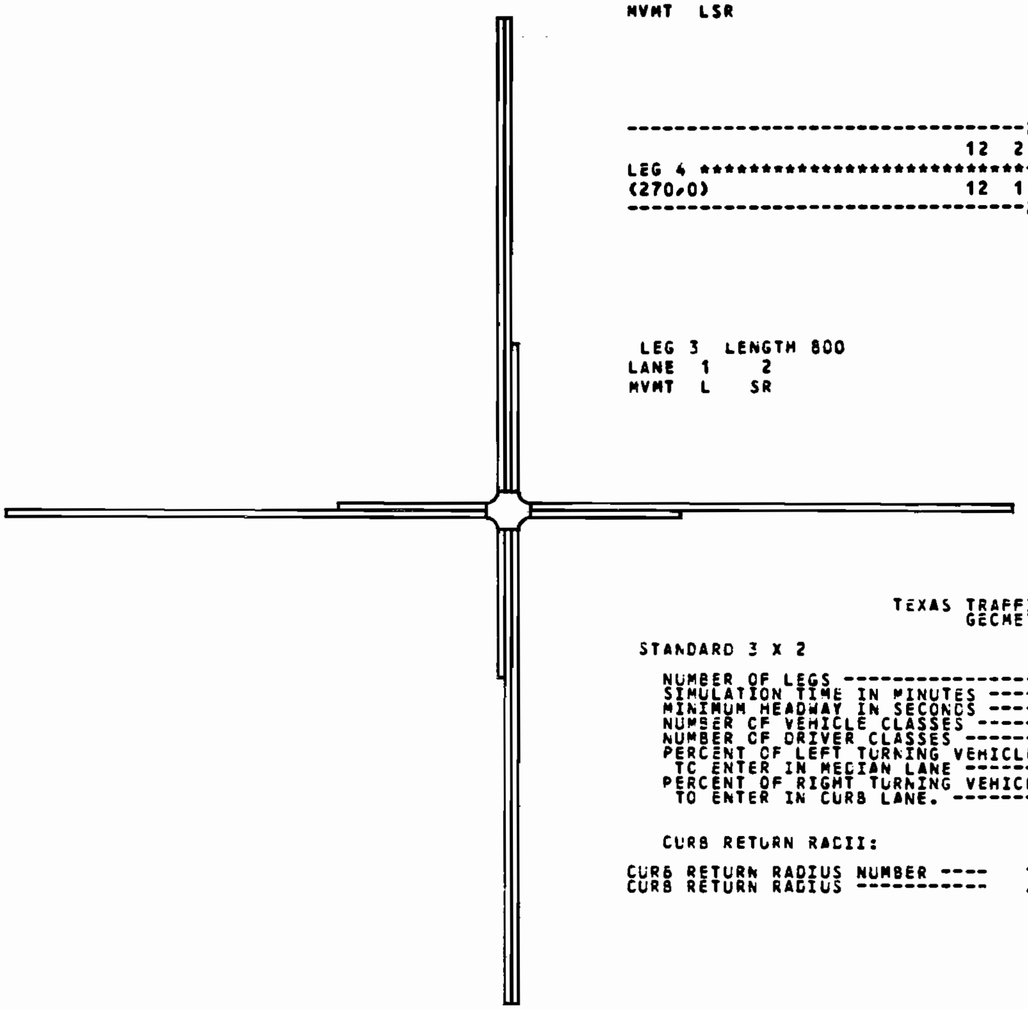
** 35th and Jefferson, Austin, TX

*** Skewed Diamond Interchange



Key for Sketches

STANDARD 3 X 2



```
LEG 4  LENGTH 800              LEG 1 (0,-12)              LEG 1  LENGTH 800
LANE    1                      |   |   *   |               LANE    1    2
MVMT  LSR                      |   |   *   |               MVMT    L    SR
                               |   |   *   |
                               |   |   *   |
                               | 12| 12*12 |
                               |   |   *   |
                               | 2 | 1 * 3 |
--------------------------------20'''''''|  2C--------------------------------
                        12  2   3X2     |   :1  12
LEG 4 ****************************-----0-----------*************************** LEG 2
(270,0)                 12  1:    |            2  12                      (90,0)
--------------------------------20  |.......2C--------------------------------
                               | 3 * 1 | 2 |
                               |   *   |   |
                               | 12*12 |12 |
                               |   *   |   |
                               |   *   |   |
                               |   *   |   |
LEG 3  LENGTH 800              |   *   |   |               LEG 2  LENGTH 8C0
LANE   1     2                 |   *   |   |                      LANE    1
MVMT   L     SR                LEG 3 (180,C)                      MVMT  LSR
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 3 X 2

NUMBER OF LEGS ----------------------	4
SIMULATION TIME IN MINUTES ----------	2C
MINIMUM HEADWAY IN SECONDS ----------	1.C
NUMBER CF VEHICLE CLASSES -----------	1C
NUMBER CF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TC ENTER IN MEDIAN LANE ------------	8C
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. -------------	8C

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS ------------	2C	2C	2C	2C

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

 STANDARD 3 X 2

   LEG 1 GEOMETRY DATA:

LEG ANGLE ---------------------------------      0
LENGTH OF INBOUND LANES ----------------       800
LENGTH OF OUTBOUND LANES ---------------       250
NUMBER OF INBOUND LANES ----------------         2
NUMBER OF OUTBOUND LANES ---------------         1
SPEED LIMIT ON INBOUND LANES IN MPH ----        30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---        30
LEG CENTERLINE OFFSET ------------------       -12
MEDIAN WIDTH ---------------------------         0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---        20
LIMITING ANGLE FOR U-TURN --------------        10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER ------------------      1       2
(INBOUND LANE NUMBER) --------      1       2
WIDTH OF LANE ----------------     12      12
MOVEMENT CODE ----------------      L      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0       0
 FROM OUTER END --------------      0       0
OFFSET OF LANE TERMINAL ------      0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------     48      52
                               MEDIAN    CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

LANE NUMBER ------------------      3
(OUTBOUND LANE NUMBER) -------      1
WIDTH OF LANE ----------------     12
MOVEMENT CODE ----------------    LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0
 FROM OUTER END --------------      0
OFFSET OF LANE TERMINAL ------      0
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

 STANDARD 3 X 2

   LEG 2 GEOMETRY DATA:

LEG ANGLE ---------------------------------     90
LENGTH OF INBOUND LANES ----------------       800
LENGTH OF OUTBOUND LANES ---------------       250
NUMBER OF INBOUND LANES ----------------         1
NUMBER OF OUTBOUND LANES ---------------         1
SPEED LIMIT ON INBOUND LANES IN MPH ----        30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---        30
LEG CENTERLINE OFFSET ------------------         0
MEDIAN WIDTH ---------------------------         0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---        20
LIMITING ANGLE FOR U-TURN --------------        10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER ------------------      1
(INBOUND LANE NUMBER) --------      1
WIDTH OF LANE ----------------     12
MOVEMENT CODE ----------------    LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0
 FROM OUTER END --------------      0
OFFSET OF LANE TERMINAL ------      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------    100

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

LANE NUMBER ------------------      2
(OUTBOUND LANE NUMBER) -------      1
WIDTH OF LANE ----------------     12
MOVEMENT CODE ----------------    LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0
 FROM OUTER END --------------      0
OFFSET OF LANE TERMINAL ------      0
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

 STANDARD 3 X 2

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      400
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER -------------------------------   1   2   3   4
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---        0  33  33  34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

 STANDARD 3 X 2

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      200
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER -------------------------------   1   2   3   4
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---       33   0  33  34
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 3 X 2

LEG 3 GEOMETRY DATA:

LEG ANGLE ----------------------------------	180
LENGTH OF INBOUND LANES -------------------	500
LENGTH OF OUTBOUND LANES ------------------	250
NUMBER OF INBOUND LANES -------------------	2
NUMBER OF OUTBOUND LANES ------------------	1
SPEED LIMIT ON INBOUND LANES IN MPH ----	30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---	30
LEG CENTERLINE OFFSET -------------------	0
MEDIAN WIDTH ------------------------------	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---	20
LIMITING ANGLE FOR U-TURN ----------------	10

LANE DATA FOR INBOUND LEG 3:
(CONVERTED APPROACH 3)

LANE NUMBER ----------------------	1	2
(INBOUND LANE NUMBER) ----------	1	2
WIDTH OF LANE ------------------	12	12
MOVEMENT CODE ------------------	L	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL -----------	0	0
FROM OUTER END ---------------	0	0
OFFSET OF LANE TERMINAL -------	0	0
PERCENT OF INBOUND TRAFFIC		
TO ENTER IN THIS LANE --------	48	52
	MEDIAN	CLRB

LANE DATA FOR OUTBOUND LEG 3:
(CONVERTED APPROACH 7)

LANE NUMBER ----------------------	3
(OUTBOUND LANE NUMBER) --------	1
WIDTH OF LANE ------------------	12
MOVEMENT CODE ------------------	LSR
LENGTH OF UNBLOCKED LANE	
FROM LANE TERMINAL -----------	0
FROM OUTER END ---------------	0
OFFSET OF LANE TERMINAL -------	0

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 3 X 2

LEG 4 GEOMETRY DATA:

LEG ANGLE ----------------------------------	270
LENGTH OF INBOUND LANES -------------------	800
LENGTH OF OUTBOUND LANES ------------------	250
NUMBER OF INBOUND LANES -------------------	1
NUMBER OF OUTBOUND LANES ------------------	1
SPEED LIMIT ON INBOUND LANES IN MPH ----	30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---	30
LEG CENTERLINE OFFSET -------------------	0
MEDIAN WIDTH ------------------------------	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---	20
LIMITING ANGLE FOR U-TURN ----------------	10

LANE DATA FOR INBOUND LEG 4:
(CONVERTED APPROACH 4)

LANE NUMBER ----------------------	1
(INBOUND LANE NUMBER) ----------	1
WIDTH OF LANE ------------------	12
MOVEMENT CODE ------------------	LSR
LENGTH OF UNBLOCKED LANE	
FROM LANE TERMINAL -----------	0
FROM OUTER END ---------------	0
OFFSET OF LANE TERMINAL -------	0
PERCENT OF INBOUND TRAFFIC	
TO ENTER IN THIS LANE --------	100

LANE DATA FOR OUTBOUND LEG 4:
(CONVERTED APPROACH 8)

LANE NUMBER ----------------------	2
(OUTBOUND LANE NUMBER) --------	1
WIDTH OF LANE ------------------	12
MOVEMENT CODE ------------------	LSR
LENGTH OF UNBLOCKED LANE	
FROM LANE TERMINAL -----------	0
FROM OUTER END ---------------	0
OFFSET OF LANE TERMINAL -------	0

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 3 X 2

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC	
HEADWAY FREQUENCY DISTRIBUTION ---------	SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------	400
PARAMETER FOR DISTRIBUTION --------------	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---	28.0
85-PERCENTILE SPEED, MPH ----------------	31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ----------------------------	1	2	3	4
PERCENT OF LEG 3 INBOUND				
VEHICLES WITH DESTINATION ON LEG ---	33	33	0	34

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 3 X 2

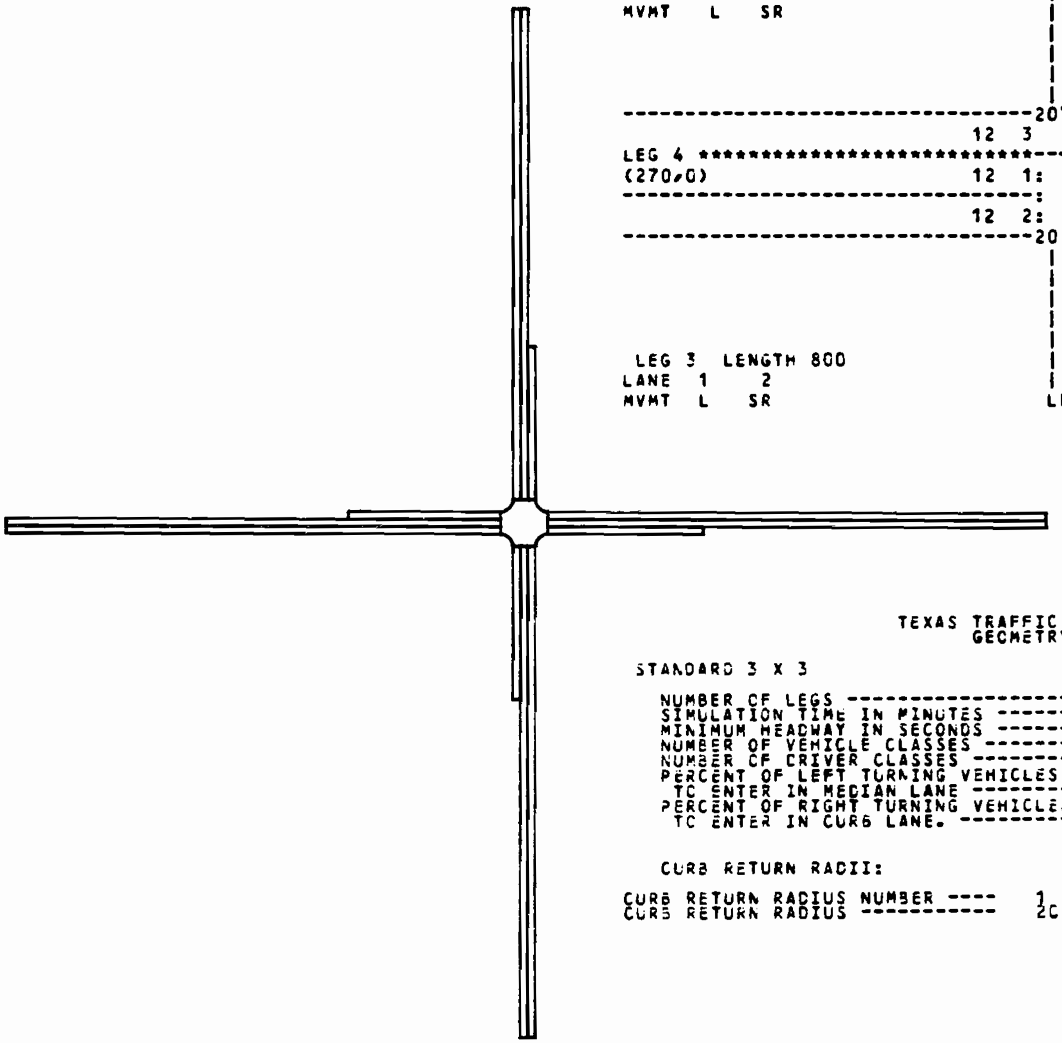
INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC	
HEADWAY FREQUENCY DISTRIBUTION ---------	SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------	200
PARAMETER FOR DISTRIBUTION --------------	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---	28.0
85-PERCENTILE SPEED, MPH ----------------	31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER ----------------------------	1	2	3	4
PERCENT OF LEG 4 INBOUND				
VEHICLES WITH DESTINATION ON LEG ---	33	33	34	0

STANDARD 3 X 3



```
 LEG 4  LENGTH 800                   LEG 1 (0,-12)                  LEG 1  LENGTH 800
LANE    1     2                      |    |    *    |                  LANE    1     2
MVMT    L    SR                      |    |    *    |                  MVMT    L    SR
                                     |    |    *    |
                                     | 12 | 12*12   |
                                     |    |    *    |
                                     | 2  |  1 * 3  |
---------------------------------20.........|      20---------------------------------
                          12   3    3X3     |       :2   12
LEG 4 ****************************-----0---+       :---------------------------------
(270,0)                   12   1:      |            :1   12
---------------------------------:     |-------------***************************** LEG 2
                          12   2:      |             3   12                 (90,-12)
---------------------------------20    |........20---------------------------------
                                     | 3 * 1  | 2   |
                                     |   *    |     |
                                     | 12*12  | 12  |
                                     |   *    |     |
                                     |   *    |     |
 LEG 3  LENGTH 800                   |   *    |     |                 LEG 2  LENGTH 800
LANE   1     2                       |   *    |     |                  LANE    1     2
MVMT   L    SR                       LEG 3 (180,0)                     MVMT    L    SR
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 3 X 3

NUMBER OF LEGS ----------------------	4
SIMULATION TIME IN MINUTES ----------	20
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. -------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS -----------	20	20	20	20

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA
 STANDARD 3 X 3

   LEG 1 GEOMETRY DATA:

  LEG ANGLE -------------------------------     0
  LENGTH OF INBOUND LANES ----------------    800
  LENGTH OF OUTBOUND LANES ---------------    250
  NUMBER OF INBOUND LANES ----------------      2
  NUMBER OF OUTBOUND LANES ---------------      1
  SPEED LIMIT ON INBOUND LANES IN MPH ----     30
  SPEED LIMIT ON OUTBOUND LANES IN MPH ---     30
  LEG CENTERLINE OFFSET ------------------    -12
  MEDIAN WIDTH ---------------------------      0
  LIMITING ANGLE FOR STRAIGHT MOVEMENT ---     20
  LIMITING ANGLE FOR U-TURN --------------     10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

  LANE NUMBER -------------------      1      2
  (INBOUND LANE NUMBER) ---------      1      2
  WIDTH OF LANE -----------------     12     12
  MOVEMENT CODE -----------------      L     SR
  LENGTH OF UNBLOCKED LANE
   FROM LANE TERMINAL -----------      0      0
   FROM OUTER END ---------------      0      0
  OFFSET OF LANE TERMINAL -------      0      0
  PERCENT OF INBOUND TRAFFIC
   TO ENTER IN THIS LANE --------     48     52
                                  MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

  LANE NUMBER -------------------      3
  (OUTBOUND LANE NUMBER) --------      1
  WIDTH OF LANE -----------------     12
  MOVEMENT CODE -----------------    LSR
  LENGTH OF UNBLOCKED LANE
   FROM LANE TERMINAL -----------      0
   FROM OUTER END ---------------      0
  OFFSET OF LANE TERMINAL -------      0
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA
 STANDARD 3 X 3

   LEG 2 GEOMETRY DATA:

  LEG ANGLE -------------------------------    90
  LENGTH OF INBOUND LANES ----------------    800
  LENGTH OF OUTBOUND LANES ---------------    250
  NUMBER OF INBOUND LANES ----------------      2
  NUMBER OF OUTBOUND LANES ---------------      1
  SPEED LIMIT ON INBOUND LANES IN MPH ----     30
  SPEED LIMIT ON OUTBOUND LANES IN MPH ---     30
  LEG CENTERLINE OFFSET ------------------    -12
  MEDIAN WIDTH ---------------------------      0
  LIMITING ANGLE FOR STRAIGHT MOVEMENT ---     20
  LIMITING ANGLE FOR U-TURN --------------     10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

  LANE NUMBER -------------------      1      2
  (INBOUND LANE NUMBER) ---------      1      2
  WIDTH OF LANE -----------------     12     12
  MOVEMENT CODE -----------------      L     SR
  LENGTH OF UNBLOCKED LANE
   FROM LANE TERMINAL -----------      0      0
   FROM OUTER END ---------------      0      0
  OFFSET OF LANE TERMINAL -------      0      0
  PERCENT OF INBOUND TRAFFIC
   TO ENTER IN THIS LANE --------     48     52
                                  MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

  LANE NUMBER -------------------      3
  (OUTBOUND LANE NUMBER) --------      1
  WIDTH OF LANE -----------------     12
  MOVEMENT CODE -----------------    LSR
  LENGTH OF UNBLOCKED LANE
   FROM LANE TERMINAL -----------      0
   FROM OUTER END ---------------      0
  OFFSET OF LANE TERMINAL -------      0
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA
 STANDARD 3 X 3

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

  NAME FOR INBOUND TRAFFIC
   HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
  TOTAL HOURLY VOLUME ON LEG -------------     400
  PARAMETER FOR DISTRIBUTION -------------    2.00
  MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
  85-PERCENTILE SPEED, MPH ---------------    31.0
  TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

  LEG NUMBER ---------------------------    1    2    3    4
  PERCENT OF LEG 1 INBOUND
   VEHICLES WITH DESTINATION ON LEG ---     0   33   33   34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA
 STANDARD 3 X 3

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

  NAME FOR INBOUND TRAFFIC
   HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
  TOTAL HOURLY VOLUME ON LEG -------------     400
  PARAMETER FOR DISTRIBUTION -------------    2.00
  MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
  85-PERCENTILE SPEED, MPH ---------------    31.0
  TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

  LEG NUMBER ---------------------------    1    2    3    4
  PERCENT OF LEG 2 INBOUND
   VEHICLES WITH DESTINATION ON LEG ---    33    0   33   34
```

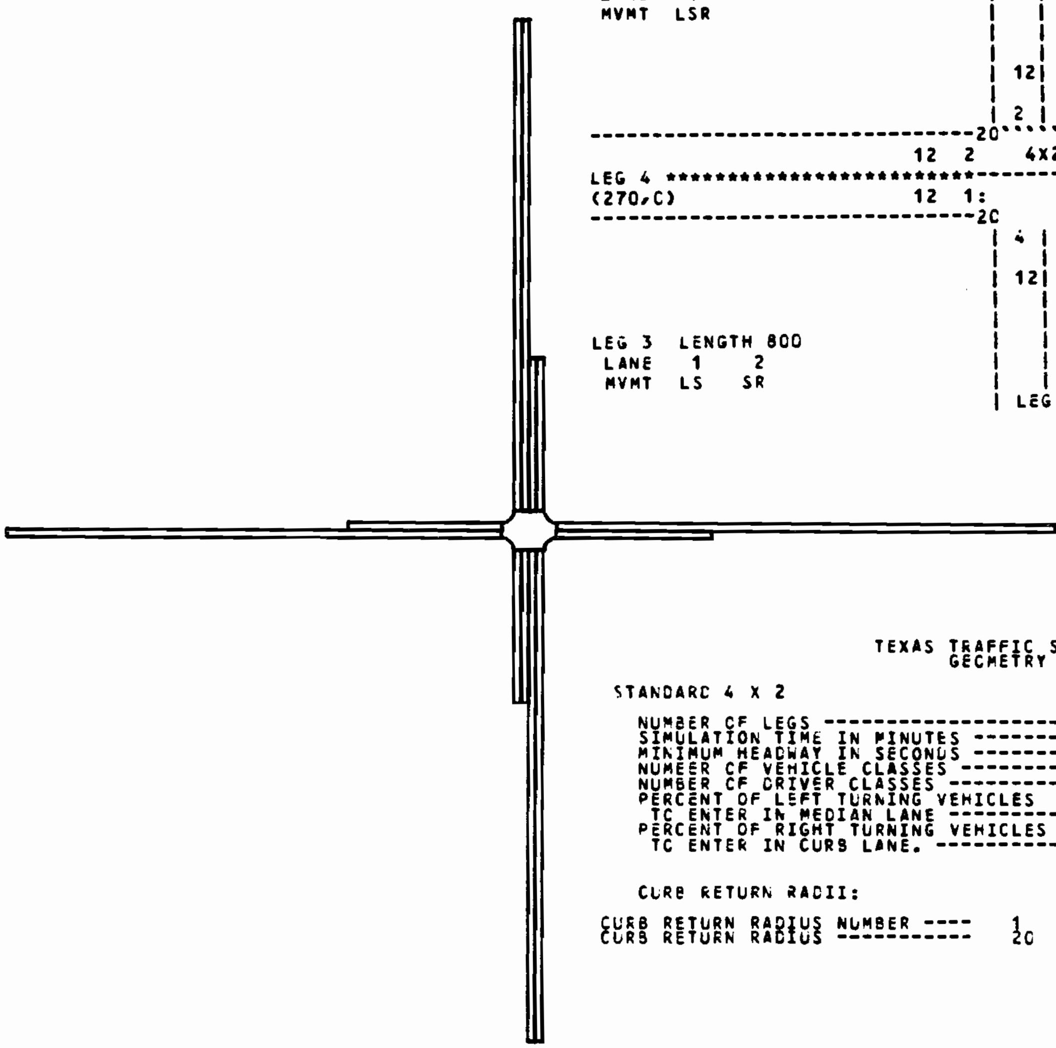
```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

 STANDARD 3 X 3

   LEG 3 GEOMETRY DATA:

LEG ANGLE ---------------------------------   180
LENGTH OF INBOUND LANES -----------------     800
LENGTH OF OUTBOUND LANES ----------------     250
NUMBER OF INBOUND LANES -----------------       2
NUMBER OF OUTBOUND LANES ----------------       1
SPEED LIMIT ON INBOUND LANES IN MPH ----       30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---       30
LEG CENTERLINE OFFSET -------------------       0
MEDIAN WIDTH ----------------------------       0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---       20
LIMITING ANGLE FOR U-TURN --------------       10

   LANE DATA FOR INBOUND LEG 3:
    (CONVERTED APPROACH 3)

LANE NUMBER -------------------      1       2
(INBOUND LANE NUMBER) ---------      1       2
WIDTH OF LANE -----------------     12      12
MOVEMENT CODE -----------------      L      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0       0
 FROM OUTER END ---------------      0       0
OFFSET OF LANE TERMINAL ------       0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     48      52
                                MEDIAN    CURB

   LANE DATA FOR OUTBOUND LEG 3:
    (CONVERTED APPROACH 7)

LANE NUMBER -------------------      3
(OUTBOUND LANE NUMBER) --------      1
WIDTH OF LANE -----------------     12
MOVEMENT CODE -----------------    LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0
 FROM OUTER END ---------------      0
OFFSET OF LANE TERMINAL ------       0
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

 STANDARD 3 X 3

   LEG 4 GEOMETRY DATA:

LEG ANGLE ---------------------------------   270
LENGTH OF INBOUND LANES -----------------     800
LENGTH OF OUTBOUND LANES ----------------     250
NUMBER OF INBOUND LANES -----------------       2
NUMBER OF OUTBOUND LANES ----------------       1
SPEED LIMIT ON INBOUND LANES IN MPH ----       30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---       30
LEG CENTERLINE OFFSET -------------------       0
MEDIAN WIDTH ----------------------------       0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---       20
LIMITING ANGLE FOR U-TURN --------------       10

   LANE DATA FOR INBOUND LEG 4:
    (CONVERTED APPROACH 4)

LANE NUMBER -------------------      1       2
(INBOUND LANE NUMBER) ---------      1       2
WIDTH OF LANE -----------------     12      12
MOVEMENT CODE -----------------      L      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0       0
 FROM OUTER END ---------------      0       0
OFFSET OF LANE TERMINAL ------       0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     48      52
                                MEDIAN    CURB

   LANE DATA FOR OUTBOUND LEG 4:
    (CONVERTED APPROACH 8)

LANE NUMBER -------------------      3
(OUTBOUND LANE NUMBER) --------      1
WIDTH OF LANE -----------------     12
MOVEMENT CODE -----------------    LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0
 FROM OUTER END ---------------      0
OFFSET OF LANE TERMINAL ------       0
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                        DRIVER-VEHICLE INPUT DATA

 STANDARD 3 X 3

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------     400
PARAMETER FOR DISTRIBUTION --------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ----------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ----------------------------   1    2    3    4
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33   33    0   34
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                        DRIVER-VEHICLE INPUT DATA

 STANDARD 3 X 3

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------     400
PARAMETER FOR DISTRIBUTION --------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ----------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER ----------------------------   1    2    3    4
PERCENT OF LEG 4 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33   33   34    0
```

STANDARD 4 X 2



```
LEG 4  LENGTH 800              |  LEG 1 (0,0)   |              LEG 1  LENGTH 800
 LANE   1                      |   |    *    |  |               LANE   1    2
 MVMT  LSR                     |   |    *    |  |               MVMT  LS    SR
                               |   |    *    |  |
                               |   |    *    |  |
                               | 12| 12*12  |12 |
                               |   |    *    |  |
                               | 2 |  1 * 3  | 4 |
------------------------------20........|       20------------------------------
                     12  2      4X2     |        :1  12
LEG 4 ************************----------0----------************************ LEG 2
(270,0)              12  1:             |         2  12                  (90,0)
------------------------------20        |.......20------------------------------
                               | 4 | 3 * 1 | 2 |
                               |   |    *   |   |
                               | 12| 12*12 |12 |
                               |   |    *   |   |
                               |   |    *   |   |
LEG 3  LENGTH 800              |   |    *   |   |               LEG 2  LENGTH 800
 LANE   1    2                 |   |    *   |   |                LANE   1
 MVMT  LS    SR                |   |    *   |   |                MVMT  LSR
                               | LEG 3 (180,0) |
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 4 X 2

```
   NUMBER OF LEGS -----------------------     4
   SIMULATION TIME IN MINUTES -----------    20
   MINIMUM HEADWAY IN SECONDS -----------   1.0
   NUMBER OF VEHICLE CLASSES ------------    10
   NUMBER OF DRIVER CLASSES -------------     3
   PERCENT OF LEFT TURNING VEHICLES
     TO ENTER IN MEDIAN LANE ------------    80
   PERCENT OF RIGHT TURNING VEHICLES
     TO ENTER IN CURB LANE. -------------    80

   CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----    1     2     3     4
CURB RETURN RADIUS -----------   20    20    20    20
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 4 X 2

   LEG 1 GEOMETRY DATA:

LEG ANGLE ----------------------------------      0
LENGTH OF INBOUND LANES ----------------       800
LENGTH OF OUTBOUND LANES ---------------       250
NUMBER OF INBOUND LANES ----------------         2
NUMBER OF OUTBOUND LANES ---------------         2
SPEED LIMIT ON INBOUND LANES IN MPH ----        30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---        30
LEG CENTERLINE OFFSET ------------------         0
MEDIAN WIDTH ---------------------------         0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---        20
LIMITING ANGLE FOR U-TURN --------------        10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER -------------------      1      2
(INBOUND LANE NUMBER) ---------      1      2
WIDTH OF LANE -----------------     12     12
MOVEMENT CODE -----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     48     52
                                MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

LANE NUMBER -------------------      3      4
(OUTBOUND LANE NUMBER) --------      1      2
WIDTH OF LANE -----------------     12     12
MOVEMENT CODE -----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------      0      0
                                MEDIAN   CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 4 X 2

   LEG 2 GEOMETRY DATA:

LEG ANGLE ----------------------------------     90
LENGTH OF INBOUND LANES ----------------       800
LENGTH OF OUTBOUND LANES ---------------       250
NUMBER OF INBOUND LANES ----------------         1
NUMBER OF OUTBOUND LANES ---------------         1
SPEED LIMIT ON INBOUND LANES IN MPH ----        30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---        30
LEG CENTERLINE OFFSET ------------------         0
MEDIAN WIDTH ---------------------------         0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---        20
LIMITING ANGLE FOR U-TURN --------------        10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER -------------------      1
(INBOUND LANE NUMBER) ---------      1
WIDTH OF LANE -----------------     12
MOVEMENT CODE -----------------    LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0
 FROM OUTER END ---------------      0
OFFSET OF LANE TERMINAL -------      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------    100

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

LANE NUMBER -------------------      2
(OUTBOUND LANE NUMBER) --------      1
WIDTH OF LANE -----------------     12
MOVEMENT CODE -----------------    LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0
 FROM OUTER END ---------------      0
OFFSET OF LANE TERMINAL -------      0
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

STANDARD 4 X 2

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      400
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER ----------------------------   1   2   3   4
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---     0  33  33  34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

STANDARD 4 X 2

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      200
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER ----------------------------   1   2   3   4
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33   0  33  34
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 4 X 2

LEG 3 GEOMETRY DATA:

LEG ANGLE --------------------------------	180
LENGTH OF INBOUND LANES ----------------	800
LENGTH OF OUTBOUND LANES ---------------	250
NUMBER OF INBOUND LANES ----------------	2
NUMBER OF OUTBOUND LANES ---------------	2
SPEED LIMIT ON INBOUND LANES IN MPH ----	30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---	30
LEG CENTERLINE OFFSET ------------------	0
MEDIAN WIDTH ---------------------------	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---	20
LIMITING ANGLE FOR U-TURN --------------	10

LANE DATA FOR INBOUND LEG 3:
(CONVERTED APPROACH 3)

LANE NUMBER ------------------	1	2
(INBOUND LANE NUMBER) --------	1	2
WIDTH OF LANE ----------------	12	12
MOVEMENT CODE ----------------	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL ----------	0	0
FROM OUTER END --------------	0	0
OFFSET OF LANE TERMINAL ------	0	0
PERCENT OF INBOUND TRAFFIC		
TO ENTER IN THIS LANE --------	48	52
	MEDIAN	CURB

LANE DATA FOR OUTBOUND LEG 3:
(CONVERTED APPROACH 7)

LANE NUMBER ------------------	3	4
(OUTBOUND LANE NUMBER) -------	1	2
WIDTH OF LANE ----------------	12	12
MOVEMENT CODE ----------------	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL ----------	0	0
FROM OUTER END --------------	0	0
OFFSET OF LANE TERMINAL ------	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 4 X 2

LEG 4 GEOMETRY DATA:

LEG ANGLE --------------------------------	270
LENGTH OF INBOUND LANES ----------------	800
LENGTH OF OUTBOUND LANES ---------------	250
NUMBER OF INBOUND LANES ----------------	1
NUMBER OF OUTBOUND LANES ---------------	1
SPEED LIMIT ON INBOUND LANES IN MPH ----	30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---	30
LEG CENTERLINE OFFSET ------------------	0
MEDIAN WIDTH ---------------------------	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---	20
LIMITING ANGLE FOR U-TURN --------------	10

LANE DATA FOR INBOUND LEG 4:
(CONVERTED APPROACH 4)

LANE NUMBER ------------------	1
(INBOUND LANE NUMBER) --------	1
WIDTH OF LANE ----------------	12
MOVEMENT CODE ----------------	LSR
LENGTH OF UNBLOCKED LANE	
FROM LANE TERMINAL ----------	0
FROM OUTER END --------------	0
OFFSET OF LANE TERMINAL ------	0
PERCENT OF INBOUND TRAFFIC	
TO ENTER IN THIS LANE --------	100

LANE DATA FOR OUTBOUND LEG 4:
(CONVERTED APPROACH 8)

LANE NUMBER ------------------	2
(OUTBOUND LANE NUMBER) -------	1
WIDTH OF LANE ----------------	12
MOVEMENT CODE ----------------	LSR
LENGTH OF UNBLOCKED LANE	
FROM LANE TERMINAL ----------	0
FROM OUTER END --------------	0
OFFSET OF LANE TERMINAL ------	0

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 4 X 2

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC	
HEADWAY FREQUENCY DISTRIBUTION ---------	SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------	400
PARAMETER FOR DISTRIBUTION -------------	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---	28.0
85-PERCENTILE SPEED, MPH ---------------	31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ---------------------------	1	2	3	4
PERCENT OF LEG 3 INBOUND				
VEHICLES WITH DESTINATION ON LEG ---	33	33	0	34

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 4 X 2

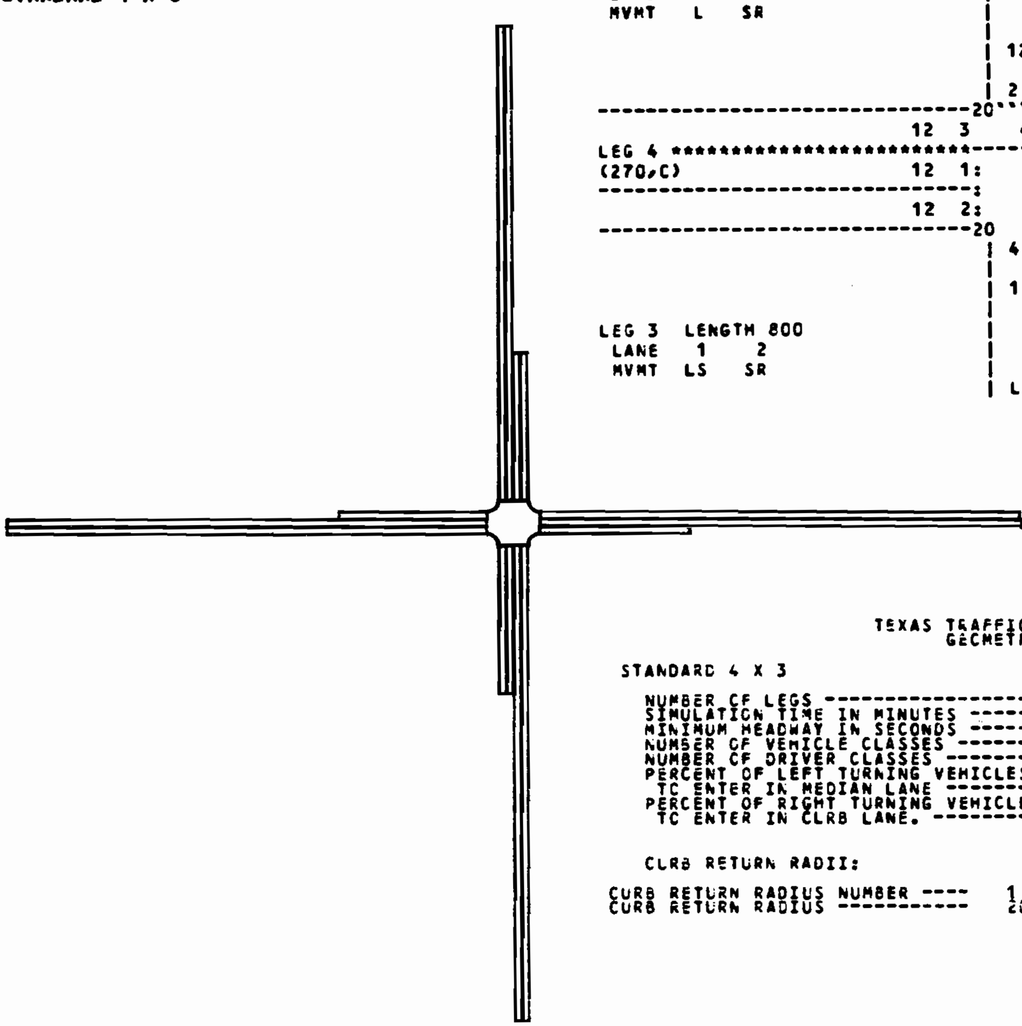
INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC	
HEADWAY FREQUENCY DISTRIBUTION ---------	SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------	200
PARAMETER FOR DISTRIBUTION -------------	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---	28.0
85-PERCENTILE SPEED, MPH ---------------	31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER ---------------------------	1	2	3	4
PERCENT OF LEG 4 INBOUND				
VEHICLES WITH DESTINATION ON LEG ---	33	33	34	0

STANDARD 4 X 3



```
LEG 4  LENGTH 800                   LEG 1 (0,0)  |                    LEG 1  LENGTH 800
 LANE   1    2                    |    |    *    |    |                LANE   1    2
 MVMT   L    SR                   |    |    *    |    |                MVMT   LS   SR
                                  |    |    *    |    |
                                  | 12 |  12*12  | 12 |
                                  |    |    *    |    |
                                  | 2  | 1  * 3  | 4  |
-------------------------------20.......|          20-------------------------------
                        12  3     4X3   |           :2  12
LEG 4 ************************---------0           :-------------------------------
(270,0)                 12  1:          |           :1  12
-------------------------------:        +---------------**************************** LEG 2
                        12  2:          |             3  12                  (90,-12)
-------------------------------20       |.......20-------------------------------
                                  | 4  | 3  * 1  | 2  |
                                  |    |    *    |    |
                                  | 12 |  12*12  | 12 |
LEG 3  LENGTH 800                 |    |    *    |    |                LEG 2  LENGTH 800
 LANE   1    2                    |    |    *    |    |                LANE   1    2
 MVMT   LS   SR                   |    |    *    |    |                MVMT   L    SR
                                  | LEG 3 (180,0)     |
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 4 X 3

NUMBER OF LEGS ----------------------	4
SIMULATION TIME IN MINUTES ----------	20
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. -------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS -----------	20	20	20	20

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

STANDARD 4 X 3

   LEG 1 GEOMETRY DATA:

LEG ANGLE ------------------------------------    0
LENGTH OF INBOUND LANES ----------------------  800
LENGTH OF OUTBOUND LANES ---------------------  250
NUMBER OF INBOUND LANES ----------------------    2
NUMBER OF OUTBOUND LANES ---------------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----------   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---------   30
LEG CENTERLINE OFFSET ------------------------    0
MEDIAN WIDTH ---------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---------   20
LIMITING ANGLE FOR U-TURN --------------------   10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER -------------------     1       2
(INBOUND LANE NUMBER) ---------     1       2
WIDTH OF LANE -----------------    12      12
MOVEMENT CODE -----------------    LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0       0
 FROM OUTER END ---------------     0       0
OFFSET OF LANE TERMINAL -------     0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------    48      52
                               MEDIAN    CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

LANE NUMBER -------------------     3       4
(OUTBOUND LANE NUMBER) --------     1       2
WIDTH OF LANE -----------------    12      12
MOVEMENT CODE -----------------    LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0       0
 FROM OUTER END ---------------     0       0
OFFSET OF LANE TERMINAL -------     0       0
                               MEDIAN    CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

STANDARD 4 X 3

   LEG 2 GEOMETRY DATA:

LEG ANGLE ------------------------------------   90
LENGTH OF INBOUND LANES ----------------------  800
LENGTH OF OUTBOUND LANES ---------------------  250
NUMBER OF INBOUND LANES ----------------------    2
NUMBER OF OUTBOUND LANES ---------------------    1
SPEED LIMIT ON INBOUND LANES IN MPH ----------   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---------   30
LEG CENTERLINE OFFSET ------------------------  -12
MEDIAN WIDTH ---------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---------   20
LIMITING ANGLE FOR U-TURN --------------------   10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER -------------------     1       2
(INBOUND LANE NUMBER) ---------     1       2
WIDTH OF LANE -----------------    12      12
MOVEMENT CODE -----------------     L      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0       0
 FROM OUTER END ---------------     0       0
OFFSET OF LANE TERMINAL -------     0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------    48      52
                               MEDIAN    CURB

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

LANE NUMBER -------------------     3
(OUTBOUND LANE NUMBER) --------     1
WIDTH OF LANE -----------------    12
MOVEMENT CODE -----------------   LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0
 FROM OUTER END ---------------     0
OFFSET OF LANE TERMINAL -------     0
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

STANDARD 4 X 3

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      400
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER ---------------------------   1    2    3    4
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    0   33   33   34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

STANDARD 4 X 3

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      400
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER ---------------------------   1    2    3    4
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   33    0   33   34
```

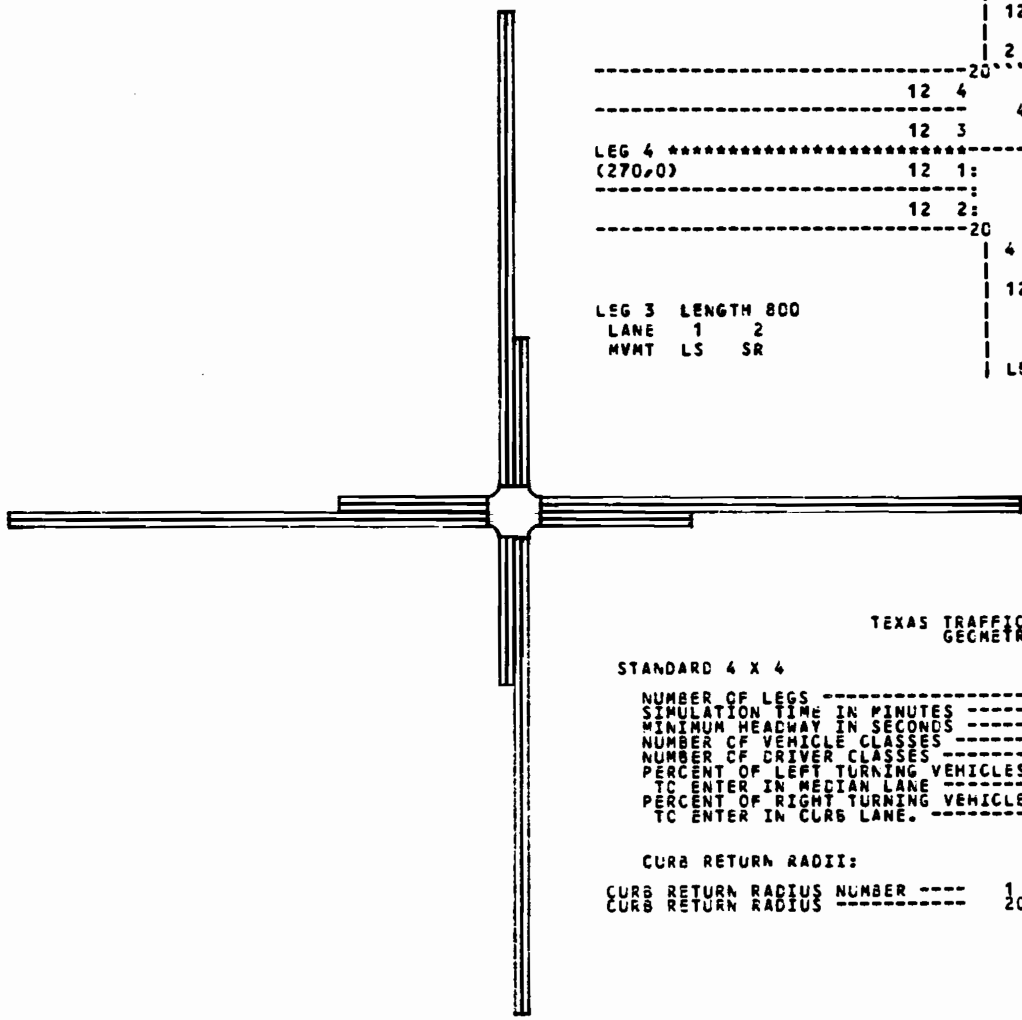
```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

 STANDARD 4 X 3

   LEG 3 GEOMETRY DATA:

LEG ANGLE ------------------------------------  180
LENGTH OF INBOUND LANES ----------------------  800
LENGTH OF OUTBOUND LANES ---------------------  250
NUMBER OF INBOUND LANES ----------------------    2
NUMBER OF OUTBOUND LANES ---------------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----------   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---------   30
LEG CENTERLINE OFFSET ------------------------    0
MEDIAN WIDTH ---------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---------   20
LIMITING ANGLE FOR U-TURN --------------------   10

   LANE DATA FOR INBOUND LEG 3:
    (CONVERTED APPROACH 3)

LANE NUMBER -------------------      1      2
(INBOUND LANE NUMBER) ---------      1      2
WIDTH OF LANE -----------------     12     12
MOVEMENT CODE -----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     48     52
                                MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 3:
    (CONVERTED APPROACH 7)

LANE NUMBER -------------------      3      4
(OUTBOUND LANE NUMBER) --------      1      2
WIDTH OF LANE -----------------     12     12
MOVEMENT CODE -----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------      0      0
                                MEDIAN   CURB
```

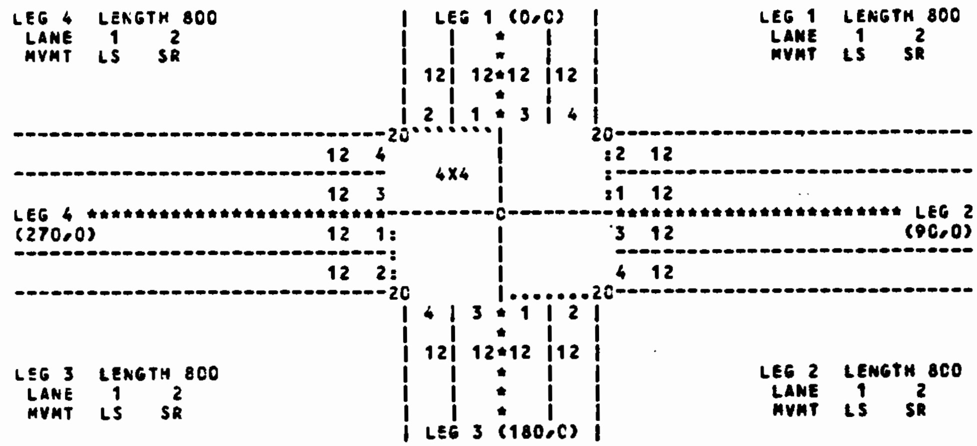
```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

 STANDARD 4 X 3

   LEG 4 GEOMETRY DATA:

LEG ANGLE ------------------------------------  270
LENGTH OF INBOUND LANES ----------------------  800
LENGTH OF OUTBOUND LANES ---------------------  250
NUMBER OF INBOUND LANES ----------------------    2
NUMBER OF OUTBOUND LANES ---------------------    1
SPEED LIMIT ON INBOUND LANES IN MPH ----------   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---------   30
LEG CENTERLINE OFFSET ------------------------    0
MEDIAN WIDTH ---------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---------   20
LIMITING ANGLE FOR U-TURN --------------------   10

   LANE DATA FOR INBOUND LEG 4:
    (CONVERTED APPROACH 4)

LANE NUMBER -------------------      1      2
(INBOUND LANE NUMBER) ---------      1      2
WIDTH OF LANE -----------------     12     12
MOVEMENT CODE -----------------      L     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     48     52
                                MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 4:
    (CONVERTED APPROACH 8)

LANE NUMBER -------------------      3
(OUTBOUND LANE NUMBER) --------      1
WIDTH OF LANE -----------------     12
MOVEMENT CODE -----------------    LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0
 FROM OUTER END ---------------      0
OFFSET OF LANE TERMINAL -------      0
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

 STANDARD 4 X 3

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------      400
PARAMETER FOR DISTRIBUTION --------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ----     28.0
85-PERCENTILE SPEED, MPH ----------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ----------------------------   1    2    3    4
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33   33    0   34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

 STANDARD 4 X 3

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------      400
PARAMETER FOR DISTRIBUTION --------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ----     28.0
85-PERCENTILE SPEED, MPH ----------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER ----------------------------   1    2    3    4
PERCENT OF LEG 4 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33   33   34    0
```

STANDARD 4 X 4





TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 4 X 4

NUMBER OF LEGS ----------------------	4
SIMULATION TIME IN MINUTES ----------	20
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. ------------	90

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS -----------	20	20	20	20

```
                        TEXAS TRAFFIC SIMULATION PACKAGE
                             GEOMETRY INPUT DATA

 STANDARD 4 X 4

   LEG 1 GEOMETRY DATA:

LEG ANGLE ------------------------------     0
LENGTH OF INBOUND LANES ----------------   800
LENGTH OF OUTBOUND LANES ---------------   250
NUMBER OF INBOUND LANES ----------------     2
NUMBER OF OUTBOUND LANES ---------------     2
SPEED LIMIT ON INBOUND LANES IN MPH ----    30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---    30
LEG CENTERLINE OFFSET ------------------     0
MEDIAN WIDTH ---------------------------     0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---    20
LIMITING ANGLE FOR U-TURN --------------    10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER ------------------     1      2
(INBOUND LANE NUMBER) --------     1      2
WIDTH OF LANE ----------------    12     12
MOVEMENT CODE ----------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0      0
 FROM OUTER END --------------     0      0
OFFSET OF LANE TERMINAL ------     0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------    48     52
                              MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

LANE NUMBER ------------------     3      4
(OUTBOUND LANE NUMBER) -------     1      2
WIDTH OF LANE ----------------    12     12
MOVEMENT CODE ----------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0      0
 FROM OUTER END --------------     0      0
OFFSET OF LANE TERMINAL ------     0      0
                              MEDIAN   CURB
```

```
                        TEXAS TRAFFIC SIMULATION PACKAGE
                             GEOMETRY INPUT DATA

 STANDARD 4 X 4

   LEG 2 GEOMETRY DATA:

LEG ANGLE ------------------------------    90
LENGTH OF INBOUND LANES ----------------   800
LENGTH OF OUTBOUND LANES ---------------   250
NUMBER OF INBOUND LANES ----------------     2
NUMBER OF OUTBOUND LANES ---------------     2
SPEED LIMIT ON INBOUND LANES IN MPH ----    30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---    30
LEG CENTERLINE OFFSET ------------------     0
MEDIAN WIDTH ---------------------------     0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---    20
LIMITING ANGLE FOR U-TURN --------------    10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER ------------------     1      2
(INBOUND LANE NUMBER) --------     1      2
WIDTH OF LANE ----------------    12     12
MOVEMENT CODE ----------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0      0
 FROM OUTER END --------------     0      0
OFFSET OF LANE TERMINAL ------     0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------    48     52
                              MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

LANE NUMBER ------------------     3      4
(OUTBOUND LANE NUMBER) -------     1      2
WIDTH OF LANE ----------------    12     12
MOVEMENT CODE ----------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0      0
 FROM OUTER END --------------     0      0
OFFSET OF LANE TERMINAL ------     0      0
                              MEDIAN   CURB
```

```
                        TEXAS TRAFFIC SIMULATION PACKAGE
                          DRIVER-VEHICLE INPUT DATA

 STANDARD 4 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------     400
PARAMETER FOR DISTRIBUTION -------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER --------------------------   1   2   3   4
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   0  33  33  34
```

```
                        TEXAS TRAFFIC SIMULATION PACKAGE
                          DRIVER-VEHICLE INPUT DATA

 STANDARD 4 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------     400
PARAMETER FOR DISTRIBUTION -------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER --------------------------   1   2   3   4
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---  33   0  33  34
```

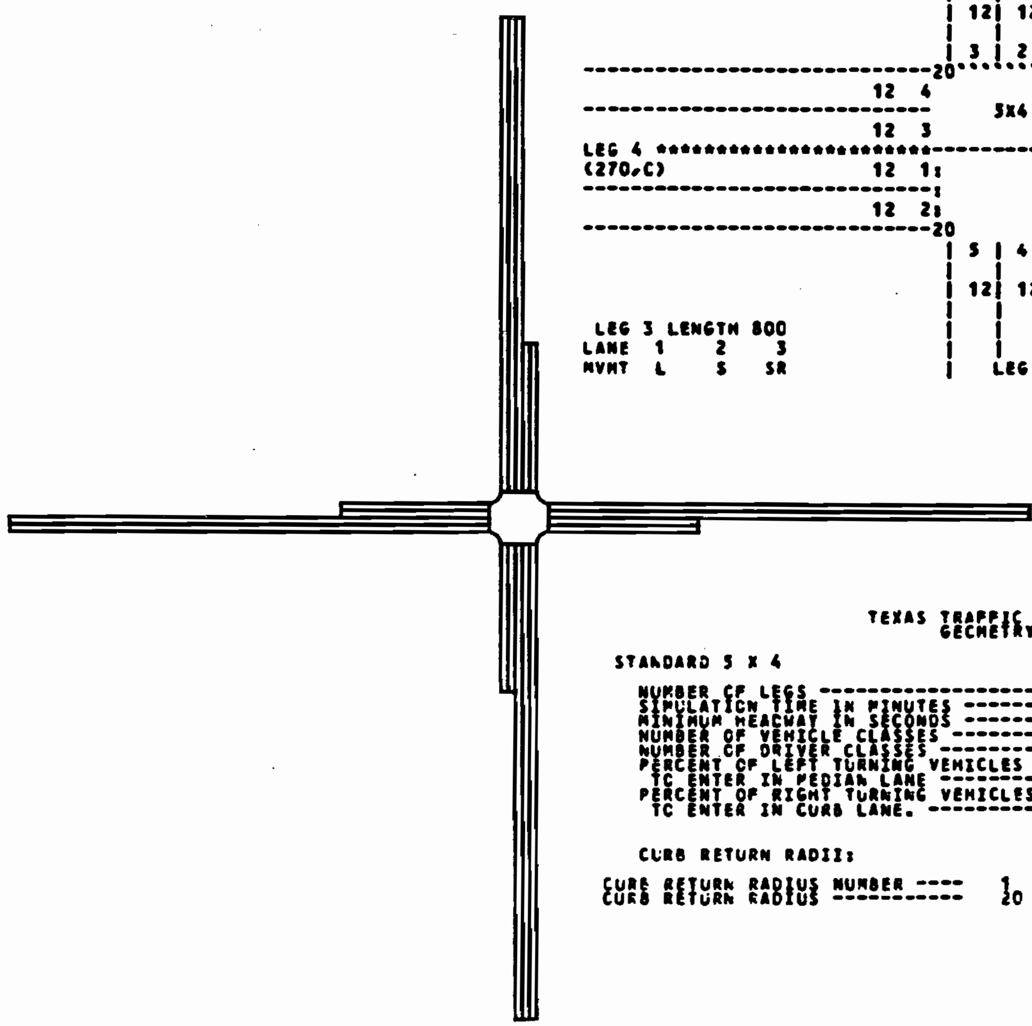
```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                              GEOMETRY INPUT DATA

STANDARD 4 X 4

   LEG 3 GEOMETRY DATA:

LEG ANGLE ---------------------------------  180
LENGTH OF INBOUND LANES -------------------  800
LENGTH OF OUTBOUND LANES ------------------  250
NUMBER OF INBOUND LANES -------------------    2
NUMBER OF OUTBOUND LANES ------------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ------    30
SPEED LIMIT ON OUTBOUND LANES IN MPH -----    30
LEG CENTERLINE OFFSET ---------------------    0
MEDIAN WIDTH ------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT -----    20
LIMITING ANGLE FOR U-TURN -----------------   10

   LANE DATA FOR INBOUND LEG 3:
     (CONVERTED APPROACH 3)

LANE NUMBER ------------------       1       2
(INBOUND LANE NUMBER) --------       1       2
WIDTH OF LANE ----------------      12      12
MOVEMENT CODE ----------------      LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------       0       0
 FROM OUTER END --------------       0       0
OFFSET OF LANE TERMINAL ------       0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------      48      52
                                MEDIAN    CURB

   LANE DATA FOR OUTBOUND LEG 3:
     (CONVERTED APPROACH 7)

LANE NUMBER ------------------       3       4
(OUTBOUND LANE NUMBER) -------       1       2
WIDTH OF LANE ----------------      12      12
MOVEMENT CODE ----------------      LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------       0       0
 FROM OUTER END --------------       0       0
OFFSET OF LANE TERMINAL ------       0       0
                                MEDIAN    CURB
```

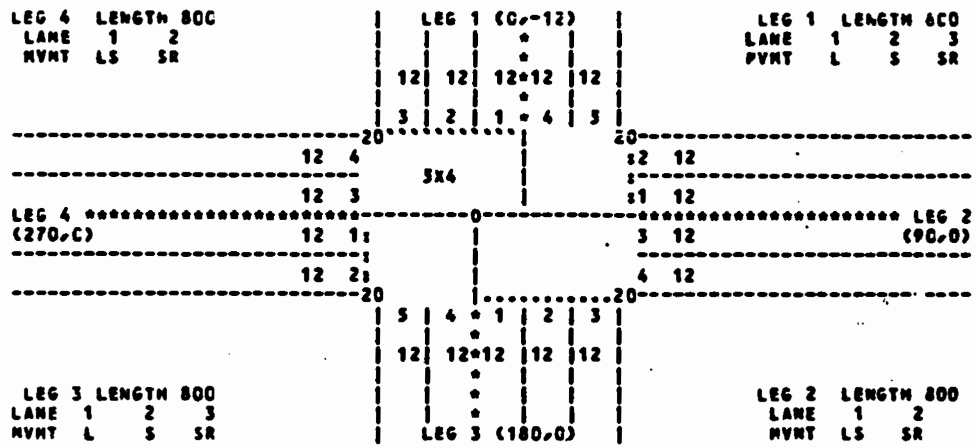
```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                              GEOMETRY INPUT DATA

STANDARD 4 X 4

   LEG 4 GEOMETRY DATA:

LEG ANGLE ---------------------------------  270
LENGTH OF INBOUND LANES -------------------  800
LENGTH OF OUTBOUND LANES ------------------  250
NUMBER OF INBOUND LANES -------------------    2
NUMBER OF OUTBOUND LANES ------------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ------    30
SPEED LIMIT ON OUTBOUND LANES IN MPH -----    30
LEG CENTERLINE OFFSET ---------------------    0
MEDIAN WIDTH ------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT -----    20
LIMITING ANGLE FOR U-TURN -----------------   10

   LANE DATA FOR INBOUND LEG 4:
     (CONVERTED APPROACH 4)

LANE NUMBER ------------------       1       2
(INBOUND LANE NUMBER) --------       1       2
WIDTH OF LANE ----------------      12      12
MOVEMENT CODE ----------------      LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------       0       0
 FROM OUTER END --------------       0       0
OFFSET OF LANE TERMINAL ------       0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------      48      52
                                MEDIAN    CURB

   LANE DATA FOR OUTBOUND LEG 4:
     (CONVERTED APPROACH 8)

LANE NUMBER ------------------       3       4
(OUTBOUND LANE NUMBER) -------       1       2
WIDTH OF LANE ----------------      12      12
MOVEMENT CODE ----------------      LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------       0       0
 FROM OUTER END --------------       0       0
OFFSET OF LANE TERMINAL ------       0       0
                                MEDIAN    CURB
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                             DRIVER-VEHICLE INPUT DATA

STANDARD 4 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------     400
PARAMETER FOR DISTRIBUTION --------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ---------------------------    1    2    3    4
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33   33    0   34
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                             DRIVER-VEHICLE INPUT DATA

STANDARD 4 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------     400
PARAMETER FOR DISTRIBUTION --------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER ---------------------------    1    2    3    4
PERCENT OF LEG 4 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33   33   34    0
```

STANDARD 5 X 4





TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 5 X 4

NUMBER OF LEGS ----------------------	4
SIMULATION TIME IN MINUTES ----------	20
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. -------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS -----------	20	20	20	20

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 5 X 4

LEG 1 GEOMETRY DATA:

```
LEG ANGLE --------------------------------------     0
LENGTH OF INBOUND LANES -----------------------    800
LENGTH OF OUTBOUND LANES ----------------------    250
NUMBER OF INBOUND LANES -----------------------      3
NUMBER OF OUTBOUND LANES ----------------------      2
SPEED LIMIT ON INBOUND LANES IN MPH -----------     30
SPEED LIMIT ON OUTBOUND LANES IN MPH ----------     30
LEG CENTERLINE OFFSET -------------------------    -12
MEDIAN WIDTH ----------------------------------      0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ----------     20
LIMITING ANGLE FOR U-TURN ---------------------     10
```

LANE DATA FOR INBOUND LEG 1:
(CONVERTED APPROACH 1)

```
LANE NUMBER ----------------------     1      2      3
(INBOUND LANE NUMBER) ------------     1      2      3
WIDTH OF LANE --------------------    12     12     12
MOVEMENT CODE --------------------     L      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL --------------     0      0      0
 FROM OUTER END ------------------     0      0      0
OFFSET OF LANE TERMINAL ----------     0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -----------    32     35     33
                                  MEDIAN          CURB
```

LANE DATA FOR OUTBOUND LEG 1:
(CONVERTED APPROACH 5)

```
LANE NUMBER ----------------------     4      5
(OUTBOUND LANE NUMBER) -----------     1      2
WIDTH OF LANE --------------------    12     12
MOVEMENT CODE --------------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL --------------     0      0
 FROM OUTER END ------------------     0      0
OFFSET OF LANE TERMINAL ----------     0      0
                                  MEDIAN   CURB
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 5 X 4

LEG 2 GEOMETRY DATA:

```
LEG ANGLE --------------------------------------    90
LENGTH OF INBOUND LANES -----------------------    800
LENGTH OF OUTBOUND LANES ----------------------    250
NUMBER OF INBOUND LANES -----------------------      2
NUMBER OF OUTBOUND LANES ----------------------      2
SPEED LIMIT ON INBOUND LANES IN MPH -----------     30
SPEED LIMIT ON OUTBOUND LANES IN MPH ----------     30
LEG CENTERLINE OFFSET -------------------------      0
MEDIAN WIDTH ----------------------------------      0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ----------     20
LIMITING ANGLE FOR U-TURN ---------------------     10
```

LANE DATA FOR INBOUND LEG 2:
(CONVERTED APPROACH 2)

```
LANE NUMBER ----------------------     1      2
(INBOUND LANE NUMBER) ------------     1      2
WIDTH OF LANE --------------------    12     12
MOVEMENT CODE --------------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL --------------     0      0
 FROM OUTER END ------------------     0      0
OFFSET OF LANE TERMINAL ----------     0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -----------    48     52
                                  MEDIAN   CURB
```

LANE DATA FOR OUTBOUND LEG 2:
(CONVERTED APPROACH 6)

```
LANE NUMBER ----------------------     3      4
(OUTBOUND LANE NUMBER) -----------     1      2
WIDTH OF LANE --------------------    12     12
MOVEMENT CODE --------------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL --------------     0      0
 FROM OUTER END ------------------     0      0
OFFSET OF LANE TERMINAL ----------     0      0
                                  MEDIAN   CURB
```

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 5 X 4

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

```
NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------   SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------       600
PARAMETER FOR DISTRIBUTION --------------      2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ----      28.0
85-PERCENTILE SPEED, MPH ----------------      31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------        NO
```

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

```
LEG NUMBER -----------------------------   1   2   3   4
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---      0  33  33  34
```

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 5 X 4

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

```
NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------   SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------       400
PARAMETER FOR DISTRIBUTION --------------      2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ----      28.0
85-PERCENTILE SPEED, MPH ----------------      31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------        NO
```

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

```
LEG NUMBER -----------------------------   1   2   3   4
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---     33   0  33  34
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 5 X 4

LEG 3 GEOMETRY DATA:

LEG ANGLE	180
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	3
NUMBER OF OUTBOUND LANES	2
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	0
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 3:
(CONVERTED APPROACH 3)

LANE NUMBER	1	2	3
(INBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	L	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	32	35	33
	MEDIAN		CURB

LANE DATA FOR OUTBOUND LEG 3:
(CONVERTED APPROACH 7)

LANE NUMBER	4	5
(OUTBOUND LANE NUMBER)	1	2
WIDTH OF LANE	12	12
MOVEMENT CODE	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	0	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 5 X 4

LEG 4 GEOMETRY DATA:

LEG ANGLE	270
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	2
NUMBER OF OUTBOUND LANES	2
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	0
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 4:
(CONVERTED APPROACH 4)

LANE NUMBER	1	2
(INBOUND LANE NUMBER)	1	2
WIDTH OF LANE	12	12
MOVEMENT CODE	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	0	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	48	52
	MEDIAN	CURB

LANE DATA FOR OUTBOUND LEG 4:
(CONVERTED APPROACH 8)

LANE NUMBER	3	4
(OUTBOUND LANE NUMBER)	1	2
WIDTH OF LANE	12	12
MOVEMENT CODE	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	0	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 5 X 4

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	600
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 3 INBOUND VEHICLES WITH DESTINATION ON LEG	33	33	0	34

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 5 X 4

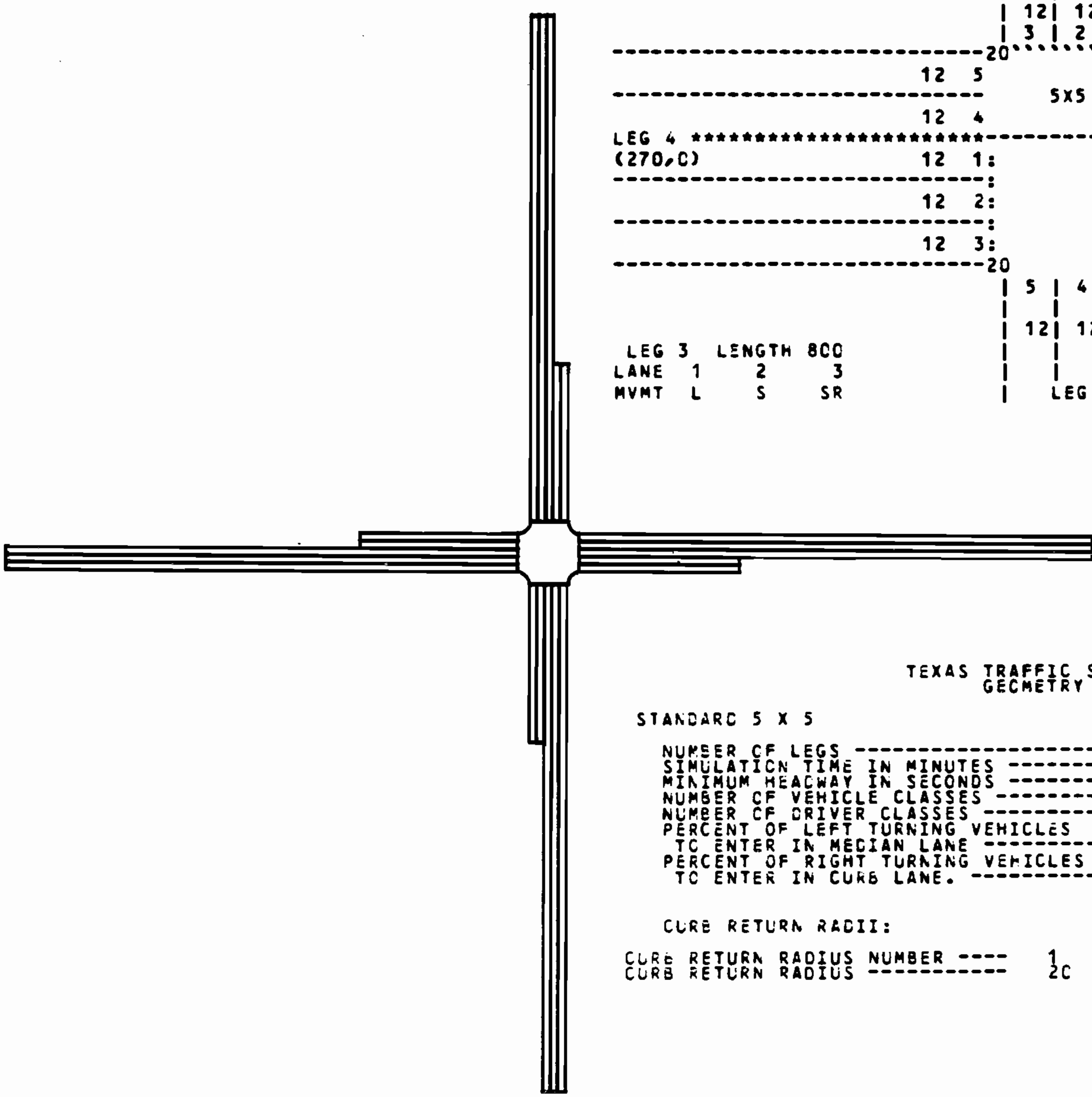
INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	400
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 4 INBOUND VEHICLES WITH DESTINATION ON LEG	33	33	34	0

STANDARD 5 X 5



```
 LEG 4  LENGTH 800            |   LEG 1 (0,-12)   |          LEG 1  LENGTH 800
LANE    1     2     3         |   |    |    *    ||          LANE    1    2    3
MVMT    L     S     SR        |   |    |    *    ||          MVMT    L    S    SR
                              | 12| 12| 12*12 |12 |
                              | 3 | 2 | 1 * 4 | 5 |
-----------------------------20'''''''''''''|    20----------------------------
                      12  5                 |     :3  12
-----------------------------      5X5      |     :----------------------------
                      12  4                 |     :2  12
LEG 4 **********************-----------0----      :----------------------------
(270,C)               12  1:           |          :1  12
---------------------------:           |------------********************** LEG 2
                      12  2:           |           4  12               (90,-12)
---------------------------:           |           ----------------------------
                      12  3:           |           5  12
-----------------------------20        |..........2C----------------------------
                              | 5 | 4 * 1 | 2 | 3 |
                              |   |   *   |   |   |
                              | 12| 12*12 |12 |12 |
 LEG 3  LENGTH 800            |   |   *   |   |   |          LEG 2  LENGTH 800
LANE    1     2     3         |   |   *   |   |   |          LANE    1    2    3
MVMT    L     S     SR        |   LEG 3 (180,C)   |          MVMT    L    S    SR
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 5 X 5

NUMBER OF LEGS ------------------------	4
SIMULATION TIME IN MINUTES ----------	20
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE -----------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. ------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS -----------	20	20	20	20

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 5 X 5

LEG 1 GEOMETRY DATA:

LEG ANGLE	0
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	3
NUMBER OF OUTBOUND LANES	2
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	-12
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 1:
(CONVERTED APPROACH 1)

LANE NUMBER	1	2	3
(INBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	L	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	32	35	33
	MEDIAN		CURB

LANE DATA FOR OUTBOUND LEG 1:
(CONVERTED APPROACH 5)

LANE NUMBER	4	5
(OUTBOUND LANE NUMBER)	1	2
WIDTH OF LANE	12	12
MOVEMENT CODE	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	0	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 5 X 5

LEG 2 GEOMETRY DATA:

LEG ANGLE	90
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	3
NUMBER OF OUTBOUND LANES	2
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	-12
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 2:
(CONVERTED APPROACH 2)

LANE NUMBER	1	2	3
(INBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	L	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	32	35	33
	MEDIAN		CURB

LANE DATA FOR OUTBOUND LEG 2:
(CONVERTED APPROACH 6)

LANE NUMBER	4	5
(OUTBOUND LANE NUMBER)	1	2
WIDTH OF LANE	12	12
MOVEMENT CODE	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	0	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 5 X 5

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	600
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 1 INBOUND VEHICLES WITH DESTINATION ON LEG	0	33	33	34

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 5 X 5

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	600
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 2 INBOUND VEHICLES WITH DESTINATION ON LEG	33	0	33	34

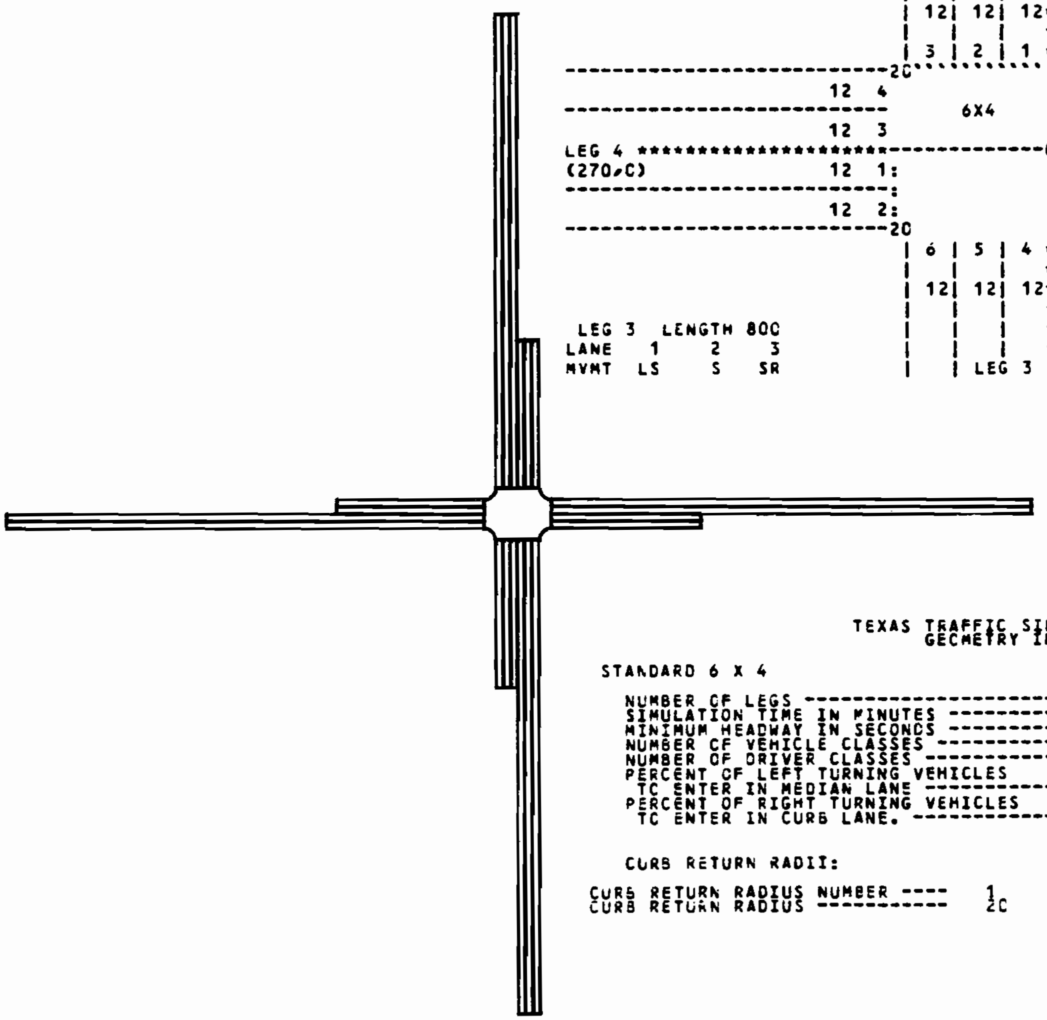
```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

STANDARD 5 X 5

   LEG 3 GEOMETRY DATA:

LEG ANGLE ------------------------------------  180
LENGTH OF INBOUND LANES ----------------------  800
LENGTH OF OUTBOUND LANES ---------------------  250
NUMBER OF INBOUND LANES ----------------------    3
NUMBER OF OUTBOUND LANES ---------------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----------   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---------   30
LEG CENTERLINE OFFSET ------------------------    0
MEDIAN WIDTH ---------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---------   20
LIMITING ANGLE FOR U-TURN --------------------   10

   LANE DATA FOR INBOUND LEG 3:
    (CONVERTED APPROACH 3)

LANE NUMBER -----------------------     1       2       3
(INBOUND LANE NUMBER) -------------     1       2       3
WIDTH OF LANE ---------------------    12      12      12
MOVEMENT CODE ---------------------     L       S      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ---------------     0       0       0
 FROM OUTER END -------------------     0       0       0
OFFSET OF LANE TERMINAL -----------     0       0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE ------------    32      35      33
                                   MEDIAN            CURB

   LANE DATA FOR OUTBOUND LEG 3:
    (CONVERTED APPROACH 7)

LANE NUMBER -----------------------     4       5
(OUTBOUND LANE NUMBER) ------------     1       2
WIDTH OF LANE ---------------------    12      12
MOVEMENT CODE ---------------------    LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ---------------     0       0
 FROM OUTER END -------------------     0       0
OFFSET OF LANE TERMINAL -----------     0       0
                                   MEDIAN    CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

STANDARD 5 X 5

   LEG 4 GEOMETRY DATA:

LEG ANGLE ------------------------------------  270
LENGTH OF INBOUND LANES ----------------------  800
LENGTH OF OUTBOUND LANES ---------------------  250
NUMBER OF INBOUND LANES ----------------------    3
NUMBER OF OUTBOUND LANES ---------------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----------   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---------   30
LEG CENTERLINE OFFSET ------------------------    0
MEDIAN WIDTH ---------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---------   20
LIMITING ANGLE FOR U-TURN --------------------   10

   LANE DATA FOR INBOUND LEG 4:
    (CONVERTED APPROACH 4)

LANE NUMBER -----------------------     1       2       3
(INBOUND LANE NUMBER) -------------     1       2       3
WIDTH OF LANE ---------------------    12      12      12
MOVEMENT CODE ---------------------     L       S      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ---------------     0       0       0
 FROM OUTER END -------------------     0       0       0
OFFSET OF LANE TERMINAL -----------     0       0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE ------------    32      35      33
                                   MEDIAN            CURB

   LANE DATA FOR OUTBOUND LEG 4:
    (CONVERTED APPROACH 8)

LANE NUMBER -----------------------     4       5
(OUTBOUND LANE NUMBER) ------------     1       2
WIDTH OF LANE ---------------------    12      12
MOVEMENT CODE ---------------------    LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ---------------     0       0
 FROM OUTER END -------------------     0       0
OFFSET OF LANE TERMINAL -----------     0       0
                                   MEDIAN    CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

STANDARD 5 X 5

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------     600
PARAMETER FOR DISTRIBUTION -------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ----------------------------   1   2   3   4
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33  33   0  34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

STANDARD 5 X 5

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------     600
PARAMETER FOR DISTRIBUTION -------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER ----------------------------   1   2   3   4
PERCENT OF LEG 4 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33  33  34   0
```

STANDARD 6 X 4



```
LEG 4  LENGTH 800            |     |  LEG 1 (0,0)  |     |         LEG 1  LENGTH 800
 LANE   1    2               |     |     |   *     |     |     |          LANE   1    2    3
 MVMT  LS   SR               |     |     |   *     |     |     |          MVMT  LS    S   SR
                             | 12| 12| 12*12 |12 |12 |
                             |     |     |   *     |     |     |
                             | 3 | 2 | 1 * 4 | 5 | 6 |
----------------------------20............|             20----------------------------
                   12  4                  |              :2  12
--------------------------        6X4     |              :---------------------------
                   12  3                  |              :1  12
LEG 4 ********************----------------0-----------------******************** LEG 2
(270,0)            12  1:                 |               3  12              (90,-12)
--------------------------:               |               ---------------------------
                   12  2:                 |               4  12
----------------------------20            |............20----------------------------
                             | 6 | 5 | 4 * 1 | 2 | 3 |
                             |     |     |   *     |     |     |
                             | 12| 12| 12*12 |12 |12 |
                             |     |     |   *     |     |     |
 LEG 3  LENGTH 800           |     |     |   *     |     |     |          LEG 2  LENGTH 800
LANE   1     2     3         |     |     |   *     |     |     |           LANE   1    2
MVMT  LS     S    SR         |     | LEG 3 (180,0) |     |           MVMT  LS   SR
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 6 X 4

```
NUMBER OF LEGS -------------------------     4
SIMULATION TIME IN MINUTES -----------      20
MINIMUM HEADWAY IN SECONDS -----------     1.0
NUMBER OF VEHICLE CLASSES ------------      10
NUMBER OF DRIVER CLASSES -------------       3
PERCENT OF LEFT TURNING VEHICLES
 TO ENTER IN MEDIAN LANE -------------      80
PERCENT OF RIGHT TURNING VEHICLES
 TO ENTER IN CURB LANE. --------------      80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----     1      2      3      4
CURB RETURN RADIUS -----------    20     20     20     20
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 6 X 4

   LEG 1 GEOMETRY DATA:

LEG ANGLE ---------------------------------------       0
LENGTH OF INBOUND LANES ------------------------      800
LENGTH OF OUTBOUND LANES -----------------------      250
NUMBER OF INBOUND LANES ------------------------        3
NUMBER OF OUTBOUND LANES -----------------------        3
SPEED LIMIT ON INBOUND LANES IN MPH ------------       30
SPEED LIMIT ON OUTBOUND LANES IN MPH -----------       30
LEG CENTERLINE OFFSET --------------------------        0
MEDIAN WIDTH -----------------------------------        0
LIMITING ANGLE FOR STRAIGHT MOVEMENT -----------       20
LIMITING ANGLE FOR U-TURN ----------------------       10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER ------------------          1       2       3
(INBOUND LANE NUMBER) --------          1       2       3
WIDTH OF LANE ----------------         12      12      12
MOVEMENT CODE ----------------         LS       S      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------          0       0       0
 FROM OUTER END --------------          0       0       0
OFFSET OF LANE TERMINAL ------          0       0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------         32      35      33
                                   MEDIAN            CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

LANE NUMBER ------------------          4       5       6
(OUTBOUND LANE NUMBER) -------          1       2       3
WIDTH OF LANE ----------------         12      12      12
MOVEMENT CODE ----------------         LS       S      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------          0       0       0
 FROM OUTER END --------------          0       0       0
OFFSET OF LANE TERMINAL ------          0       0       0
                                   MEDIAN            CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 6 X 4

   LEG 2 GEOMETRY DATA:

LEG ANGLE ---------------------------------------      90
LENGTH OF INBOUND LANES ------------------------      800
LENGTH OF OUTBOUND LANES -----------------------      250
NUMBER OF INBOUND LANES ------------------------        2
NUMBER OF OUTBOUND LANES -----------------------        2
SPEED LIMIT ON INBOUND LANES IN MPH ------------       30
SPEED LIMIT ON OUTBOUND LANES IN MPH -----------       30
LEG CENTERLINE OFFSET --------------------------        0
MEDIAN WIDTH -----------------------------------        0
LIMITING ANGLE FOR STRAIGHT MOVEMENT -----------       20
LIMITING ANGLE FOR U-TURN ----------------------       10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER ------------------          1       2
(INBOUND LANE NUMBER) --------          1       2
WIDTH OF LANE ----------------         12      12
MOVEMENT CODE ----------------         LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------          0       0
 FROM OUTER END --------------          0       0
OFFSET OF LANE TERMINAL ------          0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------         48      52
                                   MEDIAN    CURB

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

LANE NUMBER ------------------          3       4
(OUTBOUND LANE NUMBER) -------          1       2
WIDTH OF LANE ----------------         12      12
MOVEMENT CODE ----------------         LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------          0       0
 FROM OUTER END --------------          0       0
OFFSET OF LANE TERMINAL ------          0       0
                                   MEDIAN    CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

STANDARD 6 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------   SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------       600
PARAMETER FOR DISTRIBUTION -------------      2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---      28.0
85-PERCENTILE SPEED, MPH ---------------      31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------        NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER ---------------------------    1    2    3    4
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---     0   33   33   34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

STANDARD 6 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------   SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------       400
PARAMETER FOR DISTRIBUTION -------------      2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---      28.0
85-PERCENTILE SPEED, MPH ---------------      31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------        NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER ---------------------------    1    2    3    4
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33    0   33   34
```

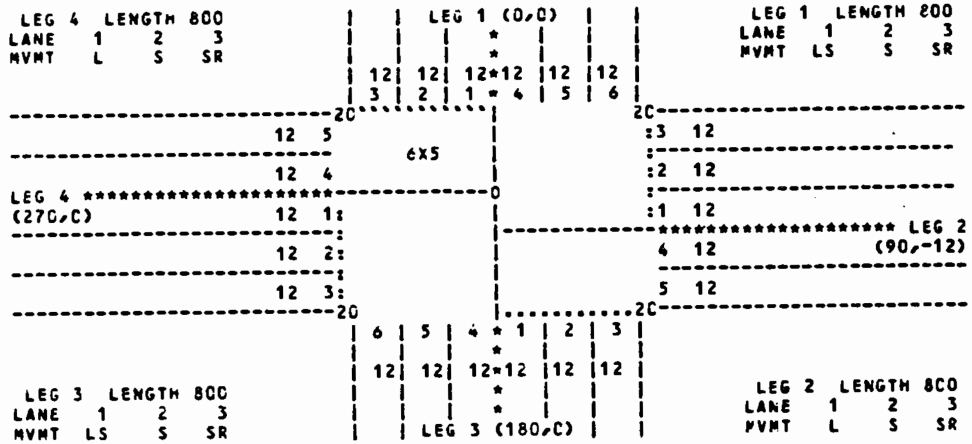
```
                        TEXAS TRAFFIC SIMULATION PACKAGE
                             GEOMETRY INPUT DATA

 STANDARD 6 X 4

   LEG 3 GEOMETRY DATA:

LEG ANGLE --------------------------------  180
LENGTH OF INBOUND LANES ------------------  200
LENGTH OF OUTBOUND LANES -----------------  250
NUMBER OF INBOUND LANES ------------------    3
NUMBER OF OUTBOUND LANES -----------------    3
SPEED LIMIT ON INBOUND LANES IN MPH ----     30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---     30
LEG CENTERLINE OFFSET --------------------    0
MEDIAN WIDTH -----------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---     20
LIMITING ANGLE FOR U-TURN ---------------    10

   LANE DATA FOR INBOUND LEG 3:
    (CONVERTED APPROACH 3)

LANE NUMBER ------------------      1      2      3
(INBOUND LANE NUMBER) --------      1      2      3
WIDTH OF LANE ----------------     12     12     12
MOVEMENT CODE ----------------     LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0      0      0
 FROM OUTER END --------------      0      0      0
OFFSET OF LANE TERMINAL ------      0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------     32     35     33
                              MEDIAN           CURB

   LANE DATA FOR OUTBOUND LEG 3:
    (CONVERTED APPROACH 7)

LANE NUMBER ------------------      4      5      6
(OUTBOUND LANE NUMBER) -------      1      2      3
WIDTH OF LANE ----------------     12     12     12
MOVEMENT CODE ----------------     LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0      0      0
 FROM OUTER END --------------      0      0      0
OFFSET OF LANE TERMINAL ------      0      0      0
                              MEDIAN           CURB
```

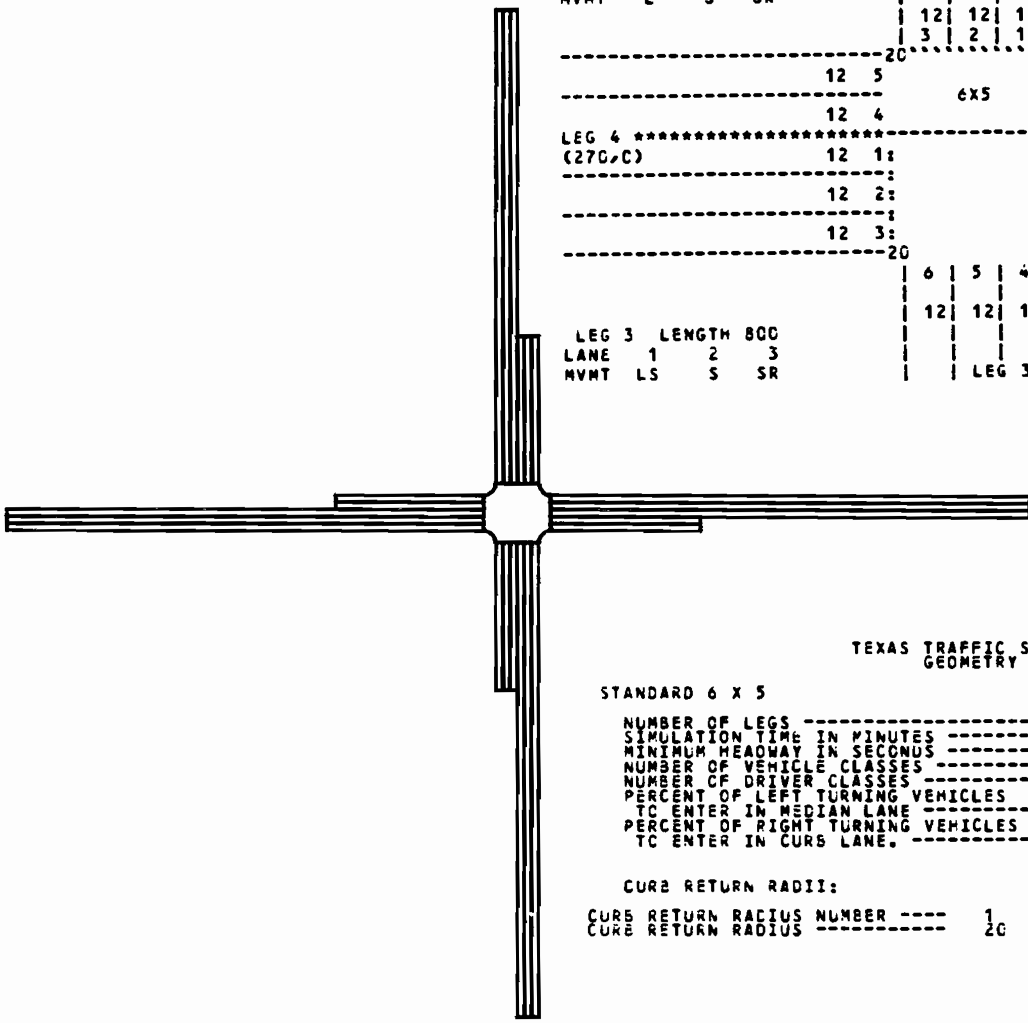
```
                        TEXAS TRAFFIC SIMULATION PACKAGE
                             GEOMETRY INPUT DATA

 STANDARD 6 X 4

   LEG 4 GEOMETRY DATA:

LEG ANGLE --------------------------------  270
LENGTH OF INBOUND LANES ------------------  600
LENGTH OF OUTBOUND LANES -----------------  250
NUMBER OF INBOUND LANES ------------------    2
NUMBER OF OUTBOUND LANES -----------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----     30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---     30
LEG CENTERLINE OFFSET --------------------    0
MEDIAN WIDTH -----------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---     20
LIMITING ANGLE FOR U-TURN ---------------    10

   LANE DATA FOR INBOUND LEG 4:
    (CONVERTED APPROACH 4)

LANE NUMBER ------------------      1      2
(INBOUND LANE NUMBER) --------      1      2
WIDTH OF LANE ----------------     12     12
MOVEMENT CODE ----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0      0
 FROM OUTER END --------------      0      0
OFFSET OF LANE TERMINAL ------      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------     48     52
                              MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 4:
    (CONVERTED APPROACH 8)

LANE NUMBER ------------------      3      4
(OUTBOUND LANE NUMBER) -------      1      2
WIDTH OF LANE ----------------     12     12
MOVEMENT CODE ----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0      0
 FROM OUTER END --------------      0      0
OFFSET OF LANE TERMINAL ------      0      0
                              MEDIAN   CURB
```

```
                        TEXAS TRAFFIC SIMULATION PACKAGE
                           DRIVER-VEHICLE INPUT DATA

 STANDARD 6 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      600
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     26.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER --------------------------    1    2    3    4
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   33   33    0   34
```

```
                        TEXAS TRAFFIC SIMULATION PACKAGE
                           DRIVER-VEHICLE INPUT DATA

 STANDARD 6 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      400
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     25.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER --------------------------    1    2    3    4
PERCENT OF LEG 4 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   33   33   34    0
```

STANDARD 6 X 5





TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 6 X 5

NUMBER OF LEGS -------------------------	4
SIMULATION TIME IN MINUTES -----------	20
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. ------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS -----------	20	20	20	20

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 6 X 5

LEG 1 GEOMETRY DATA:

LEG ANGLE	0
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	3
NUMBER OF OUTBOUND LANES	3
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	0
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 1:
(CONVERTED APPROACH 1)

LANE NUMBER	1	2	3
(INBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	LS	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	32	35	33
	MEDIAN		CURB

LANE DATA FOR OUTBOUND LEG 1:
(CONVERTED APPROACH 5)

LANE NUMBER	4	5	6
(OUTBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	LS	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
	MEDIAN		CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 6 X 5

LEG 2 GEOMETRY DATA:

LEG ANGLE	90
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	3
NUMBER OF OUTBOUND LANES	2
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	-12
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 2:
(CONVERTED APPROACH 2)

LANE NUMBER	1	2	3
(INBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	L	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	32	35	33
	MEDIAN		CURB

LANE DATA FOR OUTBOUND LEG 2:
(CONVERTED APPROACH 6)

LANE NUMBER	4	5
(OUTBOUND LANE NUMBER)	1	2
WIDTH OF LANE	12	12
MOVEMENT CODE	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	0	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 6 X 5

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	600
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 1 INBOUND VEHICLES WITH DESTINATION ON LEG	0	33	33	34

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 6 X 5

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	600
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 2 INBOUND VEHICLES WITH DESTINATION ON LEG	33	0	33	34

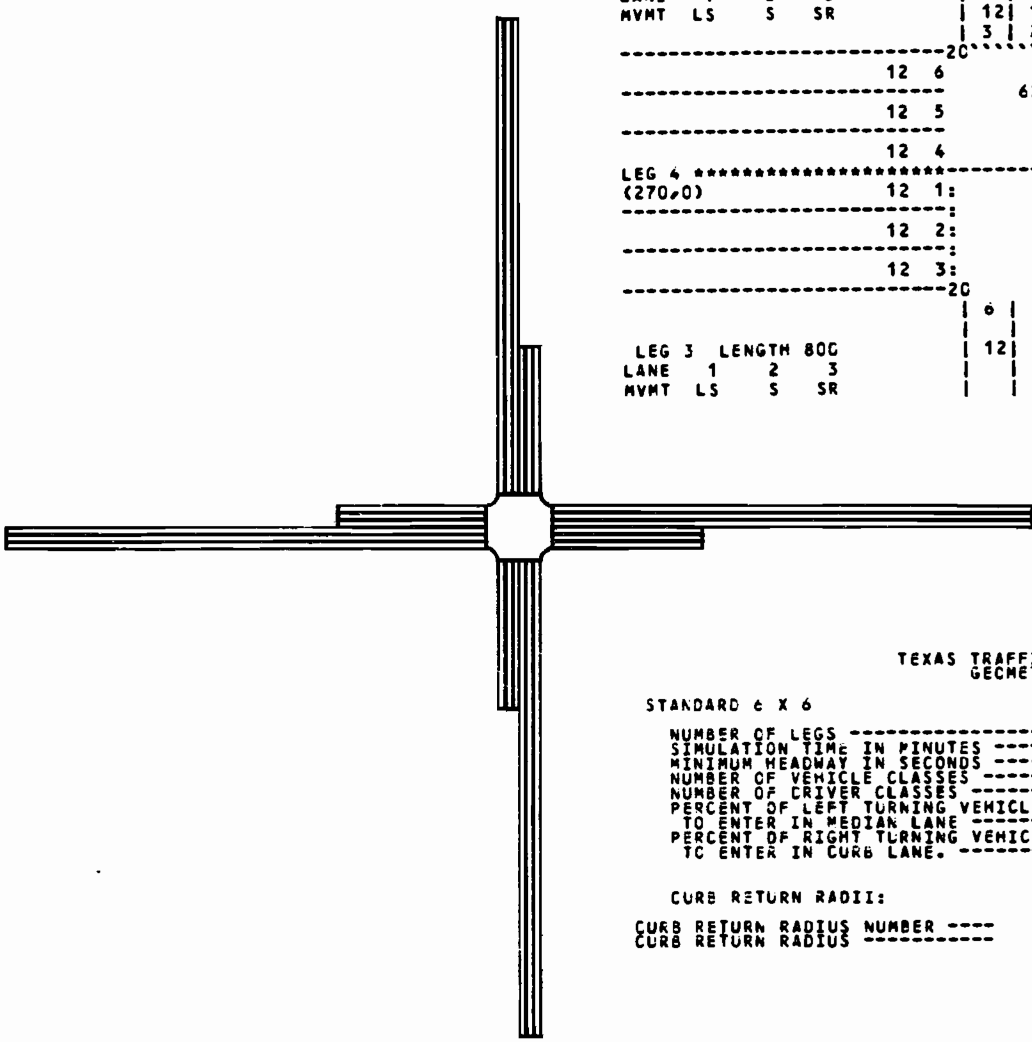
```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 6 X 5

   LEG 3 GEOMETRY DATA:

LEG ANGLE ------------------------------  180
LENGTH OF INBOUND LANES ----------------  800
LENGTH OF OUTBOUND LANES ---------------  250
NUMBER OF INBOUND LANES ----------------    3
NUMBER OF OUTBOUND LANES ---------------    3
SPEED LIMIT ON INBOUND LANES IN MPH ----   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---   30
LEG CENTERLINE OFFSET ------------------    0
MEDIAN WIDTH ---------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---   20
LIMITING ANGLE FOR U-TURN --------------   10

   LANE DATA FOR INBOUND LEG 3:
    (CONVERTED APPROACH 3)

LANE NUMBER ------------------      1        2        3
(INBOUND LANE NUMBER) --------      1        2        3
WIDTH OF LANE ----------------     12       12       12
MOVEMENT CODE ----------------     LS        S       SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0        0        0
 FROM OUTER END --------------      0        0        0
OFFSET OF LANE TERMINAL ------      0        0        0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------     32       35       33
                               MEDIAN             CURB

   LANE DATA FOR OUTBOUND LEG 3:
    (CONVERTED APPROACH 7)

LANE NUMBER ------------------      4        5        6
(OUTBOUND LANE NUMBER) -------      1        2        3
WIDTH OF LANE ----------------     12       12       12
MOVEMENT CODE ----------------     LS        S       SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0        0        0
 FROM OUTER END --------------      0        0        0
OFFSET OF LANE TERMINAL ------      0        0        0
                               MEDIAN             CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 6 X 5

   LEG 4 GEOMETRY DATA:

LEG ANGLE ------------------------------  270
LENGTH OF INBOUND LANES ----------------  800
LENGTH OF OUTBOUND LANES ---------------  250
NUMBER OF INBOUND LANES ----------------    3
NUMBER OF OUTBOUND LANES ---------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---   30
LEG CENTERLINE OFFSET ------------------    0
MEDIAN WIDTH ---------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---   20
LIMITING ANGLE FOR U-TURN --------------   10

   LANE DATA FOR INBOUND LEG 4:
    (CONVERTED APPROACH 4)

LANE NUMBER ------------------      1        2        3
(INBOUND LANE NUMBER) --------      1        2        3
WIDTH OF LANE ----------------     12       12       12
MOVEMENT CODE ----------------      L        S       SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0        0        0
 FROM OUTER END --------------      0        0        0
OFFSET OF LANE TERMINAL ------      0        0        0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------     32       35       33
                               MEDIAN             CURB

   LANE DATA FOR OUTBOUND LEG 4:
    (CONVERTED APPROACH 8)

LANE NUMBER ------------------      4        5
(OUTBOUND LANE NUMBER) -------      1        2
WIDTH OF LANE ----------------     12       12
MOVEMENT CODE ----------------     LS       SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------      0        0
 FROM OUTER END --------------      0        0
OFFSET OF LANE TERMINAL ------      0        0
                               MEDIAN     CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

STANDARD 6 X 5

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------      600
PARAMETER FOR DISTRIBUTION --------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ----     28.0
85-PERCENTILE SPEED, MPH ----------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ---------------------------   1    2    3    4
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   33   33    0   34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

STANDARD 6 X 5

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------      600
PARAMETER FOR DISTRIBUTION --------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ----     28.0
85-PERCENTILE SPEED, MPH ----------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER ---------------------------   1    2    3    4
PERCENT OF LEG 4 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   33   33   34    0
```

STANDARD 6 X 6



```
 LEG 4  LENGTH 800            |  |  LEG 1 (0,0)  |   |              LEG 1  LENGTH 8C0
LANE    1     2     3         |  |    |     *    |   |  |          LANE   1     2     3
MVMT  LS     S     SR         | 12| 12| 12*12 |12 |12 |          MVMT  LS     S     SR
                              | 3 | 2 | 1 * 4 | 5 | 6 |
---------------------------20C............|..........20---------------------------
                   12  6          |                     :3  12
----------------------------    6X6        |             :----------------------------
                   12  5                   |             :2  12
----------------------------               |             :----------------------------
                   12  4                   |             :1  12
LEG 4 *********************---------------0--------------****************** LEG 2
(270,0)            12  1:                  |              4  12               (90,0)
--------------------------:                |              ----------------------------
                   12  2:                  |              5  12
--------------------------:                |              ----------------------------
                   12  3:                  |              6  12
---------------------------20             |...........2C----------------------------
                          | 6 | 5 | 4 * 1 | 2 | 3 |
                          |   |   |   *   |   |   |
 LEG 3  LENGTH 80C        | 12| 12| 12*12 |12 |12 |          LEG 2  LENGTH 800
LANE    1     2     3     |   |   |   *   |   |   |         LANE   1     2     3
MVMT  LS     S     SR     |   | LEG 3 (18C,C) |   |         MVMT  LS     S     SR
```

TEXAS TRAFFIC SIMULATION PACKAGE
GECMETRY INPUT DATA

STANDARD 6 X 6

```
NUMBER OF LEGS -----------------------   4
SIMULATION TIME IN MINUTES -----------   20
MINIMUM HEADWAY IN SECONDS -----------   1.C
NUMBER OF VEHICLE CLASSES ------------   10
NUMBER OF CRIVER CLASSES -------------   3
PERCENT OF LEFT TURNING VEHICLES
 TO ENTER IN MEDIAN LANE -------------   8C
PERCENT OF RIGHT TURNING VEHICLES
 TC ENTER IN CURB LANE. --------------   8C

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----   1     2     3     4
CURB RETURN RADIUS -----------   2C    20    2C    20
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 6 X 6

LEG 1 GEOMETRY DATA:

LEG ANGLE	0
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	3
NUMBER OF OUTBOUND LANES	3
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	0
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 1:
(CONVERTED APPROACH 1)

LANE NUMBER	1	2	3
(INBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	LS	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	32	35	33
	MEDIAN		CURB

LANE DATA FOR OUTBOUND LEG 1:
(CONVERTED APPROACH 5)

LANE NUMBER	4	5	6
(OUTBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	LS	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
	MEDIAN		CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 6 X 6

LEG 2 GEOMETRY DATA:

LEG ANGLE	90
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	3
NUMBER OF OUTBOUND LANES	3
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	0
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 2:
(CONVERTED APPROACH 2)

LANE NUMBER	1	2	3
(INBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	LS	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	32	35	33
	MEDIAN		CURB

LANE DATA FOR OUTBOUND LEG 2:
(CONVERTED APPROACH 6)

LANE NUMBER	4	5	6
(OUTBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	LS	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
	MEDIAN		CURB

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 6 X 6

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	600
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	26.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 1 INBOUND VEHICLES WITH DESTINATION ON LEG	0	33	33	34

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 6 X 6

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	600
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	26.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 2 INBOUND VEHICLES WITH DESTINATION ON LEG	33	0	33	34

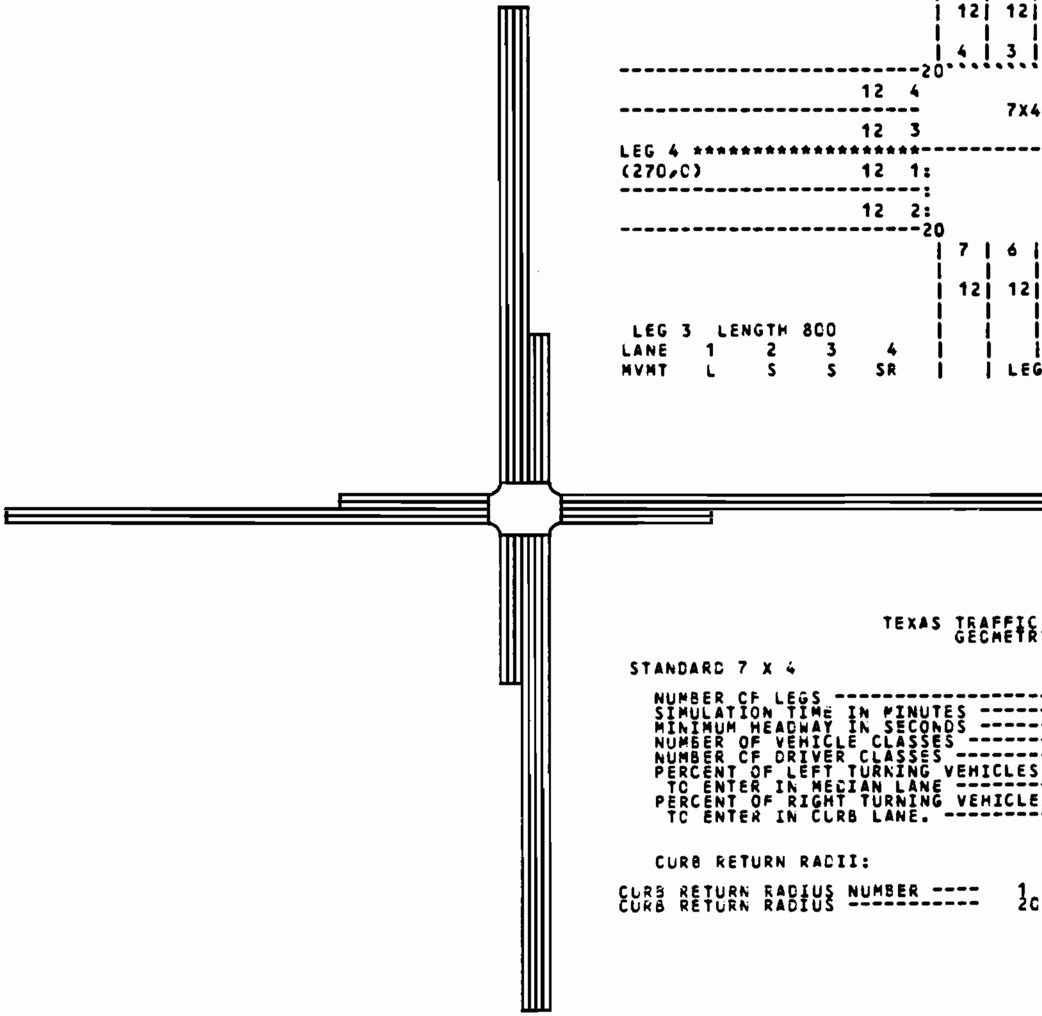
```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA
  STANDARD 6 X 6

    LEG 3 GEOMETRY DATA:

  LEG ANGLE ----------------------------------  180
  LENGTH OF INBOUND LANES --------------------  300
  LENGTH OF OUTBOUND LANES -------------------  250
  NUMBER OF INBOUND LANES --------------------    3
  NUMBER OF OUTBOUND LANES -------------------    3
  SPEED LIMIT ON INBOUND LANES IN MPH ----      30
  SPEED LIMIT ON OUTBOUND LANES IN MPH ---      30
  LEG CENTERLINE OFFSET ----------------------    0
  MEDIAN WIDTH -------------------------------    0
  LIMITING ANGLE FOR STRAIGHT MOVEMENT ---      20
  LIMITING ANGLE FOR U-TURN ------------------   10

    LANE DATA FOR INBOUND LEG 3:
     (CONVERTED APPROACH 3)

  LANE NUMBER ------------------    1       2       3
  (INBOUND LANE NUMBER) --------   1       2       3
  WIDTH OF LANE ----------------  12      12      12
  MOVEMENT CODE ----------------  LS       S      SR
  LENGTH OF UNBLOCKED LANE
   FROM LANE TERMINAL ----------   0       0       0
   FROM OUTER END --------------   0       0       0
  OFFSET OF LANE TERMINAL ------   0       0       0
  PERCENT OF INBOUND TRAFFIC
   TO ENTER IN THIS LANE -------  32      35      33
                              MEDIAN            CURB

    LANE DATA FOR OUTBOUND LEG 3:
     (CONVERTED APPROACH 7)

  LANE NUMBER ------------------   4       5       6
  (OUTBOUND LANE NUMBER) -------   1       2       3
  WIDTH OF LANE ----------------  12      12      12
  MOVEMENT CODE ----------------  LS       S      SR
  LENGTH OF UNBLOCKED LANE
   FROM LANE TERMINAL ----------   0       0       0
   FROM OUTER END --------------   0       0       0
  OFFSET OF LANE TERMINAL ------   0       0       0
                              MEDIAN            CURB
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA
  STANDARD 6 X 6

    LEG 4 GEOMETRY DATA:

  LEG ANGLE ----------------------------------  270
  LENGTH OF INBOUND LANES --------------------  300
  LENGTH OF OUTBOUND LANES -------------------  250
  NUMBER OF INBOUND LANES --------------------    3
  NUMBER OF OUTBOUND LANES -------------------    3
  SPEED LIMIT ON INBOUND LANES IN MPH ----      30
  SPEED LIMIT ON OUTBOUND LANES IN MPH ---      30
  LEG CENTERLINE OFFSET ----------------------    0
  MEDIAN WIDTH -------------------------------    0
  LIMITING ANGLE FOR STRAIGHT MOVEMENT ---      20
  LIMITING ANGLE FOR U-TURN ------------------   10

    LANE DATA FOR INBOUND LEG 4:
     (CONVERTED APPROACH 4)

  LANE NUMBER ------------------    1       2       3
  (INBOUND LANE NUMBER) --------   1       2       3
  WIDTH OF LANE ----------------  12      12      12
  MOVEMENT CODE ----------------  LS       S      SR
  LENGTH OF UNBLOCKED LANE
   FROM LANE TERMINAL ----------   0       0       0
   FROM OUTER END --------------   0       0       0
  OFFSET OF LANE TERMINAL ------   0       0       0
  PERCENT OF INBOUND TRAFFIC
   TO ENTER IN THIS LANE -------  32      35      33
                              MEDIAN            CURB

    LANE DATA FOR OUTBOUND LEG 4:
     (CONVERTED APPROACH 8)

  LANE NUMBER ------------------   4       5       6
  (OUTBOUND LANE NUMBER) -------   1       2       3
  WIDTH OF LANE ----------------  12      12      12
  MOVEMENT CODE ----------------  LS       S      SR
  LENGTH OF UNBLOCKED LANE
   FROM LANE TERMINAL ----------   0       0       0
   FROM OUTER END --------------   0       0       0
  OFFSET OF LANE TERMINAL ------   0       0       0
                              MEDIAN            CURB
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                     DRIVER-VEHICLE INPUT DATA
  STANDARD 6 X 6

    INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

  NAME FOR INBOUND TRAFFIC
   HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
  TOTAL HOURLY VOLUME ON LEG -------------      600
  PARAMETER FOR DISTRIBUTION -------------     2.00
  MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
  85-PERCENTILE SPEED, MPH ---------------     31.0
  TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

    OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

  LEG NUMBER ----------------------------   1    2    3    4
  PERCENT OF LEG 3 INBOUND
   VEHICLES WITH DESTINATION ON LEG ---    33   33    0   34
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                     DRIVER-VEHICLE INPUT DATA
  STANDARD 6 X 6

    INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

  NAME FOR INBOUND TRAFFIC
   HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
  TOTAL HOURLY VOLUME ON LEG -------------      600
  PARAMETER FOR DISTRIBUTION -------------     2.00
  MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
  85-PERCENTILE SPEED, MPH ---------------     31.0
  TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

    OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

  LEG NUMBER ----------------------------   1    2    3    4
  PERCENT OF LEG 4 INBOUND
   VEHICLES WITH DESTINATION ON LEG ---    33   33   34    0
```

STANDARD 7 X 4



```
LEG 4  LENGTH 800         |    |    | LEG 1 (0,-12) |    | LEG 1  LENGTH 800
 LANE   1     2           |    |    |    *    |    |    | LANE   1    2    3    4
 MVMT  LS     S           |    |    |    *    |    |    | MVMT   L    S    S   SR
                          | 12| 12| 12| 12*12 |12 |12 |
                          |    |    |    *    |    |    |
                          | 4 | 3 | 2 | 1 * 5 | 6 | 7 |
------------------------20...............|          20------------------------
               12  4                     |            :2  12
------------------------        7X4      |            :------------------------
               12  3                     |            :1  12
LEG 4 ******************-------------0-------------------****************** LEG 2
(270,0)        12  1:                |                3  12          (90,0)
------------------------:            |                ------------------------
               12  2:                |                4  12
------------------------20           |..............20------------------------
                          | 7 | 6 | 5 * 1 | 2 | 3 | 4 |
                          |    |    |    *    |    |    |
                          | 12| 12| 12*12 |12 |12 |12 |
                          |    |    |    *    |    |    |
 LEG 3  LENGTH 800        |    |    |    *    |    |    |        LEG 2  LENGTH 800
LANE   1    2    3    4   |    |    |    *    |    |    |         LANE   1    2
MVMT   L    S    S   SR   |    | LEG 3 (180,0) |    |    |         MVMT  LS    S
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 7 X 4

```
NUMBER OF LEGS -----------------------     4
SIMULATION TIME IN MINUTES -----------    20
MINIMUM HEADWAY IN SECONDS -----------   1.0
NUMBER OF VEHICLE CLASSES ------------    10
NUMBER OF DRIVER CLASSES -------------     3
PERCENT OF LEFT TURNING VEHICLES
 TO ENTER IN MEDIAN LANE -------------    80
PERCENT OF RIGHT TURNING VEHICLES
 TO ENTER IN CURB LANE. --------------    80
```

CURB RETURN RADII:

```
CURB RETURN RADIUS NUMBER ----    1     2     3     4
CURB RETURN RADIUS -----------   20    20    20    20
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 7 X 4

   LEG 1 GEOMETRY DATA:

LEG ANGLE -----------------------------------    0
LENGTH OF INBOUND LANES -----------------      800
LENGTH OF OUTBOUND LANES ----------------      250
NUMBER OF INBOUND LANES -----------------        4
NUMBER OF OUTBOUND LANES ----------------        3
SPEED LIMIT ON INBOUND LANES IN MPH ----        30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---        30
LEG CENTERLINE OFFSET -------------------      -12
MEDIAN WIDTH ----------------------------        0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---        20
LIMITING ANGLE FOR U-TURN ---------------       10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER -------------------     1      2      3      4
(INBOUND LANE NUMBER) ---------     1      2      3      4
WIDTH OF LANE -----------------    12     12     12     12
MOVEMENT CODE -----------------     L      S      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0      0      0      0
 FROM OUTER END ---------------     0      0      0      0
OFFSET OF LANE TERMINAL -------     0      0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------    25     25     25     25
                               MEDIAN                 CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

LANE NUMBER -------------------     5      6      7
(OUTBOUND LANE NUMBER) --------     1      2      3
WIDTH OF LANE -----------------    12     12     12
MOVEMENT CODE -----------------    LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0      0      0
 FROM OUTER END ---------------     0      0      0
OFFSET OF LANE TERMINAL -------     0      0      0
                               MEDIAN          CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 7 X 4

   LEG 2 GEOMETRY DATA:

LEG ANGLE -----------------------------------   90
LENGTH OF INBOUND LANES -----------------      800
LENGTH OF OUTBOUND LANES ----------------      250
NUMBER OF INBOUND LANES -----------------        2
NUMBER OF OUTBOUND LANES ----------------        2
SPEED LIMIT ON INBOUND LANES IN MPH ----        30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---        30
LEG CENTERLINE OFFSET -------------------        0
MEDIAN WIDTH ----------------------------        0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---        20
LIMITING ANGLE FOR U-TURN ---------------       10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER -------------------     1      2
(INBOUND LANE NUMBER) ---------     1      2
WIDTH OF LANE -----------------    12     12
MOVEMENT CODE -----------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0      0
 FROM OUTER END ---------------     0      0
OFFSET OF LANE TERMINAL -------     0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------    48     52
                               MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

LANE NUMBER -------------------     3      4
(OUTBOUND LANE NUMBER) --------     1      2
WIDTH OF LANE -----------------    12     12
MOVEMENT CODE -----------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0      0
 FROM OUTER END ---------------     0      0
OFFSET OF LANE TERMINAL -------     0      0
                               MEDIAN   CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      800
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER ---------------------------    1    2    3    4
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---     0   33   33   34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 4

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      400
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER ---------------------------    1    2    3    4
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    33    0   33   34
```

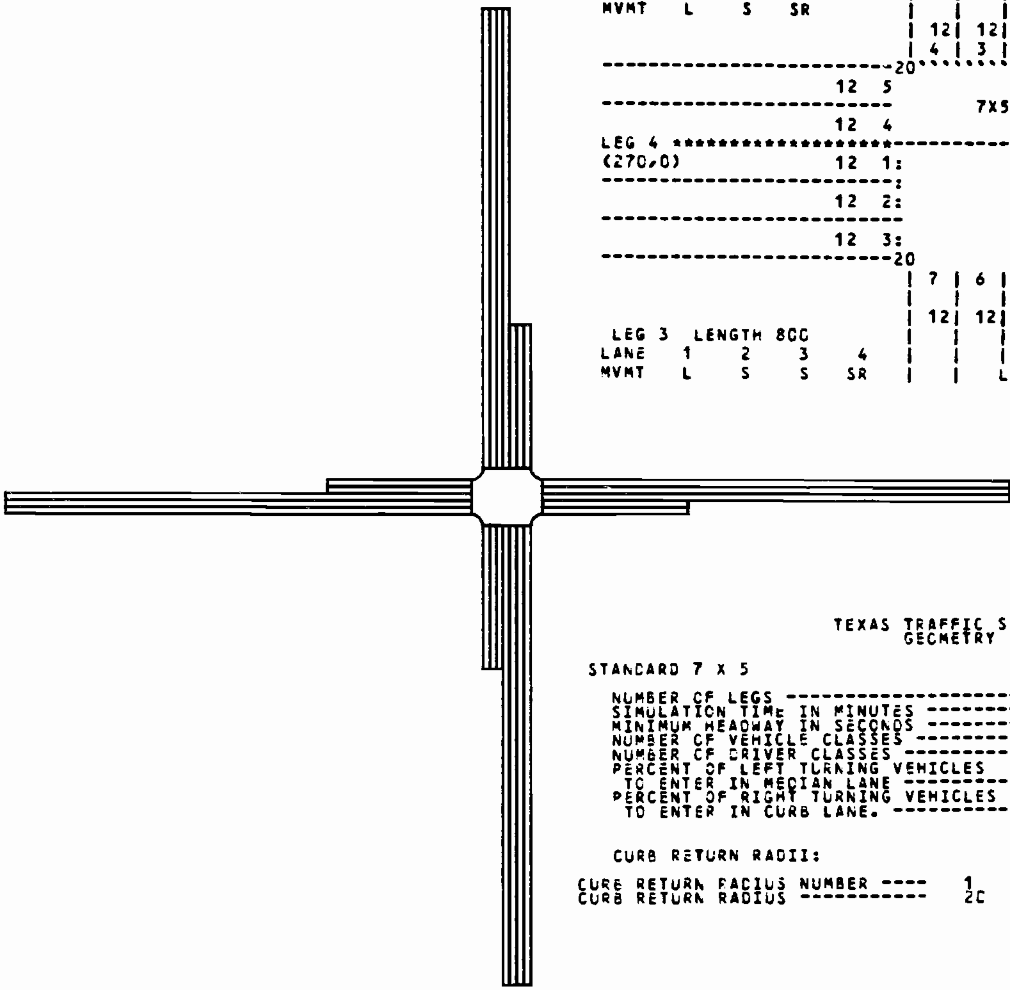
```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 7 X 4

  LEG 3 GEOMETRY DATA:

LEG ANGLE ------------------------------  180
LENGTH OF INBOUND LANES ----------------  800
LENGTH OF OUTBOUND LANES ---------------  250
NUMBER OF INBOUND LANES ----------------    4
NUMBER OF OUTBOUND LANES ---------------    3
SPEED LIMIT ON INBOUND LANES IN MPH ----   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---   30
LEG CENTERLINE OFFSET ------------------    0
MEDIAN WIDTH ---------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---   20
LIMITING ANGLE FOR U-TURN --------------   10

  LANE DATA FOR INBOUND LEG 3:
   (CONVERTED APPROACH 3)

LANE NUMBER -------------------      1       2       3       4
(INBOUND LANE NUMBER) ---------      1       2       3       4
WIDTH OF LANE -----------------     12      12      12      12
MOVEMENT CODE -----------------      L       S       S      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0       0       0       0
 FROM OUTER END ---------------      0       0       0       0
OFFSET OF LANE TERMINAL -------      0       0       0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     25      25      25      25
                                MEDIAN                    CURB

  LANE DATA FOR OUTBOUND LEG 3:
   (CONVERTED APPROACH 7)

LANE NUMBER -------------------      5       6       7
(OUTBOUND LANE NUMBER) --------      1       2       3
WIDTH OF LANE -----------------     12      12      12
MOVEMENT CODE -----------------     LS       S      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0       0       0
 FROM OUTER END ---------------      0       0       0
OFFSET OF LANE TERMINAL -------      0       0       0
                                MEDIAN            CURB
```

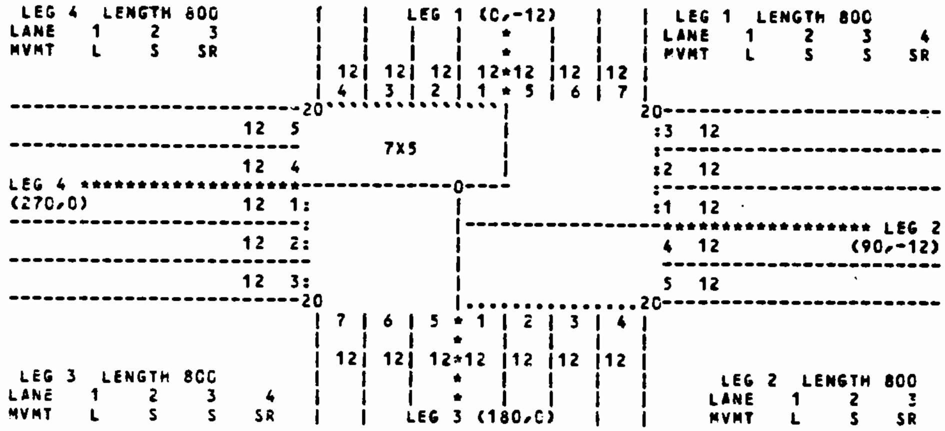
```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA

STANDARD 7 X 4

  LEG 4 GEOMETRY DATA:

LEG ANGLE ------------------------------  270
LENGTH OF INBOUND LANES ----------------  800
LENGTH OF OUTBOUND LANES ---------------  250
NUMBER OF INBOUND LANES ----------------    2
NUMBER OF OUTBOUND LANES ---------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---   30
LEG CENTERLINE OFFSET ------------------    0
MEDIAN WIDTH ---------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---   20
LIMITING ANGLE FOR U-TURN --------------   10

  LANE DATA FOR INBOUND LEG 4:
   (CONVERTED APPROACH 4)

LANE NUMBER -------------------      1       2
(INBOUND LANE NUMBER) ---------      1       2
WIDTH OF LANE -----------------     12      12
MOVEMENT CODE -----------------     LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0       0
 FROM OUTER END ---------------      0       0
OFFSET OF LANE TERMINAL -------      0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     48      52
                                MEDIAN    CURB

  LANE DATA FOR OUTBOUND LEG 4:
   (CONVERTED APPROACH 8)

LANE NUMBER -------------------      3       4
(OUTBOUND LANE NUMBER) --------      1       2
WIDTH OF LANE -----------------     12      12
MOVEMENT CODE -----------------     LS      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0       0
 FROM OUTER END ---------------      0       0
OFFSET OF LANE TERMINAL -------      0       0
                                MEDIAN    CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 4

  INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------     800
PARAMETER FOR DISTRIBUTION -------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

  OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ---------------------------   1    2    3    4
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   33   33    0   34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 4

  INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------     400
PARAMETER FOR DISTRIBUTION -------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

  OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER ---------------------------   1    2    3    4
PERCENT OF LEG 4 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   33   33   34    0
```

STANDARD 7 X 5





TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 7 X 5

NUMBER OF LEGS ------------------------	4
SIMULATION TIME IN MINUTES ----------	20
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. -------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS -----------	20	20	20	20

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 7 X 5

LEG 1 GEOMETRY DATA:

LEG ANGLE ----------------------------	0
LENGTH OF INBOUND LANES ---------------	800
LENGTH OF OUTBOUND LANES --------------	250
NUMBER OF INBOUND LANES ---------------	4
NUMBER OF OUTBOUND LANES --------------	3
SPEED LIMIT ON INBOUND LANES IN MPH ----	30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---	30
LEG CENTERLINE OFFSET -----------------	-12
MEDIAN WIDTH --------------------------	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---	20
LIMITING ANGLE FOR U-TURN --------------	10

LANE DATA FOR INBOUND LEG 1:
(CONVERTED APPROACH 1)

LANE NUMBER ------------------	1	2	3	4
(INBOUND LANE NUMBER) ---------	1	2	3	4
WIDTH OF LANE -----------------	12	12	12	12
MOVEMENT CODE -----------------	L	S	S	SR
LENGTH OF UNBLOCKED LANE				
FROM LANE TERMINAL -----------	0	0	0	0
FROM OUTER END ---------------	0	0	0	0
OFFSET OF LANE TERMINAL ------	0	0	0	0
PERCENT OF INBOUND TRAFFIC				
TO ENTER IN THIS LANE --------	25	25	25	25
	MEDIAN			CURB

LANE DATA FOR OUTBOUND LEG 1:
(CONVERTED APPROACH 5)

LANE NUMBER ------------------	5	6	7
(OUTBOUND LANE NUMBER) -------	1	2	3
WIDTH OF LANE -----------------	12	12	12
MOVEMENT CODE -----------------	LS	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL -----------	0	0	0
FROM OUTER END ---------------	0	0	0
OFFSET OF LANE TERMINAL ------	0	0	0
	MEDIAN		CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 7 X 5

LEG 2 GEOMETRY DATA:

LEG ANGLE ----------------------------	90
LENGTH OF INBOUND LANES ---------------	800
LENGTH OF OUTBOUND LANES --------------	250
NUMBER OF INBOUND LANES ---------------	3
NUMBER OF OUTBOUND LANES --------------	2
SPEED LIMIT ON INBOUND LANES IN MPH ----	30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---	30
LEG CENTERLINE OFFSET -----------------	-12
MEDIAN WIDTH --------------------------	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---	20
LIMITING ANGLE FOR U-TURN --------------	10

LANE DATA FOR INBOUND LEG 2:
(CONVERTED APPROACH 2)

LANE NUMBER ------------------	1	2	3
(INBOUND LANE NUMBER) ---------	1	2	3
WIDTH OF LANE -----------------	12	12	12
MOVEMENT CODE -----------------	L	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL -----------	0	0	0
FROM OUTER END ---------------	0	0	0
OFFSET OF LANE TERMINAL ------	0	0	0
PERCENT OF INBOUND TRAFFIC			
TO ENTER IN THIS LANE --------	32	35	33
	MEDIAN		CURB

LANE DATA FOR OUTBOUND LEG 2:
(CONVERTED APPROACH 6)

LANE NUMBER ------------------	4	5
(OUTBOUND LANE NUMBER) -------	1	2
WIDTH OF LANE -----------------	12	12
MOVEMENT CODE -----------------	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL -----------	0	0
FROM OUTER END ---------------	0	0
OFFSET OF LANE TERMINAL ------	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 5

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC	
HEADWAY FREQUENCY DISTRIBUTION --------	SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------	600
PARAMETER FOR DISTRIBUTION -------------	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---	28.0
85-PERCENTILE SPEED, MPH ---------------	31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER -------------------------	1	2	3	4
PERCENT OF LEG 1 INBOUND				
VEHICLES WITH DESTINATION ON LEG ---	0	33	33	34

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 5

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC	
HEADWAY FREQUENCY DISTRIBUTION --------	SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------	600
PARAMETER FOR DISTRIBUTION -------------	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---	28.0
85-PERCENTILE SPEED, MPH ---------------	31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER -------------------------	1	2	3	4
PERCENT OF LEG 2 INBOUND				
VEHICLES WITH DESTINATION ON LEG ---	33	0	33	34

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 7 X 5

LEG 3 GEOMETRY DATA:

LEG ANGLE	180
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	4
NUMBER OF OUTBOUND LANES	3
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	0
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 3:
(CONVERTED APPROACH 3)

LANE NUMBER	1	2	3	4
(INBOUND LANE NUMBER)	1	2	3	4
WIDTH OF LANE	12	12	12	12
MOVEMENT CODE	L	S	S	SR
LENGTH OF UNBLOCKED LANE				
FROM LANE TERMINAL	0	0	0	0
FROM OUTER END	0	0	0	0
OFFSET OF LANE TERMINAL	0	0	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	25	25	25	25
	MEDIAN			CURB

LANE DATA FOR OUTBOUND LEG 3:
(CONVERTED APPROACH 7)

LANE NUMBER	5	6	7
(OUTBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	LS	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
	MEDIAN		CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 7 X 5

LEG 4 GEOMETRY DATA:

LEG ANGLE	270
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	250
NUMBER OF INBOUND LANES	3
NUMBER OF OUTBOUND LANES	2
SPEED LIMIT ON INBOUND LANES IN MPH	30
SPEED LIMIT ON OUTBOUND LANES IN MPH	30
LEG CENTERLINE OFFSET	0
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 4:
(CONVERTED APPROACH 4)

LANE NUMBER	1	2	3
(INBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	L	S	SR
LENGTH OF UNBLOCKED LANE			
FROM LANE TERMINAL	0	0	0
FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	32	35	33
	MEDIAN		CURB

LANE DATA FOR OUTBOUND LEG 4:
(CONVERTED APPROACH 8)

LANE NUMBER	4	5
(OUTBOUND LANE NUMBER)	1	2
WIDTH OF LANE	12	12
MOVEMENT CODE	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	0	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 5

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	600
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 3 INBOUND VEHICLES WITH DESTINATION ON LEG	33	33	0	34

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 5

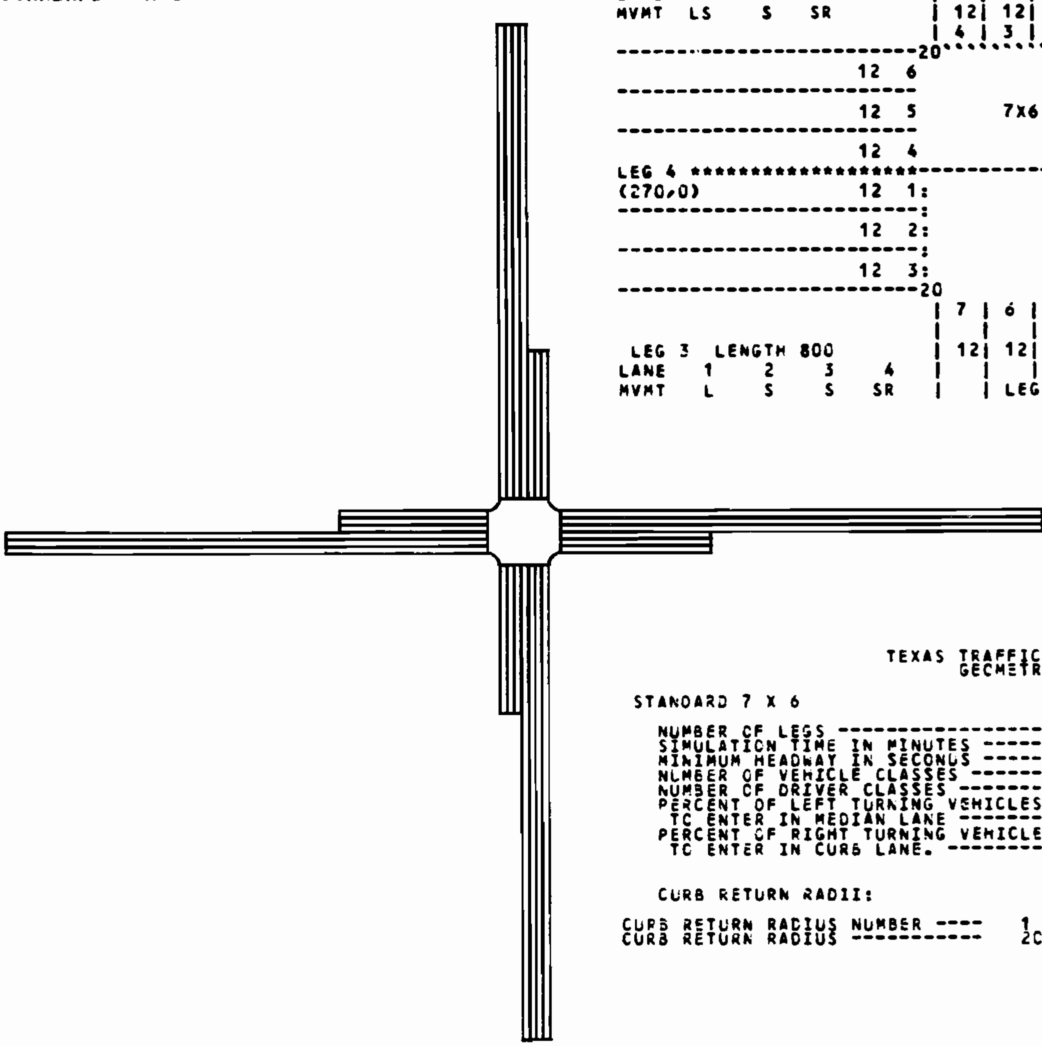
INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	600
PARAMETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0
85-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 4 INBOUND VEHICLES WITH DESTINATION ON LEG	33	33	34	0

STANDARD 7 X 6



```
 LEG 4  LENGTH 800          |    |    | LEG 1 (0,-12) |    | LEG 1  LENGTH 800
LANE   1     2     3        |    |    |    |    *    |    |    | LANE   1     2     3     4
MVMT  LS     S    SR        | 12| 12| 12| 12*12 |12 |12 | MVMT   L     S     S    SR
                            | 4 | 3 | 2 | 1 * 5 | 6 | 7 |
---------------------------20.................|          20-------------------------
                       12  6                  |           :3  12
--------------------------                    |           :-------------------------
                       12  5       7X6        |           :2  12
--------------------------                    |           :-------------------------
                       12  4                  |           :1  12
LEG 4 ********************--------------0------------------****************** LEG 2
(270,0)                12  1:           |                  -  12               (90,0)
---------------------------:            |                  -------------------------
                       12  2:           |                  5  12
---------------------------:            |                  -------------------------
                       12  3:           |                  6  12
---------------------------20           |................20-------------------------
                            | 7 | 6 | 5 * 1 | 2 | 3 | 4 |
                            |   |   |   *   |   |   |   |
 LEG 3  LENGTH 800          | 12| 12| 12*12 |12 |12 |12 |      LEG 2  LENGTH 800
LANE   1     2     3     4  |   |   |   *   |   |   |   |     LANE   1     2     3
MVMT   L     S     S    SR  |   | LEG 3 (180,0) |   |   |     MVMT  LS     S    SR
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 7 X 6

NUMBER OF LEGS ----------------------	4
SIMULATION TIME IN MINUTES ----------	20
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE -----------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. ------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS -----------	20	20	20	20

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                             GEOMETRY INPUT DATA
STANDARD 7 X 6

   LEG 1 GEOMETRY DATA:

LEG ANGLE --------------------------------      0
LENGTH OF INBOUND LANES ----------------      800
LENGTH OF OUTBOUND LANES ---------------      250
NUMBER OF INBOUND LANES ----------------        4
NUMBER OF OUTBOUND LANES ---------------        3
SPEED LIMIT ON INBOUND LANES IN MPH ----       30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---       30
LEG CENTERLINE OFFSET ------------------      -12
MEDIAN WIDTH ---------------------------        0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---       20
LIMITING ANGLE FOR U-TURN --------------       10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER ------------------       1      2      3      4
(INBOUND LANE NUMBER) --------       1      2      3      4
WIDTH OF LANE ----------------      12     12     12     12
MOVEMENT CODE ----------------       L      S      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------       0      0      0      0
 FROM OUTER END --------------       0      0      0      0
OFFSET OF LANE TERMINAL ------       0      0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------      25     25     25     25
                                MEDIAN                 CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

LANE NUMBER ------------------       5      6      7
(OUTBOUND LANE NUMBER) -------       1      2      3
WIDTH OF LANE ----------------      12     12     12
MOVEMENT CODE ----------------      LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------       0      0      0
 FROM OUTER END --------------       0      0      0
OFFSET OF LANE TERMINAL ------       0      0      0
                                MEDIAN          CURB
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                             GEOMETRY INPUT DATA
STANDARD 7 X 6

   LEG 2 GEOMETRY DATA:

LEG ANGLE --------------------------------     90
LENGTH OF INBOUND LANES ----------------      800
LENGTH OF OUTBOUND LANES ---------------      250
NUMBER OF INBOUND LANES ----------------        3
NUMBER OF OUTBOUND LANES ---------------        3
SPEED LIMIT ON INBOUND LANES IN MPH ----       30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---       30
LEG CENTERLINE OFFSET ------------------        0
MEDIAN WIDTH ---------------------------        0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---       20
LIMITING ANGLE FOR U-TURN --------------       10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER ------------------       1      2      3
(INBOUND LANE NUMBER) --------       1      2      3
WIDTH OF LANE ----------------      12     12     12
MOVEMENT CODE ----------------      LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------       0      0      0
 FROM OUTER END --------------       0      0      0
OFFSET OF LANE TERMINAL ------       0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------      32     35     33
                                MEDIAN          CURB

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

LANE NUMBER ------------------       4      5      6
(OUTBOUND LANE NUMBER) -------       1      2      3
WIDTH OF LANE ----------------      12     12     12
MOVEMENT CODE ----------------      LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------       0      0      0
 FROM OUTER END --------------       0      0      0
OFFSET OF LANE TERMINAL ------       0      0      0
                                MEDIAN          CURB
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                           DRIVER-VEHICLE INPUT DATA
STANDARD 7 X 6

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------     600
PARAMETER FOR DISTRIBUTION --------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     26.0
85-PERCENTILE SPEED, MPH ----------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER ---------------------------   1   2   3   4
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    0  33  33  34
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                           DRIVER-VEHICLE INPUT DATA
STANDARD 7 X 6

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------     600
PARAMETER FOR DISTRIBUTION --------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     26.0
85-PERCENTILE SPEED, MPH ----------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER ---------------------------   1   2   3   4
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   33   0  33  34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

STANDARD 7 X 6

   LEG 3 GEOMETRY DATA:

LEG ANGLE -----------------------------------  180
LENGTH OF INBOUND LANES ---------------------  800
LENGTH OF OUTBOUND LANES --------------------  250
NUMBER OF INBOUND LANES ---------------------    4
NUMBER OF OUTBOUND LANES --------------------    3
SPEED LIMIT ON INBOUND LANES IN MPH ---------   30
SPEED LIMIT ON OUTBOUND LANES IN MPH --------   30
LEG CENTERLINE OFFSET -----------------------    0
MEDIAN WIDTH --------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT --------   20
LIMITING ANGLE FOR U-TURN -------------------   10

   LANE DATA FOR INBOUND LEG 3:
    (CONVERTED APPROACH 3)

LANE NUMBER ------------------------     1      2      3      4
(INBOUND LANE NUMBER) --------------     1      2      3      4
WIDTH OF LANE ----------------------    12     12     12     12
MOVEMENT CODE ----------------------     L      S      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------------     0      0      0      0
 FROM OUTER END --------------------     0      0      0      0
OFFSET OF LANE TERMINAL ------------     0      0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------------    25     25     25     25
                                    MEDIAN                 CURB

   LANE DATA FOR OUTBOUND LEG 3:
    (CONVERTED APPROACH 7)

LANE NUMBER ------------------------     5      6      7
(OUTBOUND LANE NUMBER) -------------     1      2      3
WIDTH OF LANE ----------------------    12     12     12
MOVEMENT CODE ----------------------    LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------------     0      0      0
 FROM OUTER END --------------------     0      0      0
OFFSET OF LANE TERMINAL ------------     0      0      0
                                    MEDIAN          CURB
```

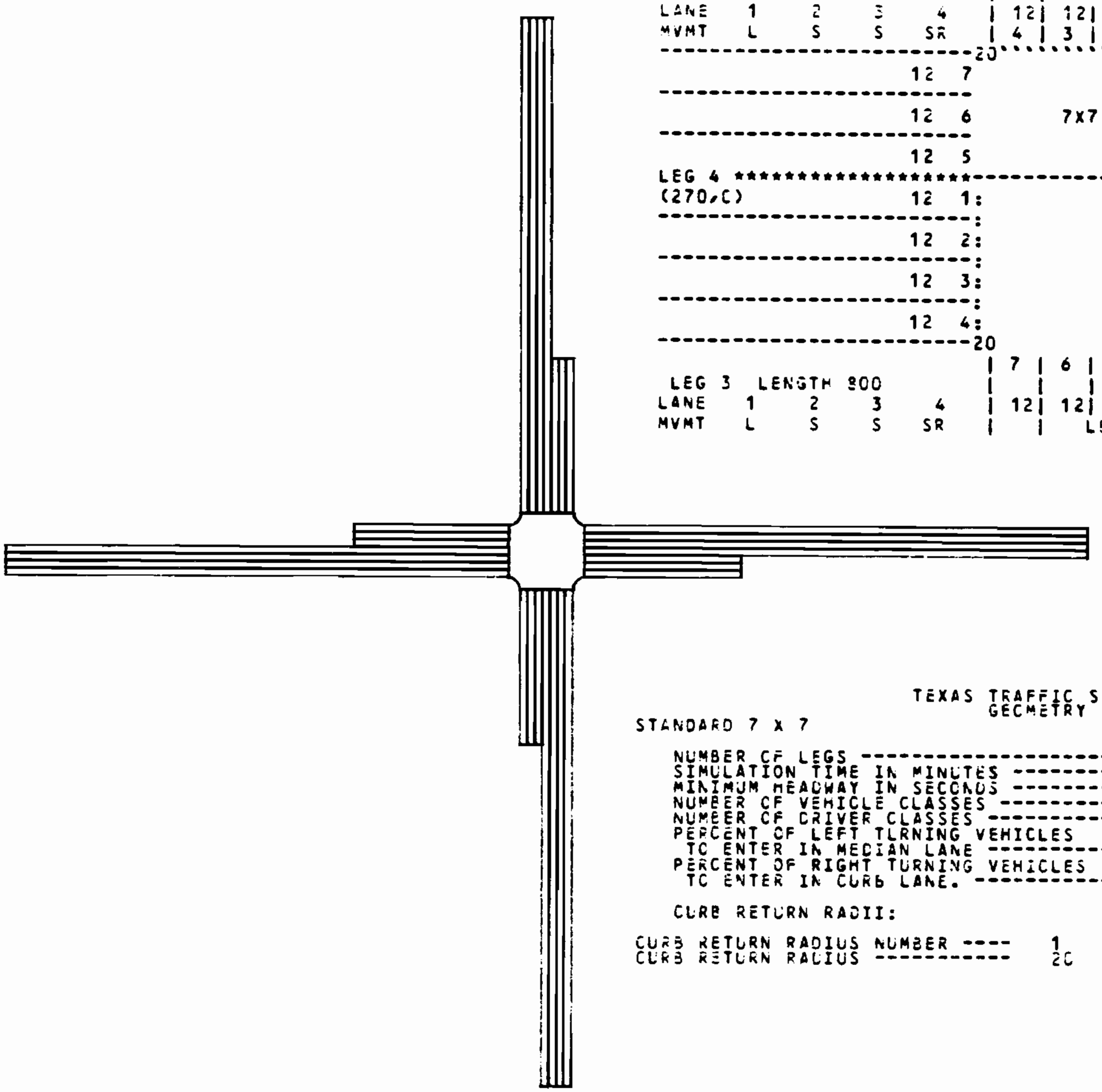
```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

STANDARD 7 X 6

   LEG 4 GEOMETRY DATA:

LEG ANGLE -----------------------------------  270
LENGTH OF INBOUND LANES ---------------------  800
LENGTH OF OUTBOUND LANES --------------------  250
NUMBER OF INBOUND LANES ---------------------    3
NUMBER OF OUTBOUND LANES --------------------    3
SPEED LIMIT ON INBOUND LANES IN MPH ---------   30
SPEED LIMIT ON OUTBOUND LANES IN MPH --------   30
LEG CENTERLINE OFFSET -----------------------    0
MEDIAN WIDTH --------------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT --------   20
LIMITING ANGLE FOR U-TURN -------------------   10

   LANE DATA FOR INBOUND LEG 4:
    (CONVERTED APPROACH 4)

LANE NUMBER ------------------------     1      2      3
(INBOUND LANE NUMBER) --------------     1      2      3
WIDTH OF LANE ----------------------    12     12     12
MOVEMENT CODE ----------------------    LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------------     0      0      0
 FROM OUTER END --------------------     0      0      0
OFFSET OF LANE TERMINAL ------------     0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------------    32     35     33
                                    MEDIAN          CURB

   LANE DATA FOR OUTBOUND LEG 4:
    (CONVERTED APPROACH 8)

LANE NUMBER ------------------------     4      5      6
(OUTBOUND LANE NUMBER) -------------     1      2      3
WIDTH OF LANE ----------------------    12     12     12
MOVEMENT CODE ----------------------    LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------------     0      0      0
 FROM OUTER END --------------------     0      0      0
OFFSET OF LANE TERMINAL ------------     0      0      0
                                    MEDIAN          CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 6

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------      800
PARAMETER FOR DISTRIBUTION --------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ----     28.0
85-PERCENTILE SPEED, MPH ----------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER -----------------------------   1    2    3    4
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---     33   33    0   34
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

STANDARD 7 X 6

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------      600
PARAMETER FOR DISTRIBUTION --------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ----     28.0
85-PERCENTILE SPEED, MPH ----------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER -----------------------------   1    2    3    4
PERCENT OF LEG 4 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---     33   33   34    0
```

STANDARD 7 X 7

```
 LEG 4  LENGTH 800                |   |    LEG 1 (0,-12)     |   |  LEG 1  LENGTH 800
LANE    1     2     3     4       | 12| 12| 12| 12*12 |12 |12 | LANE    1     2     3     4
MVMT    L     S     S     SR      | 4 | 3 | 2 | 1 * 5 | 6 | 7 | MVMT    L     S     S     SR
-----------------------------20.................|             20-------------------------
                        12  7                   |             :4  12
-----------------------------                   |             :-------------------------
                        12  6        7X7        |             :3  12
-----------------------------                   |             :-------------------------
                        12  5                   |             :2  12
LEG 4 *********************-----------------0----             :-------------------------
(270,C)                 12  1:              |                 :1  12
-----------------------------:              |------------------******************* LEG 2
                        12  2:              |                  5  12            (90,-12)
-----------------------------:              |                  -------------------------
                        12  3:              |                  6  12
-----------------------------:              |                  -------------------------
                        12  4:              |                  7  12
-----------------------------20             |.................20-------------------------
                              | 7 | 6 | 5 * 1 | 2 | 3 | 4 |
 LEG 3  LENGTH 800            |   |   |   *   |   |   |   |  LEG 2  LENGTH 800
LANE    1     2     3     4   | 12| 12| 12*12 |12 |12 |12 | LANE    1     2     3     4
MVMT    L     S     S     SR  |   |    LEG 3 (180,C)  |   | MVMT    L     S     S     SR
```



TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 7 X 7

```
   NUMBER OF LEGS ----------------------        4
   SIMULATION TIME IN MINUTES ----------       20
   MINIMUM HEADWAY IN SECONDS ----------      1.0
   NUMBER OF VEHICLE CLASSES -----------       10
   NUMBER OF DRIVER CLASSES ------------        3
   PERCENT OF LEFT TURNING VEHICLES
     TO ENTER IN MEDIAN LANE -----------       80
   PERCENT OF RIGHT TURNING VEHICLES
     TO ENTER IN CURB LANE. ------------       80

   CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----     1      2      3      4
CURB RETURN RADIUS -----------    20     20     20     20
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                              GEOMETRY INPUT DATA
STANDARD 7 X 7

   LEG 1 GEOMETRY DATA:

LEG ANGLE -------------------------------     0
LENGTH OF INBOUND LANES ----------------   800
LENGTH OF OUTBOUND LANES ---------------   250
NUMBER OF INBOUND LANES ----------------     4
NUMBER OF OUTBOUND LANES ---------------     3
SPEED LIMIT ON INBOUND LANES IN MPH ----    30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---    30
LEG CENTERLINE OFFSET ------------------   -12
MEDIAN WIDTH ---------------------------     0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---    20
LIMITING ANGLE FOR U-TURN --------------    10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER -------------------      1      2      3      4
(INBOUND LANE NUMBER) ---------      1      2      3      4
WIDTH OF LANE -----------------     12     12     12     12
MOVEMENT CODE -----------------      L      S      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0      0      0
 FROM OUTER END ---------------      0      0      0      0
OFFSET OF LANE TERMINAL -------      0      0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     25     25     25     25
                               MEDIAN                  CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

LANE NUMBER -------------------      5      6      7
(OUTBOUND LANE NUMBER) --------      1      2      3
WIDTH OF LANE -----------------     12     12     12
MOVEMENT CODE -----------------     LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0      0
 FROM OUTER END ---------------      0      0      0
OFFSET OF LANE TERMINAL -------      0      0      0
                               MEDIAN           CURB
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                              GEOMETRY INPUT DATA
STANDARD 7 X 7

   LEG 2 GEOMETRY DATA:

LEG ANGLE -------------------------------    90
LENGTH OF INBOUND LANES ----------------   800
LENGTH OF OUTBOUND LANES ---------------   250
NUMBER OF INBOUND LANES ----------------     4
NUMBER OF OUTBOUND LANES ---------------     3
SPEED LIMIT ON INBOUND LANES IN MPH ----    30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---    30
LEG CENTERLINE OFFSET ------------------   -12
MEDIAN WIDTH ---------------------------     0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---    20
LIMITING ANGLE FOR U-TURN --------------    10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER -------------------      1      2      3      4
(INBOUND LANE NUMBER) ---------      1      2      3      4
WIDTH OF LANE -----------------     12     12     12     12
MOVEMENT CODE -----------------      L      S      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0      0      0
 FROM OUTER END ---------------      0      0      0      0
OFFSET OF LANE TERMINAL -------      0      0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     25     25     25     25
                               MEDIAN                  CURB

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

LANE NUMBER -------------------      5      6      7
(OUTBOUND LANE NUMBER) --------      1      2      3
WIDTH OF LANE -----------------     12     12     12
MOVEMENT CODE -----------------     LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0      0
 FROM OUTER END ---------------      0      0      0
OFFSET OF LANE TERMINAL -------      0      0      0
                               MEDIAN           CURB
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                            DRIVER-VEHICLE INPUT DATA
STANDARD 7 X 7

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      800
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DISTRIBUTION DATA FOR LEG 1:

LEG NUMBER -------------------------------------------    1    2    3    4
% OF LEG 1 INBOUND VEHICLES TO BE OUTBOUND ON LEG --      0   33   33   34
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                            DRIVER-VEHICLE INPUT DATA
STANDARD 7 X 7

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------      800
PARAMETER FOR DISTRIBUTION -------------     2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ---------------     31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DISTRIBUTION DATA FOR LEG 2:

LEG NUMBER -------------------------------------------    1    2    3    4
% OF LEG 2 INBOUND VEHICLES TO BE OUTBOUND ON LEG --     33    0   33   34
```

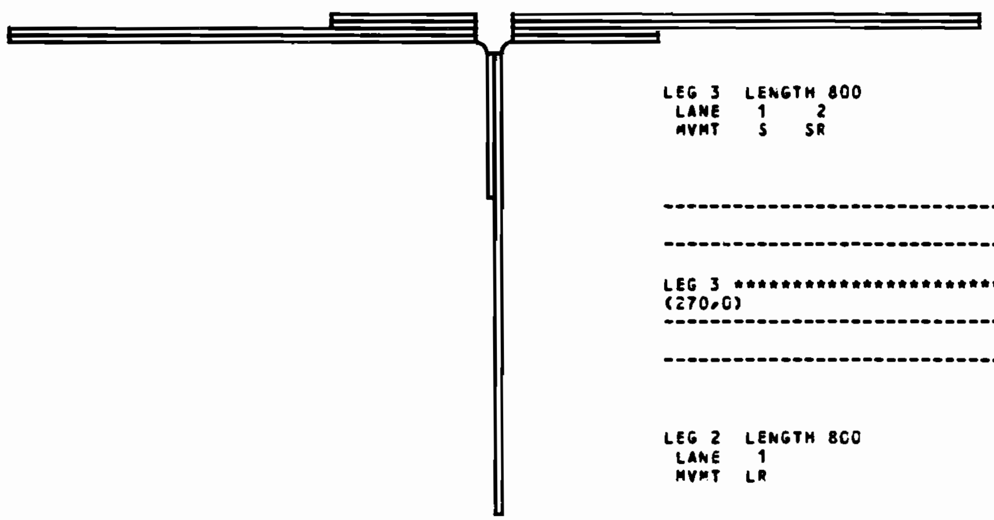
```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                              GEOMETRY INPUT DATA
STANDARD 7 X 7

   LEG 3 GEOMETRY DATA:

LEG ANGLE --------------------------------   180
LENGTH OF INBOUND LANES -----------------   800
LENGTH OF OUTBOUND LANES ----------------   250
NUMBER OF INBOUND LANES -----------------     4
NUMBER OF OUTBOUND LANES ----------------     3
SPEED LIMIT ON INBOUND LANES IN MPH ----    30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---    30
LEG CENTERLINE OFFSET -------------------     0
MEDIAN WIDTH ----------------------------     0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---    20
LIMITING ANGLE FOR U-TURN --------------    10

   LANE DATA FOR INBOUND LEG 3:
    (CONVERTED APPROACH 3)

LANE NUMBER ------------------      1      2      3      4
(INBOUND LANE NUMBER) ---------     1      2      3      4
WIDTH OF LANE -----------------    12     12     12     12
MOVEMENT CODE -----------------     L      S      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0      0      0      0
 FROM OUTER END ---------------     0      0      0      0
OFFSET OF LANE TERMINAL -------     0      0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------    25     25     25     25
                               MEDIAN                 CURB

   LANE DATA FOR OUTBOUND LEG 3:
    (CONVERTED APPROACH 7)

LANE NUMBER ------------------      5      6      7
(OUTBOUND LANE NUMBER) --------     1      2      3
WIDTH OF LANE -----------------    12     12     12
MOVEMENT CODE -----------------    LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0      0      0
 FROM OUTER END ---------------     0      0      0
OFFSET OF LANE TERMINAL -------     0      0      0
                               MEDIAN          CURB
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                              GEOMETRY INPUT DATA
STANDARD 7 X 7

   LEG 4 GEOMETRY DATA:

LEG ANGLE --------------------------------   270
LENGTH OF INBOUND LANES -----------------   800
LENGTH OF OUTBOUND LANES ----------------   250
NUMBER OF INBOUND LANES -----------------     4
NUMBER OF OUTBOUND LANES ----------------     3
SPEED LIMIT ON INBOUND LANES IN MPH ----    30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---    30
LEG CENTERLINE OFFSET -------------------     0
MEDIAN WIDTH ----------------------------     0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---    20
LIMITING ANGLE FOR U-TURN --------------    10

   LANE DATA FOR INBOUND LEG 4:
    (CONVERTED APPROACH 4)

LANE NUMBER ------------------      1      2      3      4
(INBOUND LANE NUMBER) ---------     1      2      3      4
WIDTH OF LANE -----------------    12     12     12     12
MOVEMENT CODE -----------------     L      S      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0      0      0      0
 FROM OUTER END ---------------     0      0      0      0
OFFSET OF LANE TERMINAL -------     0      0      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------    25     25     25     25
                               MEDIAN                 CURB

   LANE DATA FOR OUTBOUND LEG 4:
    (CONVERTED APPROACH 8)

LANE NUMBER ------------------      5      6      7
(OUTBOUND LANE NUMBER) --------     1      2      3
WIDTH OF LANE -----------------    12     12     12
MOVEMENT CODE -----------------    LS      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------     0      0      0
 FROM OUTER END ---------------     0      0      0
OFFSET OF LANE TERMINAL -------     0      0      0
                               MEDIAN          CURB
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                            DRIVER-VEHICLE INPUT DATA
STANDARD 7 X 7

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------     300
PARAMETER FOR DISTRIBUTION -------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    29.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DISTRIBUTION DATA FOR LEG 3:

LEG NUMBER ---------------------------------------------   1    2    3    4
% OF LEG 3 INBOUND VEHICLES TO BE OUTBOUND ON LEG --    33   33    0   34
```

```
                         TEXAS TRAFFIC SIMULATION PACKAGE
                            DRIVER-VEHICLE INPUT DATA
STANDARD 7 X 7

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------     800
PARAMETER FOR DISTRIBUTION -------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    28.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DISTRIBUTION DATA FOR LEG 4:

LEG NUMBER ---------------------------------------------   1    2    3    4
% OF LEG 4 INBOUND VEHICLES TO BE OUTBOUND ON LEG --    33   33   34    0
```

STANDARD 4 T 2



```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA
STANDARD 4 T 2

  NUMBER OF LEGS ----------------------     3
  SIMULATION TIME IN MINUTES ----------    20
  MINIMUM HEADWAY IN SECONDS ----------   1.0
  NUMBER OF VEHICLE CLASSES -----------    10
  NUMBER OF DRIVER CLASSES ------------     3
  PERCENT OF LEFT TURNING VEHICLES
    TO ENTER IN MEDIAN LANE -----------    30
  PERCENT OF RIGHT TURNING VEHICLES
    TO ENTER IN CURB LANE. ------------    80

  CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----    1      2      3
CURB RETURN RADIUS -----------   32     20     20

LEG 3   LENGTH 800
 LANE     1     2
 MVMT     S     SR

-----------------------------------|-32-|-32-|---------------------------------
                            12  4       |     :2  12
--------------------------------- 4T2   |     :--------------------------------
                            12  3       |     :1  12
LEG 3 *****************************-----0----******************************* LEG 1
(270,0)                     12  1:      |      3  12                     (90,0)
----------------------------------:     |     ---------------------------------
                            12  2:      |      4  12
---------------------------------20     |...20---------------------------------
                                  | 2 * 1 |
                                  |   *   |
                                  | 12*12 |
LEG 2   LENGTH 800                |   *   |                  LEG 1   LENGTH 800
 LANE     1                       |   *   |                   LANE     1     2
 MVMT     LR                      |   *   |                   MVMT     LS    S
                                LEG 2 (180,0)
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                    GEOMETRY INPUT DATA

STANDARD 4 T 2

   LEG 1 GEOMETRY DATA:

LEG ANGLE -------------------------------------   90
LENGTH OF INBOUND LANES ----------------------   800
LENGTH OF OUTBOUND LANES ---------------------   250
NUMBER OF INBOUND LANES ----------------------     2
NUMBER OF OUTBOUND LANES ---------------------     2
SPEED LIMIT ON INBOUND LANES IN MPH ----          30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---          30
LEG CENTERLINE OFFSET ------------------           0
MEDIAN WIDTH ---------------------------           0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---          20
LIMITING ANGLE FOR U-TURN --------------          10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER ------------------         1      2
(INBOUND LANE NUMBER) ---------        1      2
WIDTH OF LANE -----------------       12     12
MOVEMENT CODE -----------------       LS      S
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------        0      0
 FROM OUTER END ---------------        0      0
OFFSET OF LANE TERMINAL ------         0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------        48     52
                                  MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 4)

LANE NUMBER ------------------         3      4
(OUTBOUND LANE NUMBER) -------         1      2
WIDTH OF LANE -----------------       12     12
MOVEMENT CODE -----------------       SR     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------        0      0
 FROM OUTER END ---------------        0      0
OFFSET OF LANE TERMINAL ------         0      0
                                  MEDIAN   CURB
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                    GEOMETRY INPUT DATA

STANDARD 4 T 2

   LEG 2 GEOMETRY DATA:

LEG ANGLE -------------------------------------  180
LENGTH OF INBOUND LANES ----------------------   800
LENGTH OF OUTBOUND LANES ---------------------   250
NUMBER OF INBOUND LANES ----------------------     1
NUMBER OF OUTBOUND LANES ---------------------     1
SPEED LIMIT ON INBOUND LANES IN MPH ----          30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---          30
LEG CENTERLINE OFFSET ------------------           0
MEDIAN WIDTH ---------------------------           0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---          20
LIMITING ANGLE FOR U-TURN --------------          10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER ------------------         1
(INBOUND LANE NUMBER) ---------        1
WIDTH OF LANE -----------------       12
MOVEMENT CODE -----------------       LR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------        0
 FROM OUTER END ---------------        0
OFFSET OF LANE TERMINAL ------         0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------       100

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 5)

LANE NUMBER ------------------         2
(OUTBOUND LANE NUMBER) -------         1
WIDTH OF LANE -----------------       12
MOVEMENT CODE -----------------       LR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------        0
 FROM OUTER END ---------------        0
OFFSET OF LANE TERMINAL ------         0
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                   DRIVER-VEHICLE INPUT DATA

STANDARD 4 T 2

  INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------       400
PARAMETER FOR DISTRIBUTION -------------      2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---      28.0
85-PERCENTILE SPEED, MPH ---------------      31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------        NO

  OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER -------------------------    1    2    3
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   0   50   50
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                   DRIVER-VEHICLE INPUT DATA

STANDARD 4 T 2

  INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------       200
PARAMETER FOR DISTRIBUTION -------------      2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---      28.0
85-PERCENTILE SPEED, MPH ---------------      31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------        NO

  OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER -------------------------    1    2    3
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---  50    0   50
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                        GEOMETRY INPUT DATA
 STANDARD 4 T 2

   LEG 3 GEOMETRY DATA:

LEG ANGLE --------------------------------  270
LENGTH OF INBOUND LANES ------------------  800
LENGTH OF OUTBOUND LANES -----------------  250
NUMBER OF INBOUND LANES ------------------    2
NUMBER OF OUTBOUND LANES -----------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ------   30
SPEED LIMIT ON OUTBOUND LANES IN MPH -----   30
LEG CENTERLINE OFFSET --------------------    0
MEDIAN WIDTH -----------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT -----   20
LIMITING ANGLE FOR U-TURN ----------------   10

   LANE DATA FOR INBOUND LEG 3:
    (CONVERTED APPROACH 3)

LANE NUMBER -------------------      1       2
(INBOUND LANE NUMBER) ---------      1       2
WIDTH OF LANE -----------------     12      12
MOVEMENT CODE -----------------      S      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0       0
 FROM OUTER END ---------------      0       0
OFFSET OF LANE TERMINAL -------      0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     48      52
                                MEDIAN    CURB

   LANE DATA FOR OUTBOUND LEG 3:
    (CONVERTED APPROACH 6)

LANE NUMBER -------------------      3       4
(OUTBOUND LANE NUMBER) --------      1       2
WIDTH OF LANE -----------------     12      12
MOVEMENT CODE -----------------     LS      LS
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0       0
 FROM OUTER END ---------------      0       0
OFFSET OF LANE TERMINAL -------      0       0
                                MEDIAN    CURB


                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA
 STANDARD 4 T 2
   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------     400
PARAMETER FOR DISTRIBUTION --------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ----    28.0
85-PERCENTILE SPEED, MPH ----------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER --------------------------   1    2    3
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---  50   50    0
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

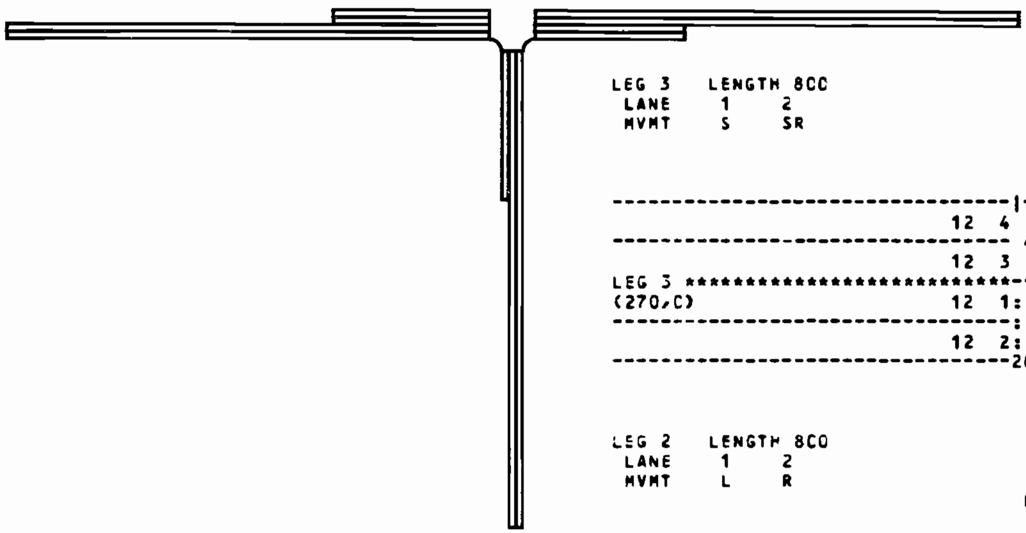
STANDARD 4 T 3

NUMBER OF LEGS ----------------------	3
SIMULATION TIME IN MINUTES ----------	20
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. ------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3
CURB RETURN RADIUS -----------	44	20	20

STANDARD 4 T 3



LEG 3 LENGTH 800

LANE	1	2
MVMT	S	SR

```
---------------------------------|-32-|---44---|--------------------------------
                           12  4      |        :2  12
--------------------------------- 4T3 |        :--------------------------------
                           12  3      |        :1  12
LEG 3 ***************************-----0--------******************************* LEG 1
(270,C)                    12  1:     |         3  12                     (90,0)
--------------------------------:     |         --------------------------------
                           12  2:     |         4  12
--------------------------------20    |.......20--------------------------------
                                 | 3  * 1 | 2 |
                                 |    *   |   |
                                 | 12*12  |12 |
                                 |    *   |   |
                                 |    *   |   |
                                 |    *   |   |
                                 LEG 2 (180,C)
```

LEG 2 LENGTH 800

LANE	1	2
MVMT	L	R

LEG 1 LENGTH 800

LANE	1	2
MVMT	LS	S

```
                 TEXAS TRAFFIC SIMULATION PACKAGE
                      GEOMETRY INPUT DATA
STANDARD 4 T 3

  LEG 1 GEOMETRY DATA:

LEG ANGLE --------------------------------   90
LENGTH OF INBOUND LANES ----------------    800
LENGTH OF OUTBOUND LANES ---------------    250
NUMBER OF INBOUND LANES ----------------      2
NUMBER OF OUTBOUND LANES ---------------      2
SPEED LIMIT ON INBOUND LANES IN MPH ----     30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---     30
LEG CENTERLINE OFFSET ------------------      0
MEDIAN WIDTH ---------------------------      0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---     20
LIMITING ANGLE FOR U-TURN --------------     10

  LANE DATA FOR INBOUND LEG 1:
   (CONVERTED APPROACH 1)

LANE NUMBER ------------------     1       2
(INBOUND LANE NUMBER) --------     1       2
WIDTH OF LANE ----------------    12      12
MOVEMENT CODE ----------------    LS       S
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0       0
 FROM OUTER END --------------     0       0
OFFSET OF LANE TERMINAL ------     0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------    48      52
                              MEDIAN    CURB

  LANE DATA FOR OUTBOUND LEG 1:
   (CONVERTED APPROACH 4)

LANE NUMBER ------------------     3       4
(OUTBOUND LANE NUMBER) -------     1       2
WIDTH OF LANE ----------------    12      12
MOVEMENT CODE ----------------    SR      SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0       0
 FROM OUTER END --------------     0       0
OFFSET OF LANE TERMINAL ------     0       0
                              MEDIAN    CURB
```

```
                 TEXAS TRAFFIC SIMULATION PACKAGE
                      GEOMETRY INPUT DATA
STANDARD 4 T 3

  LEG 2 GEOMETRY DATA:

LEG ANGLE --------------------------------  180
LENGTH OF INBOUND LANES ----------------    800
LENGTH OF OUTBOUND LANES ---------------    250
NUMBER OF INBOUND LANES ----------------      2
NUMBER OF OUTBOUND LANES ---------------      1
SPEED LIMIT ON INBOUND LANES IN MPH ----     30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---     30
LEG CENTERLINE OFFSET ------------------      0
MEDIAN WIDTH ---------------------------      0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---     20
LIMITING ANGLE FOR U-TURN --------------     10

  LANE DATA FOR INBOUND LEG 2:
   (CONVERTED APPROACH 2)

LANE NUMBER ------------------     1       2
(INBOUND LANE NUMBER) --------     1       2
WIDTH OF LANE ----------------    12      12
MOVEMENT CODE ----------------     L       R
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0       0
 FROM OUTER END --------------     0       0
OFFSET OF LANE TERMINAL ------     0       0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------    48      52
                              MEDIAN    CURB

  LANE DATA FOR OUTBOUND LEG 2:
   (CONVERTED APPROACH 5)

LANE NUMBER ------------------     3
(OUTBOUND LANE NUMBER) -------     1
WIDTH OF LANE ----------------    12
MOVEMENT CODE ----------------    LR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0
 FROM OUTER END --------------     0
OFFSET OF LANE TERMINAL ------     0
```

```
                 TEXAS TRAFFIC SIMULATION PACKAGE
                   DRIVER-VEHICLE INPUT DATA
STANDARD 4 T 3

  INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------       400
PARAMETER FOR DISTRIBUTION -------------      2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---      28.0
85-PERCENTILE SPEED, MPH ---------------      31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------        NO

  OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER --------------------------    1    2    3
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    0   50   50
```

```
                 TEXAS TRAFFIC SIMULATION PACKAGE
                   DRIVER-VEHICLE INPUT DATA
STANDARD 4 T 3

  INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------       400
PARAMETER FOR DISTRIBUTION -------------      2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---      28.0
85-PERCENTILE SPEED, MPH ---------------      31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------        NO

  OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER --------------------------    1    2    3
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   50    0   50
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                         GEOMETRY INPUT DATA
 STANDARD 4 T 3

   LEG 3 GEOMETRY DATA:

LEG ANGLE ------------------------------  270
LENGTH OF INBOUND LANES ----------------  800
LENGTH OF OUTBOUND LANES ---------------  250
NUMBER OF INBOUND LANES ----------------    2
NUMBER OF OUTBOUND LANES ---------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---   30
LEG CENTERLINE OFFSET ------------------    0
MEDIAN WIDTH ---------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---   20
LIMITING ANGLE FOR U-TURN --------------   10

   LANE DATA FOR INBOUND LEG 3:
    (CONVERTED APPROACH 3)

LANE NUMBER -------------------       1      2
(INBOUND LANE NUMBER) ---------       1      2
WIDTH OF LANE -----------------      12     12
MOVEMENT CODE -----------------       S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------       0      0
 FROM OUTER END ---------------       0      0
OFFSET OF LANE TERMINAL -------       0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------      48     52
                                 MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 3:
    (CONVERTED APPROACH 6)

LANE NUMBER -------------------       3      4
(OUTBOUND LANE NUMBER) --------       1      2
WIDTH OF LANE -----------------      12     12
MOVEMENT CODE -----------------      LS     LS
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------       0      0
 FROM OUTER END ---------------       0      0
OFFSET OF LANE TERMINAL -------      12     12
                                 MEDIAN   CURB
```

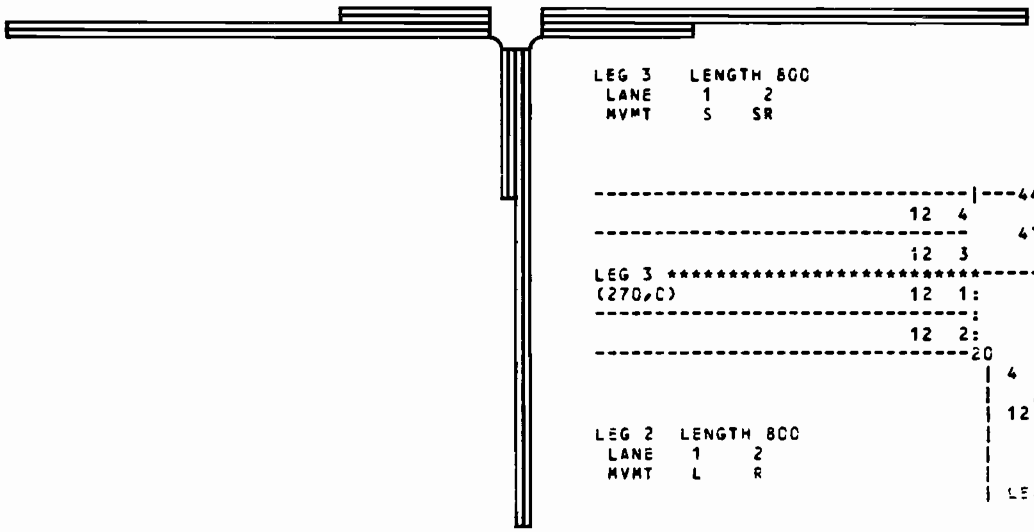
```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                      DRIVER-VEHICLE INPUT DATA
 STANDARD 4 T 3

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------     400
PARAMETER FOR DISTRIBUTION -------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---    26.0
85-PERCENTILE SPEED, MPH ---------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ---------------------------  1   2   3
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---  50  50   0
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 4 T 4

```
  NUMBER OF LEGS -----------------------   3
  SIMULATION TIME IN MINUTES ----------   20
  MINIMUM HEADWAY IN SECONDS ----------  1.0
  NUMBER OF VEHICLE CLASSES -----------   10
  NUMBER OF DRIVER CLASSES ------------    3
  PERCENT OF LEFT TURNING VEHICLES
   TO ENTER IN MEDIAN LANE ------------   80
  PERCENT OF RIGHT TURNING VEHICLES
   TO ENTER IN CURB LANE. -------------   80

  CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----    1     2     3
CURB RETURN RADIUS -----------   44    20    20
```

STANDARD 4 T 4



```
LEG 3   LENGTH 800
 LANE     1     2
 MVMT     S     SR

-------------------------------|---44---|---44---|------------------------------
                        12  4                    :2  12
-----------------------------       4T4     |    :-----------------------------
                        12  3               |    :1  12
LEG 3 *************************-------------0-----************************ LEG 1
(270,0)                 12  1:              |     3  12                   (90,0)
-------------------------------:            |     ------------------------------
                        12  2:              |     4  12
-------------------------------20           |.......20------------------------------
                                | 4  | 3  * 1  | 2  |
                                |    |    *    |    |
                                | 12 | 12*12  |12  |
LEG 2  LENGTH 800               |    |    *    |    |          LEG 1  LENGTH 800
 LANE    1     2                |    |    *    |    |           LANE    1     2
 MVMT    L     R                |    |    *    |    |           MVMT    LS    S
                                | LEG 2 (180,0)     |
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 4 T 4

LEG 1 GEOMETRY DATA:

LEG ANGLE ----------------------------------	90
LENGTH OF INBOUND LANES ----------------	800
LENGTH OF OUTBOUND LANES ---------------	250
NUMBER OF INBOUND LANES ----------------	2
NUMBER OF OUTBOUND LANES ---------------	2
SPEED LIMIT ON INBOUND LANES IN MPH ----	30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---	30
LEG CENTERLINE OFFSET ------------------	0
MEDIAN WIDTH ---------------------------	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---	20
LIMITING ANGLE FOR U-TURN --------------	10

LANE DATA FOR INBOUND LEG 1:
(CONVERTED APPROACH 1)

LANE NUMBER ------------------	1	2
(INBOUND LANE NUMBER) ---------	1	2
WIDTH OF LANE ----------------	12	12
MOVEMENT CODE ----------------	LS	S
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL ----------	0	0
FROM OUTER END --------------	0	0
OFFSET OF LANE TERMINAL ------	0	0
PERCENT OF INBOUND TRAFFIC		
TO ENTER IN THIS LANE --------	48	52
	MEDIAN	CURB

LANE DATA FOR OUTBOUND LEG 1:
(CONVERTED APPROACH 4)

LANE NUMBER ------------------	3	4
(OUTBOUND LANE NUMBER) -------	1	2
WIDTH OF LANE ----------------	12	12
MOVEMENT CODE ----------------	SR	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL ----------	0	0
FROM OUTER END --------------	0	0
OFFSET OF LANE TERMINAL ------	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 4 T 4

LEG 2 GEOMETRY DATA:

LEG ANGLE ----------------------------------	180
LENGTH OF INBOUND LANES ----------------	800
LENGTH OF OUTBOUND LANES ---------------	250
NUMBER OF INBOUND LANES ----------------	2
NUMBER OF OUTBOUND LANES ---------------	2
SPEED LIMIT ON INBOUND LANES IN MPH ----	30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---	30
LEG CENTERLINE OFFSET ------------------	0
MEDIAN WIDTH ---------------------------	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---	20
LIMITING ANGLE FOR U-TURN --------------	10

LANE DATA FOR INBOUND LEG 2:
(CONVERTED APPROACH 2)

LANE NUMBER ------------------	1	2
(INBOUND LANE NUMBER) ---------	1	2
WIDTH OF LANE ----------------	12	12
MOVEMENT CODE ----------------	L	R
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL ----------	0	0
FROM OUTER END --------------	0	0
OFFSET OF LANE TERMINAL ------	0	0
PERCENT OF INBOUND TRAFFIC		
TO ENTER IN THIS LANE --------	48	52
	MEDIAN	CURB

LANE DATA FOR OUTBOUND LEG 2:
(CONVERTED APPROACH 3)

LANE NUMBER ------------------	3	4
(OUTBOUND LANE NUMBER) -------	1	2
WIDTH OF LANE ----------------	12	12
MOVEMENT CODE ----------------	LR	LR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL ----------	0	0
FROM OUTER END --------------	0	0
OFFSET OF LANE TERMINAL ------	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 4 T 4

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC	
HEADWAY FREQUENCY DISTRIBUTION ---------	SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------	400
PARAMETER FOR DISTRIBUTION -------------	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---	26.0
85-PERCENTILE SPEED, MPH ---------------	31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER --------------------------	1	2	3
PERCENT OF LEG 1 INBOUND VEHICLES WITH DESTINATION ON LEG ---	0	50	50

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 4 T 4

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC	
HEADWAY FREQUENCY DISTRIBUTION ---------	SNEGEXP
TOTAL HOURLY VOLUME ON LEG -------------	400
PARAMETER FOR DISTRIBUTION -------------	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---	26.0
85-PERCENTILE SPEED, MPH ---------------	31.0
TRAFFIC MIX DATA TO FOLLOW ? -----------	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER --------------------------	1	2	3
PERCENT OF LEG 2 INBOUND VEHICLES WITH DESTINATION ON LEG ---	50	0	50

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

STANDARD 4 T 4

LEG 3 GEOMETRY DATA:

```
LEG ANGLE ------------------------------  270
LENGTH OF INBOUND LANES ----------------  800
LENGTH OF OUTBOUND LANES ---------------  250
NUMBER OF INBOUND LANES ----------------    2
NUMBER OF OUTBOUND LANES ---------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---   30
LEG CENTERLINE OFFSET ------------------    0
MEDIAN WIDTH ---------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---   20
LIMITING ANGLE FOR U-TURN --------------   10
```

LANE DATA FOR INBOUND LEG 3:
(CONVERTED APPROACH 3)

```
LANE NUMBER -------------------      1      2
(INBOUND LANE NUMBER) ---------      1      2
WIDTH OF LANE -----------------     12     12
MOVEMENT CODE -----------------      S     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------      0      0
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     48     52
                                MEDIAN   CURB
```

LANE DATA FOR OUTBOUND LEG 3:
(CONVERTED APPROACH 6)

```
LANE NUMBER -------------------      3      4
(OUTBOUND LANE NUMBER) --------      1      2
WIDTH OF LANE -----------------     12     12
MOVEMENT CODE -----------------     LS     LS
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------      0      0
                                MEDIAN   CURB
```

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

STANDARD 4 T 4

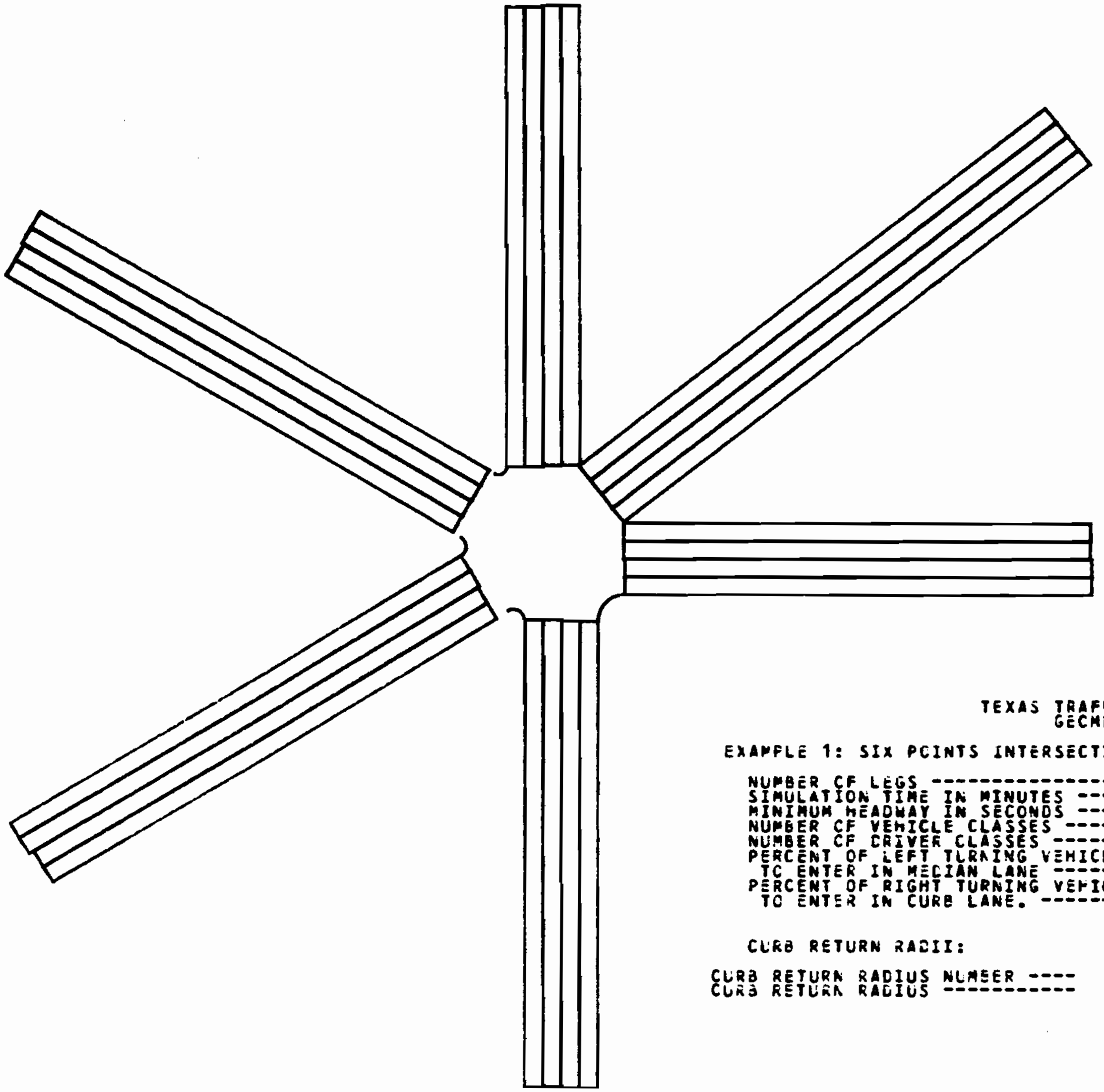
INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

```
NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------     400
PARAMETER FOR DISTRIBUTION --------------    2.00
MEAN SPEED OF ENTERING VEHICLES, MPH ---     28.0
85-PERCENTILE SPEED, MPH ----------------    31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------      NO
```

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

```
LEG NUMBER ---------------------------   1   2   3
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   50  50   0
```

EXAMPLE 1. SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)



TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

NUMBER OF LEGS -----------------------	6
SIMULATION TIME IN MINUTES -----------	12
MINIMUM HEADWAY IN SECONDS -----------	1.1
NUMBER OF VEHICLE CLASSES ------------	10
NUMBER OF DRIVER CLASSES -------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------	100
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. -------------	100

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4	5	6
CURB RETURN RADIUS -----------	7	0	0	22	9	9

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                      GEOMETRY INPUT DATA

 EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

   LEG 1 GEOMETRY DATA:

LEG ANGLE -----------------------------------     0
LENGTH OF INBOUND LANES ---------------------   383
LENGTH OF OUTBOUND LANES --------------------   383
NUMBER OF INBOUND LANES ---------------------     2
NUMBER OF OUTBOUND LANES --------------------     2
SPEED LIMIT ON INBOUND LANES IN MPH ---------    30
SPEED LIMIT ON OUTBOUND LANES IN MPH --------    30
LEG CENTERLINE OFFSET -----------------------    15
MEDIAN WIDTH --------------------------------     0
LIMITING ANGLE FOR STRAIGHT MOVEMENT --------    20
LIMITING ANGLE FOR U-TURN -------------------    10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER ----------------------     1      2
(INBOUND LANE NUMBER) ------------     1      2
WIDTH OF LANE --------------------    12     12
MOVEMENT CODE --------------------    LS     SR
LENGTH OF UNBLOCKED LANE
  FROM LANE TERMINAL -------------     0      0
  FROM OUTER END -----------------     0      0
OFFSET OF LANE TERMINAL ----------     0      0
PERCENT OF INBOUND TRAFFIC
  TO ENTER IN THIS LANE ----------    45     55
                                  MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 7)

LANE NUMBER ----------------------     3      4
(OUTBOUND LANE NUMBER) -----------     1      2
WIDTH OF LANE --------------------    12     12
MOVEMENT CODE --------------------    LS     SR
LENGTH OF UNBLOCKED LANE
  FROM LANE TERMINAL -------------     0      0
  FROM OUTER END -----------------     0      0
OFFSET OF LANE TERMINAL ----------     0      0
                                  MEDIAN   CURB
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                      GEOMETRY INPUT DATA

 EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

   LEG 2 GEOMETRY DATA:

LEG ANGLE -----------------------------------    52
LENGTH OF INBOUND LANES ---------------------   480
LENGTH OF OUTBOUND LANES --------------------   460
NUMBER OF INBOUND LANES ---------------------     2
NUMBER OF OUTBOUND LANES --------------------     2
SPEED LIMIT ON INBOUND LANES IN MPH ---------    30
SPEED LIMIT ON OUTBOUND LANES IN MPH --------    30
LEG CENTERLINE OFFSET -----------------------    22
MEDIAN WIDTH --------------------------------     0
LIMITING ANGLE FOR STRAIGHT MOVEMENT --------    20
LIMITING ANGLE FOR U-TURN -------------------    10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER ----------------------     1      2
(INBOUND LANE NUMBER) ------------     1      2
WIDTH OF LANE --------------------    12     12
MOVEMENT CODE --------------------    LS     SR
LENGTH OF UNBLOCKED LANE
  FROM LANE TERMINAL -------------     0      0
  FROM OUTER END -----------------     0      0
OFFSET OF LANE TERMINAL ----------     0      0
PERCENT OF INBOUND TRAFFIC
  TO ENTER IN THIS LANE ----------    40     60
                                  MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 8)

LANE NUMBER ----------------------     3      4
(OUTBOUND LANE NUMBER) -----------     1      2
WIDTH OF LANE --------------------    12     12
MOVEMENT CODE --------------------    LS     SR
LENGTH OF UNBLOCKED LANE
  FROM LANE TERMINAL -------------     0      0
  FROM OUTER END -----------------     0      0
OFFSET OF LANE TERMINAL ----------     0      0
                                  MEDIAN   CURB
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                   DRIVER-VEHICLE INPUT DATA

 EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- LOGNRML
TOTAL HOURLY VOLUME ON LEG --------------     450
PARAMETER FOR DISTRIBUTION --------------    5.06
MEAN SPEED OF ENTERING VEHICLES, MPH ----    30.0
85-PERCENTILE SPEED, MPH ----------------    34.0
TRAFFIC MIX DATA TO FOLLOW ? ------------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER ---------------------------    1   2   3   4   5   6
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---     0   9   9  40  27  15
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                   DRIVER-VEHICLE INPUT DATA

 EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- LOGNRML
TOTAL HOURLY VOLUME ON LEG --------------     725
PARAMETER FOR DISTRIBUTION --------------    4.73
MEAN SPEED OF ENTERING VEHICLES, MPH ----    19.0
85-PERCENTILE SPEED, MPH ----------------    25.7
TRAFFIC MIX DATA TO FOLLOW ? ------------      NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER ---------------------------    1   2   3   4   5   6
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    13   0   7   8  42  30
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

  EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

     LEG 3 GEOMETRY DATA:

LEG ANGLE --------------------------------   90
LENGTH OF INBOUND LANES ------------------  383
LENGTH OF OUTBOUND LANES -----------------  383
NUMBER OF INBOUND LANES ------------------    2
NUMBER OF OUTBOUND LANES -----------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---   30
LEG CENTERLINE OFFSET --------------------    0
MEDIAN WIDTH -----------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---   30
LIMITING ANGLE FOR U-TURN ----------------   10

     LANE DATA FOR INBOUND LEG 3:
      (CONVERTED APPROACH 3)

LANE NUMBER --------------------     1       2
(INBOUND LANE NUMBER) ---------      1       2
WIDTH OF LANE ------------------    15      15
MOVEMENT CODE ------------------    LS      SR
LENGTH OF UNBLOCKED LANE
  FROM LANE TERMINAL -----------     0       0
  FROM OUTER END ---------------     0       0
OFFSET OF LANE TERMINAL -------      0       0
PERCENT OF INBOUND TRAFFIC
  TO ENTER IN THIS LANE -------     45      55
                                MEDIAN    CURB

     LANE DATA FOR OUTBOUND LEG 3:
      (CONVERTED APPROACH 9)

LANE NUMBER --------------------     3       4
(OUTBOUND LANE NUMBER) --------      1       2
WIDTH OF LANE ------------------    15      15
MOVEMENT CODE ------------------    LS      SR
LENGTH OF UNBLOCKED LANE
  FROM LANE TERMINAL -----------     0       0
  FROM OUTER END ---------------     0       0
OFFSET OF LANE TERMINAL -------      0       0
                                MEDIAN    CURB
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

  EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

     LEG 4 GEOMETRY DATA:

LEG ANGLE --------------------------------  180
LENGTH OF INBOUND LANES ------------------  388
LENGTH OF OUTBOUND LANES -----------------  388
NUMBER OF INBOUND LANES ------------------    2
NUMBER OF OUTBOUND LANES -----------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----   30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---   30
LEG CENTERLINE OFFSET --------------------    0
MEDIAN WIDTH -----------------------------    0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---   20
LIMITING ANGLE FOR U-TURN ----------------   10

     LANE DATA FOR INBOUND LEG 4:
      (CONVERTED APPROACH 4)

LANE NUMBER --------------------     1       2
(INBOUND LANE NUMBER) ---------      1       2
WIDTH OF LANE ------------------    15      15
MOVEMENT CODE ------------------    LS      SR
LENGTH OF UNBLOCKED LANE
  FROM LANE TERMINAL -----------     0       0
  FROM OUTER END ---------------     0       0
OFFSET OF LANE TERMINAL -------      0       0
PERCENT OF INBOUND TRAFFIC
  TO ENTER IN THIS LANE -------     50      50
                                MEDIAN    CURB

     LANE DATA FOR OUTBOUND LEG 4:
      (CONVERTED APPROACH 10)

LANE NUMBER --------------------     3       4
(OUTBOUND LANE NUMBER) --------      1       2
WIDTH OF LANE ------------------    15      15
MOVEMENT CODE ------------------    LS      SR
LENGTH OF UNBLOCKED LANE
  FROM LANE TERMINAL -----------     0       0
  FROM OUTER END ---------------     0       0
OFFSET OF LANE TERMINAL -------      0       0
                                MEDIAN    CURB
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                        DRIVER-VEHICLE INPUT DATA

  EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

     INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- LOGNRML
TOTAL HOURLY VOLUME ON LEG --------------     470
PARAMETER FOR DISTRIBUTION --------------    6.23
MEAN SPEED OF ENTERING VEHICLES, MPH ---    19.0
85-PERCENTILE SPEED, MPH ----------------    25.7
TRAFFIC MIX DATA TO FOLLOW ? ------------      NO

     OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER ---------------------------    1    2    3    4    5    6
PERCENT OF LEG 3 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   25   10    0   11    9   45
```

```
                     TEXAS TRAFFIC SIMULATION PACKAGE
                        DRIVER-VEHICLE INPUT DATA

  EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

     INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------     550
PARAMETER FOR DISTRIBUTION --------------    2.18
MEAN SPEED OF ENTERING VEHICLES, MPH ---    23.0
85-PERCENTILE SPEED, MPH ----------------    28.6
TRAFFIC MIX DATA TO FOLLOW ? ------------      NO

     OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER ---------------------------    1    2    3    4    5    6
PERCENT OF LEG 4 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   38   27   20    0    5   10
```

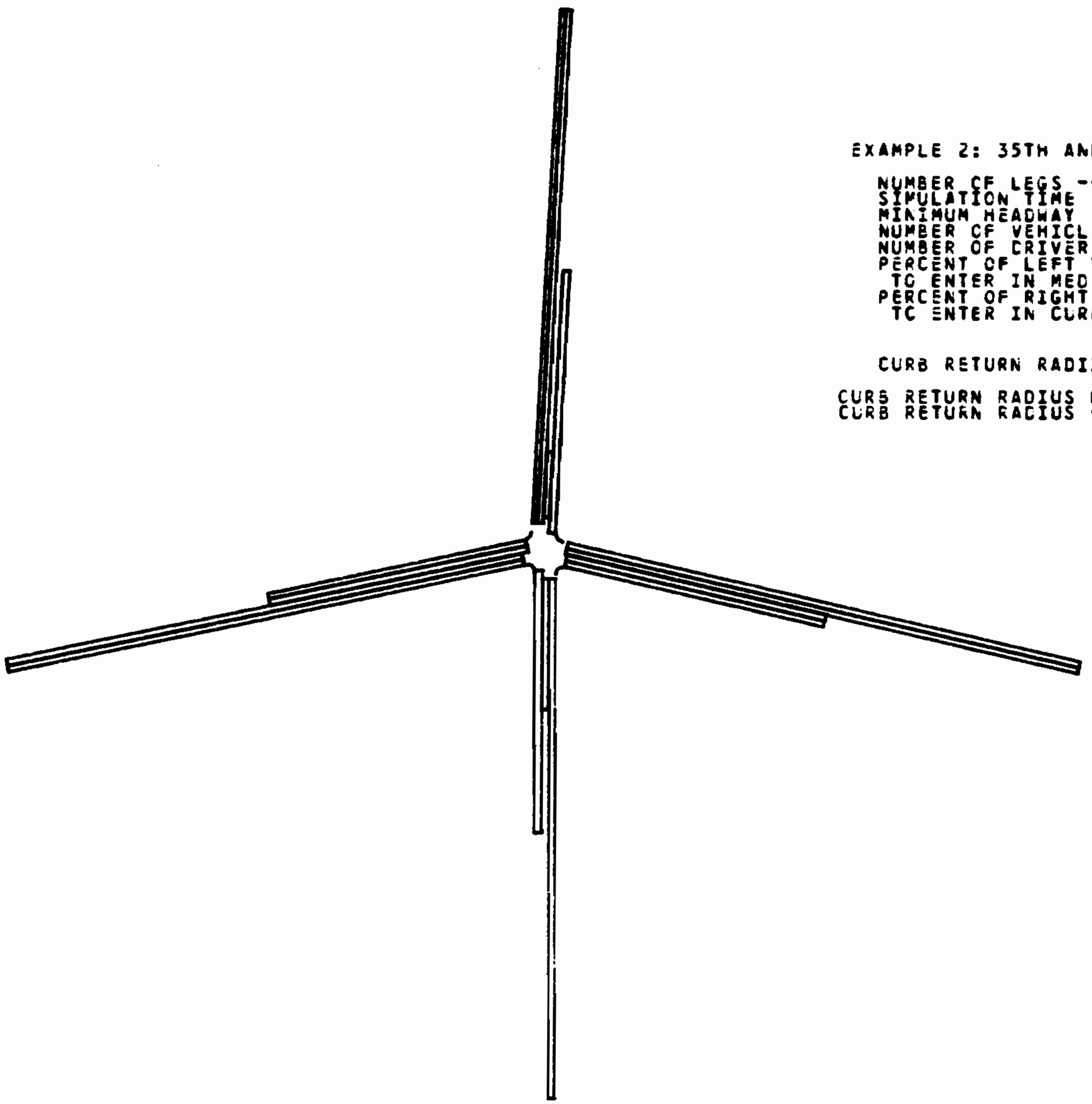
```
                TEXAS TRAFFIC SIMULATION PACKAGE
                      GEOMETRY INPUT DATA

EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

   LEG 5 GEOMETRY DATA:

LEG ANGLE ------------------------------------  239
LENGTH OF INBOUND LANES ----------------------  439
LENGTH OF OUTBOUND LANES ---------------------  433
NUMBER OF INBOUND LANES ----------------------    2
NUMBER OF OUTBOUND LANES ---------------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----       30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---       30
LEG CENTERLINE OFFSET ------------------      -15
MEDIAN WIDTH ----------------------------------   0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---       20
LIMITING ANGLE FOR U-TURN --------------       10

   LANE DATA FOR INBOUND LEG 5:
    (CONVERTED APPROACH 5)

LANE NUMBER -------------------      1      2
(INBOUND LANE NUMBER) ---------      1      2
WIDTH OF LANE -----------------     15     15
MOVEMENT CODE -----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------    -12    -12
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     50     50
                               MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 5:
    (CONVERTED APPROACH 11)

LANE NUMBER -------------------      3      4
(OUTBOUND LANE NUMBER) --------      1      2
WIDTH OF LANE -----------------     15     15
MOVEMENT CODE -----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------      0      0
                               MEDIAN   CURB
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                      GEOMETRY INPUT DATA

EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

   LEG 6 GEOMETRY DATA:

LEG ANGLE ------------------------------------  300
LENGTH OF INBOUND LANES ----------------------  433
LENGTH OF OUTBOUND LANES ---------------------  433
NUMBER OF INBOUND LANES ----------------------    2
NUMBER OF OUTBOUND LANES ---------------------    2
SPEED LIMIT ON INBOUND LANES IN MPH ----       30
SPEED LIMIT ON OUTBOUND LANES IN MPH ---       30
LEG CENTERLINE OFFSET ------------------       -4
MEDIAN WIDTH ----------------------------------   0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---       30
LIMITING ANGLE FOR U-TURN --------------       10

   LANE DATA FOR INBOUND LEG 6:
    (CONVERTED APPROACH 6)

LANE NUMBER -------------------      1      2
(INBOUND LANE NUMBER) ---------      1      2
WIDTH OF LANE -----------------     15     15
MOVEMENT CODE -----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------     -8     -8
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE --------     50     50
                               MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 6:
    (CONVERTED APPROACH 12)

LANE NUMBER -------------------      3      4
(OUTBOUND LANE NUMBER) --------      1      2
WIDTH OF LANE -----------------     15     15
MOVEMENT CODE -----------------     LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL -----------      0      0
 FROM OUTER END ---------------      0      0
OFFSET OF LANE TERMINAL -------     -6     -6
                               MEDIAN   CURB
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                   DRIVER-VEHICLE INPUT DATA

EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

  INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 5:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  LOGNRML
TOTAL HOURLY VOLUME ON LEG --------------      575
PARAMETER FOR DISTRIBUTION --------------     4.99
MEAN SPEED OF ENTERING VEHICLES, MPH ----     23.9
85-PERCENTILE SPEED, MPH ----------------     28.6
TRAFFIC MIX DATA TO FOLLOW ? ------------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 5:

LEG NUMBER -------------------------   1   2   3   4   5   6
PERCENT OF LEG 5 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---  7  45  25  12   0  11
```

```
                TEXAS TRAFFIC SIMULATION PACKAGE
                   DRIVER-VEHICLE INPUT DATA

EXAMPLE 1: SIX POINTS INTERSECTION (6 LEGS WITH 4 LANES EACH)

  INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 6:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION ---------  SNEGEXP
TOTAL HOURLY VOLUME ON LEG --------------      500
PARAMETER FOR DISTRIBUTION --------------     2.16
MEAN SPEED OF ENTERING VEHICLES, MPH ----     24.5
85-PERCENTILE SPEED, MPH ----------------     27.4
TRAFFIC MIX DATA TO FOLLOW ? ------------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 6:

LEG NUMBER -------------------------   1   2   3   4   5   6
PERCENT OF LEG 6 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---  9   6  37  26  22   0
```

35TH AND JEFFERSON AUSTIN



TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 2: 35TH AND JEFFERSON AUSTIN

NUMBER OF LEGS ----------------------	4
SIMULATION TIME IN MINUTES ----------	12
MINIMUM HEADWAY IN SECONDS ----------	1.0
NUMBER OF VEHICLE CLASSES -----------	10
NUMBER OF DRIVER CLASSES ------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. ------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4
CURB RETURN RADIUS -----------	12	13	10	9

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

 EXAMPLE 2: 35TH AND JEFFERSON    AUSTIN

   LEG 1 GEOMETRY DATA:

LEG ANGLE ----------------------------------    7
LENGTH OF INBOUND LANES ----------------    800
LENGTH OF OUTBOUND LANES ---------------    400
NUMBER OF INBOUND LANES ----------------      3
NUMBER OF OUTBOUND LANES ---------------      1
SPEED LIMIT ON INBOUND LANES IN MPH ----     35
SPEED LIMIT ON OUTBOUND LANES IN MPH ---     35
LEG CENTERLINE OFFSET ------------------     -8
MEDIAN WIDTH ---------------------------      0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---     20
LIMITING ANGLE FOR U-TURN --------------     10

   LANE DATA FOR INBOUND LEG 1:
    (CONVERTED APPROACH 1)

LANE NUMBER ------------------     1      2      3
(INBOUND LANE NUMBER) --------     1      2      3
WIDTH OF LANE ----------------     9      9      8
MOVEMENT CODE ----------------     L      S      R
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------   100      0      0
 FROM OUTER END --------------     0      0      0
OFFSET OF LANE TERMINAL ------   -25    -15    -15
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------     0     55     45
                              MEDIAN          CURB

   LANE DATA FOR OUTBOUND LEG 1:
    (CONVERTED APPROACH 5)

LANE NUMBER ------------------     4
(OUTBOUND LANE NUMBER) -------     1
WIDTH OF LANE ----------------    11
MOVEMENT CODE ----------------   LSR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0
 FROM OUTER END --------------     0
OFFSET OF LANE TERMINAL ------     0
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                          GEOMETRY INPUT DATA

 EXAMPLE 2: 35TH AND JEFFERSON    AUSTIN

   LEG 2 GEOMETRY DATA:

LEG ANGLE ----------------------------------  103
LENGTH OF INBOUND LANES ----------------    800
LENGTH OF OUTBOUND LANES ---------------    400
NUMBER OF INBOUND LANES ----------------      2
NUMBER OF OUTBOUND LANES ---------------      2
SPEED LIMIT ON INBOUND LANES IN MPH ----     35
SPEED LIMIT ON OUTBOUND LANES IN MPH ---     35
LEG CENTERLINE OFFSET ------------------      0
MEDIAN WIDTH ---------------------------      0
LIMITING ANGLE FOR STRAIGHT MOVEMENT ---     25
LIMITING ANGLE FOR U-TURN --------------     10

   LANE DATA FOR INBOUND LEG 2:
    (CONVERTED APPROACH 2)

LANE NUMBER ------------------     1      2
(INBOUND LANE NUMBER) --------     1      2
WIDTH OF LANE ----------------     9      9
MOVEMENT CODE ----------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0      0
 FROM OUTER END --------------     0      0
OFFSET OF LANE TERMINAL ------    -8     -8
PERCENT OF INBOUND TRAFFIC
 TO ENTER IN THIS LANE -------    36     64
                              MEDIAN   CURB

   LANE DATA FOR OUTBOUND LEG 2:
    (CONVERTED APPROACH 6)

LANE NUMBER ------------------     3      4
(OUTBOUND LANE NUMBER) -------     1      2
WIDTH OF LANE ----------------    10     10
MOVEMENT CODE ----------------    LS     SR
LENGTH OF UNBLOCKED LANE
 FROM LANE TERMINAL ----------     0      0
 FROM OUTER END --------------     0      0
OFFSET OF LANE TERMINAL ------     0      0
                              MEDIAN   CURB
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

 EXAMPLE 2: 35TH AND JEFFERSON    AUSTIN

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- LOGNRML
TOTAL HOURLY VOLUME ON LEG -------------      500
PARAMETER FOR DISTRIBUTION -------------    11.06
MEAN SPEED OF ENTERING VEHICLES, MPH ---     19.0
85-PERCENTILE SPEED, MPH ---------------     25.7
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER ---------------------------   1   2   3   4
PERCENT OF LEG 1 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---    0  18  71  11
```

```
                    TEXAS TRAFFIC SIMULATION PACKAGE
                       DRIVER-VEHICLE INPUT DATA

 EXAMPLE 2: 35TH AND JEFFERSON    AUSTIN

   INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC
 HEADWAY FREQUENCY DISTRIBUTION --------- LOGNRML
TOTAL HOURLY VOLUME ON LEG -------------      600
PARAMETER FOR DISTRIBUTION -------------     4.99
MEAN SPEED OF ENTERING VEHICLES, MPH ---     23.9
85-PERCENTILE SPEED, MPH ---------------     26.6
TRAFFIC MIX DATA TO FOLLOW ? -----------       NO

   OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER ---------------------------   1   2   3   4
PERCENT OF LEG 2 INBOUND
 VEHICLES WITH DESTINATION ON LEG ---   13   0  17  70
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 2: 35TH AND JEFFERSON   AUSTIN

LEG 3 GEOMETRY DATA:

LEG ANGLE	180
LENGTH OF INBOUND LANES	800
LENGTH OF OUTBOUND LANES	400
NUMBER OF INBOUND LANES	2
NUMBER OF OUTBOUND LANES	1
SPEED LIMIT ON INBOUND LANES IN MPH	35
SPEED LIMIT ON OUTBOUND LANES IN MPH	35
LEG CENTERLINE OFFSET	0
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	20
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 3:
(CONVERTED APPROACH 3)

LANE NUMBER	1	2
(INBOUND LANE NUMBER)	1	2
WIDTH OF LANE	10	10
MOVEMENT CODE	L	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	200	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	-7	-7
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	0	100
	MEDIAN	CURB

LANE DATA FOR OUTBOUND LEG 3:
(CONVERTED APPROACH 7)

LANE NUMBER	3
(OUTBOUND LANE NUMBER)	1
WIDTH OF LANE	12
MOVEMENT CODE	LSR
LENGTH OF UNBLOCKED LANE	
FROM LANE TERMINAL	0
FROM OUTER END	0
OFFSET OF LANE TERMINAL	0

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 2: 35TH AND JEFFERSON   AUSTIN

LEG 4 GEOMETRY DATA:

LEG ANGLE	258
LENGTH OF INBOUND LANES	600
LENGTH OF OUTBOUND LANES	400
NUMBER OF INBOUND LANES	2
NUMBER OF OUTBOUND LANES	2
SPEED LIMIT ON INBOUND LANES IN MPH	35
SPEED LIMIT ON OUTBOUND LANES IN MPH	35
LEG CENTERLINE OFFSET	0
MEDIAN WIDTH	0
LIMITING ANGLE FOR STRAIGHT MOVEMENT	25
LIMITING ANGLE FOR U-TURN	10

LANE DATA FOR INBOUND LEG 4:
(CONVERTED APPROACH 4)

LANE NUMBER	1	2
(INBOUND LANE NUMBER)	1	2
WIDTH OF LANE	10	9
MOVEMENT CODE	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	0	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	-5	-5
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE	41	59
	MEDIAN	CURB

LANE DATA FOR OUTBOUND LEG 4:
(CONVERTED APPROACH 8)

LANE NUMBER	3	4
(OUTBOUND LANE NUMBER)	1	2
WIDTH OF LANE	10	9
MOVEMENT CODE	LS	SR
LENGTH OF UNBLOCKED LANE		
FROM LANE TERMINAL	0	0
FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

EXAMPLE 2: 35TH AND JEFFERSON   AUSTIN

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	LOGNRML
TOTAL HOURLY VOLUME ON LEG	750
PARAMETER FOR DISTRIBUTION	5.43
MEAN SPEED OF ENTERING VEHICLES, MPH	30.0
85-PERCENTILE SPEED, MPH	34.3
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 3 INBOUND VEHICLES WITH DESTINATION ON LEG	63	21	0	16

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

EXAMPLE 2: 35TH AND JEFFERSON   AUSTIN

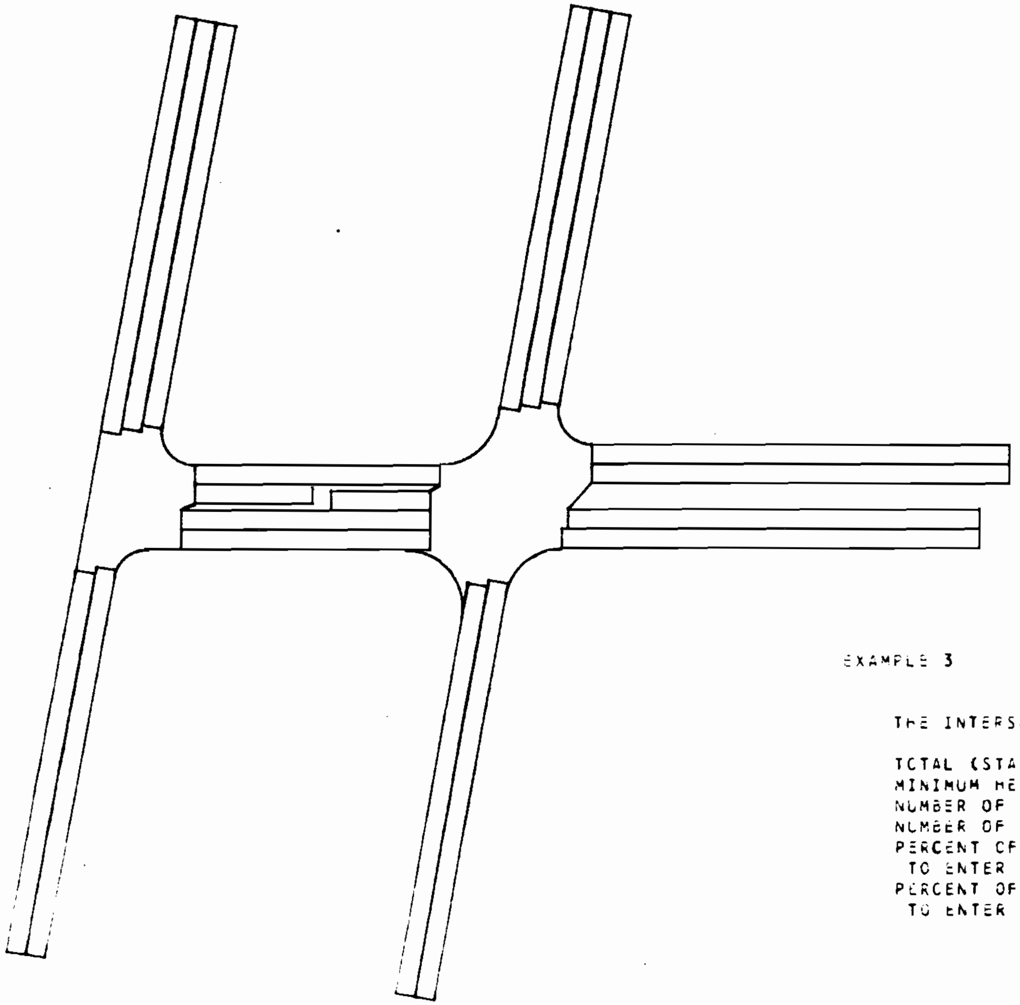
INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	550
PARAMETER FOR DISTRIBUTION	1.16
MEAN SPEED OF ENTERING VEHICLES, MPH	33.6
85-PERCENTILE SPEED, MPH	38.7
TRAFFIC MIX DATA TO FOLLOW ?	NO

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

LEG NUMBER	1	2	3	4
PERCENT OF LEG 4 INBOUND VEHICLES WITH DESTINATION ON LEG	3	84	13	0

EXAMPLE 3   SKEWED DIAMOND   ONLY 5 LEGS



SCALE FACTOR IS 75.0 FEET PER INCH

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 3   SKEWED DIAMOND   ONLY 5 LEGS

THE INTERSECTION BEING MODELED IS A DIAMOND INTERSECTION.

TOTAL (STARTUP+SIMULATION) TIME IN MINUTES -----	20
MINIMUM HEADWAY IN SECONDS ----------------------	1.0
NUMBER OF VEHICLE CLASSES -----------------------	12
NUMBER OF DRIVER CLASSES ------------------------	3
PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE ------------------------	80
PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE --------------------------	80

CURB RETURN RADII:

CURB RETURN RADIUS NUMBER ----	1	2	3	4	5	6
CURB RETURN RADIUS -----------	35	20	35	20	-38	-42

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

INTERNAL LANES GEOMETRY DATA:

DISTANCE BETWEEN INTERSECTION CENTER R AND CENTER L ---	200
NUMBER OF LANES INBOUND TO CENTER R -------------------	3
NUMBER OF LANES INBOUND TO CENTER L -------------------	2
SPEED LIMIT ON LANES INBOUND TO CENTER R (MPH) --------	30
SPEED LIMIT ON LANES INBOUND TO CENTER L (MPH) --------	30
MEDIAN WIDTH --	-8

LANE DATA FOR LANES INBOUND TO CENTER R:
(CONVERTED APPROACH 4)

LANE NUMBER -------------------------------	1	2	3
(INBOUND LANE NUMBER) ---------------------	1	2	3
WIDTH OF LANE -----------------------------	12	12	12
MOVEMENT CODE AT END NEAR CENTER R --------	L	S	S
MOVEMENT CODE AT END NEAR CENTER L --------		L	L
LENGTH OF USABLE LANE FROM CENTER R -------	60	0	0
LENGTH OF USABLE LANE FROM CENTER L -------	0	0	0
OFFSET OF LN. TERM. NEAR CENTER R ---------	15	15	15
OFFSET OF LN. TERM. NEAR CENTER L ---------	0	-20	-20
	MEDIAN		CURB

LANE DATA FOR LANES INBOUND TO CENTER L:
(CONVERTED APPROACH 5)

LANE NUMBER -------------------------------	4	5
(OUTBOUND LANE NUMBER) --------------------	1	2
WIDTH OF LANE -----------------------------	12	12
MOVEMENT CODE AT END NEAR CENTER R --------		LS
MOVEMENT CODE AT END NEAR CENTER L --------	L	L
LENGTH OF USABLE LANE FROM CENTER R -------	0	0
LENGTH OF USABLE LANE FROM CENTER L -------	70	0
OFFSET OF LN. TERM. NEAR CENTER R ---------	0	0
OFFSET OF LN. TERM. NEAR CENTER L ---------	0	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

LEG 1 GEOMETRY DATA:

LEG ANGLE -----------------------------	10
LENGTH OF INBOUND LANES ---------------	600
LENGTH OF OUTBOUND LANES --------------	250
NUMBER OF INBOUND LANES ---------------	0
NUMBER OF OUTBOUND LANES --------------	3
SPEED LIMIT ON INBOUND LANES (MPH) ----	30
SPEED LIMIT ON OUTBOUND LANES (MPH) ---	30
LEG CENTERLINE OFFSET -----------------	0
MEDIAN WIDTH --------------------------	0

THERE ARE NO INBOUND LANES FOR LEG 1

LANE DATA FOR OUTBOUND LEG 1:
(CONVERTED APPROACH 9)

LANE NUMBER -------------------------------	1	2	3
(OUTBOUND LANE NUMBER) --------------------	1	2	3
WIDTH OF LANE -----------------------------	12	12	12
MOVEMENT CODE -----------------------------	LS	S	R
LENGTH OF USABLE LANE FROM LANE TERMINAL --	0	0	0
LENGTH OF USABLE LANE FROM OUTER END ------	0	0	0
OFFSET OF LANE TERMINAL -------------------	8	4	0
	MEDIAN		CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

LEG 2 GEOMETRY DATA:

LEG ANGLE ----------------------------	90
LENGTH OF INBOUND LANES ---------------	600
LENGTH OF OUTBOUND LANES --------------	250
NUMBER OF INBOUND LANES ---------------	2
NUMBER OF OUTBOUND LANES --------------	2
SPEED LIMIT ON INBOUND LANES (MPH) ----	30
SPEED LIMIT ON OUTBOUND LANES (MPH) ---	30
LEG CENTERLINE OFFSET -----------------	1
MEDIAN WIDTH --------------------------	16

LANE DATA FOR INBOUND LEG 2:
(CONVERTED APPROACH 2)

LANE NUMBER ------------------------------	1	2
(INBOUND LANE NUMBER) --------------------	1	2
WIDTH OF LANE ----------------------------	12	12
MOVEMENT CODE ----------------------------	S	R
LENGTH OF USABLE LANE FROM LANE TERMINAL --	0	0
LENGTH OF USABLE LANE FROM OUTER END ------	0	0
OFFSET OF LANE TERMINAL ------------------	0	0
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE --------------------	48	52
	MEDIAN	CURB

LANE DATA FOR OUTBOUND LEG 2:
(CONVERTED APPROACH 10)

LANE NUMBER ------------------------------	3	4
(OUTBOUND LANE NUMBER) -------------------	1	2
WIDTH OF LANE ----------------------------	12	12
MOVEMENT CODE ----------------------------	S	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL --	0	0
LENGTH OF USABLE LANE FROM OUTER END ------	0	0
OFFSET OF LANE TERMINAL ------------------	-4	0
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION ---	SNEGEXP
TOTAL HOURLY VOLUME ON LEG, VPH ---------------------------	400
PARAMETER FOR DISTRIBUTION --------------------------------	2.00
MEAN/85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH ---	29.0, 31.0
TRAFFIC MIX DATA TO FOLLOW ? ------------------------------	NO
SEED FOR RANDOM NUMBERS -----------------------------------	13747

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER --------------------------	1	2	3	4	5	6
PERCENT OF LEG 2 INBOUND VEHICLES WITH DESTINATION ON LEG ---	45	0	0	55	0	0

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

LEG 3 GEOMETRY DATA:

LEG ANGLE ----------------------------	190
LENGTH OF INBOUND LANES --------------	800
LENGTH OF OUTBOUND LANES -------------	250
NUMBER OF INBOUND LANES --------------	2
NUMBER OF OUTBOUND LANES -------------	0
SPEED LIMIT ON INBOUND LANES (MPH) ----	30
SPEED LIMIT ON OUTBOUND LANES (MPH) ---	30
LEG CENTERLINE OFFSET ----------------	0
MEDIAN WIDTH -------------------------	0

LANE DATA FOR INBOUND LEG 3:
(CONVERTED APPROACH 3)

LANE NUMBER ------------------------------	1	2
(INBOUND LANE NUMBER) --------------------	1	2
WIDTH OF LANE ----------------------------	12	12
MOVEMENT CODE ----------------------------	LS	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL --	0	0
LENGTH OF USABLE LANE FROM OUTER END ------	0	0
OFFSET OF LANE TERMINAL ------------------	4	8
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE --------------------	48	52
	MEDIAN	CURB

THERE ARE NO OUTBOUND LANES FOR LEG 3

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION ---	SNEGEXP
TOTAL HOURLY VOLUME ON LEG, VPH --------------------------	400
PARAMETER FOR DISTRIBUTION ------------------------------	2.00
MEAN/85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH --- 29.0,	31.0
TRAFFIC MIX DATA TO FOLLOW ? ----------------------------	NO
SEED FOR RANDOM NUMBERS --------------------------------	291

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

LEG NUMBER --------------------------	1	2	3	4	5	6
PERCENT OF LEG 3 INBOUND VEHICLES WITH DESTINATION ON LEG ---	60	30	0	10	0	0

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

LEG 4 GEOMETRY DATA:

LEG ANGLE ------------------------------	190
LENGTH OF INBOUND LANES ---------------	800
LENGTH OF OUTBOUND LANES --------------	250
NUMBER OF INBOUND LANES ---------------	0
NUMBER OF OUTBOUND LANES --------------	2
SPEED LIMIT ON INBOUND LANES (MPH) ----	30
SPEED LIMIT ON OUTBOUND LANES (MPH) ---	30
LEG CENTERLINE OFFSET -----------------	-12
MEDIAN WIDTH --------------------------	0

THERE ARE NO INBOUND LANES FOR LEG 4

LANE DATA FOR OUTBOUND LEG 4:
(CONVERTED APPROACH 14)

LANE NUMBER -------------------------------	1	2
(OUTBOUND LANE NUMBER) --------------------	1	2
WIDTH OF LANE -----------------------------	12	12
MOVEMENT CODE -----------------------------	LS	LS
LENGTH OF USABLE LANE FROM LANE TERMINAL --	0	0
LENGTH OF USABLE LANE FROM OUTER END ------	0	0
OFFSET OF LANE TERMINAL -------------------	-10	-14
	MEDIAN	CURB

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

LEG 5 GEOMETRY DATA:

LEG ANGLE ------------------------------	270
LENGTH OF INBOUND LANES ---------------	800
LENGTH OF OUTBOUND LANES --------------	250
NUMBER OF INBOUND LANES ---------------	0
NUMBER OF OUTBOUND LANES --------------	0
SPEED LIMIT ON INBOUND LANES (MPH) ----	30
SPEED LIMIT ON OUTBOUND LANES (MPH) ---	30
LEG CENTERLINE OFFSET -----------------	0
MEDIAN WIDTH --------------------------	0

THERE ARE NO LANES FOR LEG 5

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

LEG 6 GEOMETRY DATA:

LEG ANGLE ------------------------------	10
LENGTH OF INBOUND LANES ---------------	800
LENGTH OF OUTBOUND LANES --------------	250
NUMBER OF INBOUND LANES ---------------	3
NUMBER OF OUTBOUND LANES --------------	0
SPEED LIMIT ON INBOUND LANES (MPH) ----	30
SPEED LIMIT ON OUTBOUND LANES (MPH) ---	30
LEG CENTERLINE OFFSET -----------------	0
MEDIAN WIDTH --------------------------	0

LANE DATA FOR INBOUND LEG 6:
(CONVERTED APPROACH 8)

LANE NUMBER -------------------------------	1	2	3
(INBOUND LANE NUMBER) ---------------------	1	2	3
WIDTH OF LANE -----------------------------	12	12	12
MOVEMENT CODE -----------------------------	LS	LS	S
LENGTH OF USABLE LANE FROM LANE TERMINAL --	0	0	0
LENGTH OF USABLE LANE FROM OUTER END ------	0	0	0
OFFSET OF LANE TERMINAL -------------------	0	4	8
PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE --------------------	32	35	33
	MEDIAN		CURB

THERE ARE NO OUTBOUND LANES FOR LEG 6

TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA

EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 6:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION ---	SNEGEXP
TOTAL HOURLY VOLUME ON LEG, VPH ------------------------------	600
PARAMETER FOR DISTRIBUTION -----------------------------------	2.00
MEAN,85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH ---	29.0, 31.0
TRAFFIC MIX DATA TO FOLLOW ? ---------------------------------	NO
SEED FOR RANDOM NUMBERS --------------------------------------	33145

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 6:

LEG NUMBER --------------------------	1	2	3	4	5	6
PERCENT OF LEG 6 INBOUND VEHICLES WITH DESTINATION ON LEG ---	10	30	0	60	0	0

APPENDIX A.2

EXAMPLES OF HOW TO USE THE DATA-ENTRY PROGRAM

CONTENTS

*See pages A-21 and A-22 for descriptions of Cases and Actions.

```
$ GDVDATA
GEOMETRY & DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED.
DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY ?
ID=6X6

 LEG 4  LENGTH 800            |    |  LEG 1 (0,0)  |    |         LEG 1  LENGTH 800
LANE    1    2    3           |    |    |   *   |    |    |        LANE    1    2    3
MVMT  LS     S    SR          | 12 | 12 | 12*12 | 12 | 12 |        MVMT  LS     S    SR
                              | 3  | 2  | 1 * 4 | 5  | 6  |
---------------------------20`````````````|            20--------------------------
                      12  6               |             :3  12
-------------------------- 6X6            |             :--------------------------
                      12  5               |             :2  12
--------------------------                |             :--------------------------
                      12  4               |             :1  12
LEG 4 *********************--------------0-------------********************* LEG 2
(270,0)               12  1:              |              4  12              (90,-12)
---------------------------               |             ---------------------------
                      12  2:              |              5  12
---------------------------:              |             ---------------------------
                      12  3:              |              6  12
---------------------------20             |...........20--------------------------
                              | 6  | 5  | 4 * 1 | 2  | 3  |
                              |    |    |   *   |    |    |
 LEG 3  LENGTH 800            | 12 | 12 | 12*12 | 12 | 12 |         LEG 2  LENGTH 800
LANE    1    2    3           |    |    |   *   |    |    |        LANE    1    2    3
MVMT  LS     S    SR          |    | LEG 3 (180,0) |    |        MVMT  LS     S    SR
DO YOU WANT TO USE THIS PERMANENT LIBRARY FILE (ID="6X6") ?
Y
DO YOU WANT TO COPY AND REVISE THIS FILE FROM THE PERMANENT LIBRARY ?
Y -(1)
DO YOU WANT TO SAVE THE REVISED DATA ?
Y
KEYIN FILE NAME FOR NEW/REVISED DATA:
NEW6X6 -(2)
IS FILE NAME "QSA2:[055100]NEW6X6.DAT;1" OK ? -(3)
Y -(4)
FILE NAME "QSA2:[055100]NEW6X6.DAT;1" ADDED TO USER-GROUP LIBRARY
REVISED DATA FROM FILE "QSA2:[055100.TEXAS]GDV6X6.DAT;1"
WILL BE SAVED ON FILE "QSA2:[055100]NEW6X6.DAT;1"

                                  (5)

INPUT DATA FOR GEOMETRY & DRIVER-VEHICLE PROCESSORS ARE NOW ON:
    "QSA2:[055100]NEW6X6.DAT;1"
GEOMETRY & DRIVER-VEHICLE INPUT DATA LISTING ON "QSA2:[055100]FOR030.DAT;1"
GEOMETRY AND DRIVER-VEHICLE DATA FOR TEXAS MODEL HAS BEEN DEFINED.
```

Figure A.2-0. Example of CASE 1, Action 1b - Choosing a permanent library file, automatically copying it, making revisions and saving the revised data on a new file for future use.

(continued)

Figure A.2-0. Continued.

NOTES:

(1) This response indicates that the user wants to name, save and catalog the file that holds the revised data.

(2) Name for file of revised data.

(3) Prompt to show the complete file name to the user. File naming convention will vary, depending on the type of host computer. This example is from a Digital Equipment Co., VAX.

(4) Pressing [N] [C/R] here would cause the program to reprompt for a file name for the revised data, as on the line just before (2) .

(5) Review existing data and make changes as desired.

```
$ [GDVDATA]
GEOMETRY & DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED.
DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY ?
[ID=5X5] -(1)

 LEG 4  LENGTH 800               |   LEG 1  (0,-12)   |          LEG 1  LENGTH 800
LANE    1    2    3              |   |   |    *   |   |         LANE    1    2    3
MVMT    L    S    SR             |   |   |    *   |   |         MVMT    L    S    SR
                                 | 12| 12| 12*12  |12 |
                                 | 3 | 2 | 1 * 4  | 5 |
-----------------------------20````````````|        20-----------------------------
                        12  5              |         :3  12
----------------------------     5X5       |         :-----------------------------
                        12  4              |         :2  12
LEG 4 ***********************----------0----         :-----------------------------
(270,0)                 12  1:             |         :1  12
-----------------------------:             |-----------********************** LEG 2
                        12  2:             |          4  12                (90,-12)
-----------------------------:             |          -----------------------------
                        12  3:             |          5  12
-----------------------------20            |...........20-----------------------------
                             | 5 | 4 * 1 | 2 | 3 |
                             |   |   *   |   |   |
                             | 12| 12*12 |12 |12 |
 LEG 3  LENGTH 800           |   |   *   |   |   |           LEG 2  LENGTH 800
LANE  1    2    3            |   |   *   |   |   |          LANE    1    2    3
MVMT  L    S    SR           |   LEG 3 (180,0)   |          MVMT    L    S    SR
DO YOU WANT TO USE THIS PERMANENT LIBRARY FILE (ID="5X5") ?
[Y]
DO YOU WANT TO COPY AND REVISE THIS FILE FROM THE PERMANENT LIBRARY ?
[Y]
DO YOU WANT TO SAVE THE REVISED DATA ?
[N] -(2)
REVISED DATA FROM FILE "QSA2:[055100.TEXAS]GDV5X5.DAT;1"
WILL NOT BE SAVED
                 ^
                (3)                                                          (4)
                 v                                                          /
GEOMETRY & DRIVER-VEHICLE INPUT DATA LISTING ON "QSA2:[055100]FOR030.DAT;1"
GEOMETRY AND DRIVER-VEHICLE DATA FOR TEXAS MODEL HAS BEEN DEFINED.
```

Figure A.2-1. Example of CASE 1, Action 1c - Choosing a permanent library file, automatically copying it, making revisions and discarding the revised data after a single use.

(continued)

Figure A.2-1. Continued.

NOTES:

1. The prompt is a "shortcut" for asking to use a file from the library and then being prompted for the ID.
2. This response indicates that the user only wants to use the revised data once and not save it for future use.
3. Review existing data and make revisions as desired.
4. A listing of the revised data is on this file. To see the listing, send this file to a printer or display it on the terminal.

```
$ GDVDATA
GEOMETRY & DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED.
DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY ?
N
DO YOU WANT TO USE AN EXISTING DATA FILE ?
Y
KEYIN AN EXISTING DATA FILE NAME:
NEW6X6
IS EXISTING DATA FILE NAME "QSA2:[055100]NEW6X6.DAT;1" OK ?
Y
DO YOU WANT TO REVISE THE EXISTING DATA ?
N
INPUT DATA FOR GEOMETRY & DRIVER-VEHICLE PROCESSORS ARE NOW ON:
    "QSA2:[055100]NEW6X6.DAT;1"
GEOMETRY AND DRIVER-VEHICLE DATA FOR TEXAS MODEL HAS BEEN DEFINED.
```

Figure A.2-2. Example of CASE 2, Action 2a - Using an existing file without revision.

```
$ [GDVDATA]
GEOMETRY & DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED.
DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY ?
[FILE=NEW6X6] -(1)
IS EXISTING DATA FILE NAME "QSA2:[055100]NEW6X6.DAT;1" OK ?
Y
DO YOU WANT TO REVISE THE EXISTING DATA ?
[Y]
DO YOU WANT TO SAVE THE REVISED DATA ?
[FILE= ] -(2)
IS FILE NAME "QSA2:[055100]NEW6X6.DAT;1" OK ?
[Y]
FILE NAMED TO SAVE REVISED DATA IS THE FILE THAT CONTAINS THE EXISTING DATA
DO YOU WANT TO SAVE THE REVISED DATA ON THE EXISTING DATA FILE ? -(3)
[Y] -(4)
FILE NAME "QSA2:[055100]NEW6X6.DAT;1" ADDED TO USER-GROUP LIBRARY
DATA ON FILE "QSA2:[055100]NEW6X6.DAT;1" WILL BE REVISED


INPUT DATA FOR GEOMETRY & DRIVER-VEHICLE PROCESSORS ARE NOW ON:
    "QSA2:[055100]NEW6X6.DAT;1"
GEOMETRY & DRIVER-VEHICLE INPUT DATA LISTING ON "QSA2:[055100]FOR030.DAT;1"
GEOMETRY AND DRIVER-VEHICLE DATA FOR TEXAS MODEL HAS BEEN DEFINED.
```

Figure A.2-3. Example of CASE 2, Action 2b - Choosing an existing file and making revisions on the existing file.

NOTES:

(1) This is a "shortcut" to indicate the desire to use an existing file and also to enter the existing file name with a single keyin.

(2) Another "shortcut" to indicate the desire to name and save the file of revised data and with the same keyin, name the file to receive the revised data. The "empty" file name forces the program to use the file name referenced previously at (1) .

(3) Message to notify user that the revisions will be made directly to the existing file. This will write the revised data over the currently existing data permanently, making it impossible to recover the data as it was before revision.

(4) Pressing [N] [C/R] here will cause the program to re-prompt for the name of the file on which to save the revised.

(5) Review existing data and make changes as desired.

```
$ [GDVDATA]
GEOMETRY & DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED.
DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY ?
[N]
DO YOU WANT TO USE AN EXISTING DATA FILE ?
[N]
DO YOU WANT TO KEYIN NEW DATA ?
[Y]
NEW DATA WILL BE ENTERED BY KEYIN
DO YOU WANT TO SAVE THE NEW DATA ?
[FILE=RRDATA]
IS FILE NAME "QSA2:[055100]RRDATA.DAT;1" OK ?
[Y]
FILE NAME "QSA2:[055100]RRDATA.DAT;1" ADDED TO USER-GROUP LIBRARY
KEYED IN DATA
WILL BE SAVED ON FILE "QSA2:[055100]RRDATA.DAT;1"
                            ↑
                           (1)
                            ↓
INPUT DATA FOR GEOMETRY & DRIVER-VEHICLE PROCESSORS ARE NOW ON:
    "QSA2:[055100]RRDATA.DAT;1"
GEOMETRY & DRIVER-VEHICLE INPUT DATA LISTING ON "QSA2:[055100]FOR030.DAT;1"
GEOMETRY AND DRIVER-VEHICLE DATA FOR TEXAS MODEL HAS BEEN DEFINED.
```

Figure A.2-4. Example of CASE 3, Action 3a - Keyed in data saved on a new file for future use.

NOTE:

(1) Key in data in response to prompts.

```
$ [GDVDATA]
GEOMETRY & DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED.
DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY ?
[KEY] -(1)
NEW DATA WILL BE ENTERED BY KEYIN
DO YOU WANT TO SAVE THE NEW DATA ?
[N]

                   (2)

GEOMETRY & DRIVER-VEHICLE INPUT DATA LISTING ON "QSA2:[055100]FOR030.DAT;1"
GEOMETRY AND DRIVER-VEHICLE DATA FOR TEXAS MODEL HAS BEEN DEFINED.
```

Figure A.2-5. Example of CASE 3, Action 3b - Keying in data and discarding the data after a single use.

NOTES:

(1) This is a "shortcut" to indicate that data is to be entered by keyin.

(2) Keyin data in response to prompts.

APPENDIX A.3

HARD COPIES OF SCREEN DISPLAYS FOR SIMDATA

PAGE

Description of data fields displayed in prompts by SIMDATA

SIMULATION PARAMETER-OPTION DATA:

F(1) - START-UP TIME IN MINUTES. (STATISTICS NOT GATHERED) <2.0 TO 10.0> [5.0]

F(2) - SIMULATION TIME IN MINUTES. <10.0 TO 60.0> [FROM G&D-V REF. FILE]

F(3) - TIME INCREMENT FOR SIMULATION, "DT". (SUGGEST 1.0 FOR SIGNAL, 0.5 FOR NON-SIGNAL) <0.50 TO 1.00> [0.50]

F(4) - TYPE OF INTERSECTION CONTROL: <"U", "Y", "ST", "A", "P", "SE" OR "F">
- "U" - UNCONTROLLED.
- "Y" - YIELD.
- "ST" - STOP, LESS THAN ALL WAY.
- "A" - ALL-WAY STOP.
- "P" - PRETIMED SIGNAL.
- "SE" - SEMI-ACTUATED SIGNAL.
- "F" - FULL-ACTUATED SIGNAL.

F(5) - STATISTICAL SUMMARY BY TURNING MOVEMENT ? <"YES" OR "NO"> ["YES"]

F(6) - STATISTICAL SUMMARY BY INBOUND APPROACH ? <"YES" OR "NO"> ["YES"]

F(7) - COMPRESSED OUTPUT OF STATISTICS ? <"YES" OR "NO"> ["NO"]

F(8) - POLLUTION/DISPLAY TAPE ? <"YES" OR "NO"> ["NO"]

SIMULATION PARAMETER-OPTION DATA 2:

F(1) - SPEED BELOW WHICH A SPECIAL DELAY STATISTIC IS COLLECTED. <0 TO 40> [10]

F(2) - MAXIMUM CLEAR DISTANCE FOR BEING IN A QUEUE. <4 TO 40> [30]

F(3) - CAR FOLLOWING EQUATION PARAMETER LAMBDA. <2.300 TO 4.000> [2.800]

F(4) - CAR FOLLOWING PARAMETER MU. <0.600 TO 1.000> [0.800]

F(5) - CAR FOLLOWING PARAMETER ALPHA. <0 TO 10000> [4000]

F(6) - TIME FOR LEAD ZONE USED IN CONFLICT CHECKING. <0.50 TO 3.00> [1.30]

F(7) - TIME FOR LAG ZONE USED IN CONFLICT CHECKING. <0.50 TO 3.00> [.50]

LANE CONTROL DATA:

EACH FIELD - TYPE OF CONTROL FOR THE INDICATED INBOUND LANE:
- "BL" - BLOCKED LANE. LANE ENDS BEFORE THE INTERSECTION.
- "UN" - UNCONTROLLED. <ONLY IF INTER. CONTROL = "NONE", "YIELD" OR "STOP">
- "YI" - YIELD SIGN. <NOT IF INTERSECTION CONTROL = "NONE">
- "ST" - STOP SIGN. <ONLY IF INTERSECTION CONTROL = "STOP" OR "ALL-WAY">
- "SI" - SIGNAL WITHOUT LEFT OR RIGHT TURN ON RED. <SIGNALIZED INTER. ONLY>
- "LT" - SIGNAL WITH LEFT TURN ON RED. <SIGNALIZED INTERSECTION ONLY>
- "RT" - SIGNAL WITH RIGHT TURN ON RED. <SIGNALIZED INTERSECTION ONLY>

PRETIMED SIGNAL TIMING DATA (SECONDS):

F(1) - GREEN INTERVAL. <1.0 TO 99.0, SECONDS> [30.0]

F(2) - YELLOW-CHANGE INTERVAL. <1.0 TO 9.0, SECONDS> [3.0]

F(3) - ALL RED-CLEARANCE INTERVAL. <0.0 TO 9.0, SECONDS> [0.0]

PRETIMED SIGNAL TIMING DATA (PERCENT OF CYCLE):

F(1) - GREEN INTERVAL. <1 TO 99, PERCENT OF CYCLE> [30]

F(2) - YELLOW-CHANGE INTERVAL. <1 TO 9, PERCENT OF CYCLE> [5]

F(3) - ALL RED-CLEARANCE INTERVAL. <0 TO 9, PERCENT OF CYCLE> [0]

Description of data fields displayed in prompts by SIMDATA (continuation)

```
SEMI-ACTUATED SIGNAL TIMING DATA FOR UNACTUATED CONTROLLER PHASE A:
F(1) - MINIMUM GREEN INTERVAL.  <1.0 TO 99.0, SECONDS> [30.0]
F(2) - YELLOW-CHANGE INTERVAL.  <1.0 TO 9.0, SECONDS> [3.0]
F(3) - ALL RED-CLEARANCE INTERVAL.  <0.0 TO 9.0, SECONDS> [0.0]
```

```
SEMI-ACTUATED SIGNAL TIMING DATA FOR ACTUATED CONTROLLER PHASES:
F(1) - INITIAL INTERVAL. <0.0 TO 99.0>[3.0]
F(2) - VEHICLE INTERVAL.  <"DT" TO 99.0> [2.0]
F(3) - YELLOW-CHANGE INTERVAL.  <1.0 TO 9.0> [3.0]
F(4) - ALL RED-CLEARANCE INTERVAL.  <0.0 TO 9.0> [0.0]
F(5) - MAXIMUM EXTENSION. <0.0 TO 99.0>  [30.0]
F(6) - SKIP PHASE SWITCH POSITION.  <"ON" OF "OFF"> ["OFF"]
F(7) - RECALL SWITCH POSITION.  <"ON" OR "OFF"> ["OFF"]
F(8) - MINOR MOVEMENT CONTROLLER ?  <"YES" OR "NO"> ["NO"]
F(9) - DUAL LEFTS TO BE FOLLOWED BY TWO SINGLE LEFTS !  <"YES" OR "NO"> ["NO"]
```

```
FULL ACTUATED SIGNAL TIMING DATA:
F(1) - INITIAL INTERVAL.  <"DT" TO 99.0> [3.0]
F(2) - VEHICLE INTERVAL. <"DT" TO 99.0> [2.0]
F(3) - YELLOW-CHANGE INTERVAL.  <1.0 TO 9.0> [3.0]
F(4) - ALL RED-CLEARANCE INTERVAL.  <0.0 TO 9.0> [0.0]
F(5) - MAXIMUM EXTENSION. <0.0 TO 99.0>  [30.0]
F(6) - SKIP PHASE SWITCH POSITION.  <"ON" OF "OFF"> ["OFF"]
F(7) - RECALL SWITCH POSITION.  <"ON" OR "OFF"> ["OFF"]
F(8) - MINOR MOVEMENT CONTROLLER ?  <"YES" OR "NO"> ["NO"]
F(9) - DUAL LEFTS TO BE FOLLOWED BY TWO SINGLE LEFTS ?  <"YES" OR "NO"> ["NO"]
```

```
GREEN INTERVAL SEQUENCE DATA:
EACH FIELD -GREEN SIGNAL INDICATION FOR THE CONTROLLER PHASE AND LANE:
"C" - CIRCULAR GREEN. ALL PERMITTED MOVEMENTS MAY MOVE.
"L" - LEFT GREEN ARROW, PROTECTED LEFT TURN.
"S" - STRAIGHT GREEN ARROW.   "R" - RIGHT GREEN ARROW.
*** ANY TWO OF THE ABOVE MAY BE USED TOGETHER, EXCEPT "LS" OR "LR".
"UN" - UNSIGNALIZED, SIGN CONTROL OR BLOCKED LANE, PER LANE CONTROL DATA.
BLANK - IMPLIED RED.
```

```
DATA FOR DETECTORS:
F(1) - LEG ON WHICH DETECTOR IS LOCATED.  <1 TO NUMBER OF LEGS> [1]
F(2) - FIRST INBOUND LANE COVERED BY DETECTOR. [1]
F(3) - NUMBER OF INBOUND LANES COVERED BY DETECTOR.  [1]
F(4) - SPACING BETWEEN DETECTOR AND NOMINAL LANE TERMINAL.  <-1000 TO 100> [0]
F(5) - DETECTOR LENGTH.  <1 TO 100> [60]
F(6) - TYPE OF DETECTOR.<"PU" (PULSE),"PR" (PRESENCE) OR "IN" (INACTIVE)>["PR"]
```

Description of data fields displayed in prompts by SIMDATA (continuation)

DETECTOR CONNECTION DATA:
F(1) - DETECTOR CONNECTION FOR THE CONTROLLER PHASE. <"AND" OR "OR"> ["OR"]
F(2) AND GREATER - THE NUMBER OF A DETECTOR CONNECTED TO THE CONTROLLER PHASE. NEGATIVE INDICATES A "NOT" CONNECTION. (USE "0" TO INDICATE THAT NO DETECTOR IS CONNECTED) <+/- NUMBER OF DETECTORS (1)>

CONTROLLER PHASE "CLEAR TO" DATA:
EACH FIELD - THE LETTER OF A CONTROLLER PHASE THAT CAN BE "CLEARED TO" DIRECTLY FROM THE INDICATED CONTROLLER PHASE. <PHASE LETTER, "A" THRU "Z">

Data-edit requests for use in SIMDATA

```
PHASE DATA EDIT REQUEST: P[(i[,j])]=[n*]fij[,...]
   ITEMS BETWEEN BRACKETS ("[...]") ARE OPTIONAL AND MAY BE OMITTED.
i - THE LETTER OF THE CONTROLLER PHASE FOR WHICH DATA IS TO BE EDITED. [A]
j - THE NUMBER OF THE FIRST FIELD TO BE EDITED.<INTEGER, 1 TO NO. OF FIELDS>[1]
fij - DATA TO REPLACE DATA THAT IS CURRENTLY IN THE FIRST FIELD TO BE EDITED.
      ADDITIONAL REPLACEMENT DATA FIELDS MAY FOLLOW fij, SEPARATED BY COMMAS.
      USE MULTIPLE COMMAS TO SKIP FIELDS.
n - DUPLICATION FACTOR.  USE FOR n SEQUENTIAL IDENTICAL FIELDS.

DETECTOR DATA EDIT REQUEST: D[(i[,j])]=[n*]fij[,...]
   ITEMS BETWEEN BRACKETS ("[...]") ARE OPTIONAL AND MAY BE OMITTED.
i - THE NUMBER OF THE DETECTOR FOR WHICH DATA IS TO BE EDITED. [1]
j - THE NUMBER OF THE FIRST FIELD TO BE EDITED.<INTEGER, 1 TO NO. OF FIELDS>[1]
fij - DATA TO REPLACE DATA THAT IS CURRENTLY IN THE FIRST FIELD TO BE EDITED.
      ADDITIONAL REPLACEMENT DATA FIELDS MAY FOLLOW fij, SEPARATED BY COMMAS.
      USE MULTIPLE COMMAS TO SKIP FIELDS.
n - DUPLICATION FACTOR.  USE FOR n SEQUENTIAL IDENTICAL FIELDS.
```

APPENDIX B. IMPLEMENTATION OF THE TEXAS DIAMOND SIGNAL CONTROLLER IN THE TEXAS MODEL VERSION 3.0 SIMULATION PROCESSOR

The TEXAS Model for Intersection Traffic Version 3.0 incorporates modifications to earlier versions of the model for simulating the Texas State Department of Highways and Public Transportation Diamond Interchange Signal Controller. This implementation provides users with a choice of four different phase sequence patterns which are referred to as "Figure 3", "Figure 4", "Figure 6", and "Figure 7". Information provided in the following paragraphs describe modifications made to the simulation processor ("SIMPRO") which implement these signal controller schemes. The implementation is based upon a literal interpretation of the Texas State Department of Highways and Public Transportation (SDHPT) Diamond Controller Operation Specifications [Ref 14]. The information which follows is intended for use by a "programmer level" user who does not use the user-friendly pre-processors. That is, most of the specific input data is transparent to users of the user-friendly pre-processors and is, therefore, of little interest. However, simulation of very unusual cases or special purpose research efforts may find this information extremely helpful.

The user-friendly pre-processor SIMDATA prompts users for data which are formatted in the form of data lines in a file which is read by the simulation processor SIMPRO. Modifications to SIMPRO begin with an extension to its interpretation of the parameter data line. Parameter line input to SIMPRO has been modified to allow the user to specify type of intersection control as "Figures 3, 4, 6, or 7" respectively by entering in columns 39 and 40, a value 8, 9, 10, or 11. Entering any of these special values for type of intersection control causes the following:

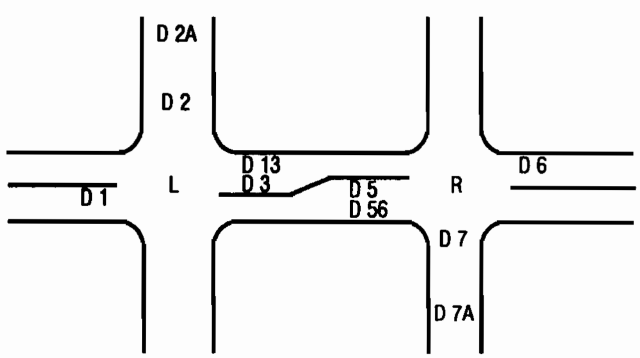
(1) sets the number of overlap definitions to a value of 2,
(2) sets the first overlap definition as Overlap A,
(3) sets the second overlap definition as overlap B,
(4) sets overlap A to be made up of phase 1 and phase 3,
(5) sets Overlap B to be made up of phase 5 and phase 6,
(6) sets the number of rings to a value of 2,
(7) sets the number of phases in ring 1 to a value of 3,
(8) sets ring 1 to be contain phase 1, 2, and 3,
(9) sets the number of phases in ring 2 to a value of 3,
(10) sets ring 2 to contain phases 5, 6, and 7, and
(11) sets the number of detectors to a value of 10.

The SDHPT Standard Specification for "Figures 3, 4, 6, and 7" [Ref 14] provides for a system for numbering and locations for the 10 detectors. That system, and the corresponding numbering system used in SIMPRO are shown in Fig B-1.

The cam stack line 1 input to SIMPRO has not been modified. The number of cam stacks does not include the cam stack line 2 inputs for the overlap definitions.

The cam stack line 2 input to SIMPRO has been modified to allow the user to enter a value of "A" or "B" for the phase number for the overlap phase definitions and to allow the user to enter a value of "NCP" (Not Controlled by Phase) for the signal indication three-character code for each lane for lanes not controlled by the phase. The phase number is entered on the cam stack line 2 columns 1 through 2. The signal indication three-character code for each lane is entered on the cam stack line 2 columns 6 through 8, 9 through 11, 12 through 14, etc. There should be only one yellow change interval for each phase and an all-red clearance interval if the duration of the all-red is non-zero. There should be only one yellow change interval and no red clearance interval for each overlap phase.

Modifications to the full-actuated signal controller under Texas Diamond operation have deleted requirements for user specifications regarding a number of items on phase line 2. These include the skip phase switch option, recall switch option, minor movement controller option, dual left followed by two single lefts option, detector connection option, number of detectors attached to this phase, number of phases which can be cleared to directly from this phase, and the list of phase numbers which can be cleared to directly from this phase. This data is normally entered on the full-actuated signal controller phase line 2 columns 30 through



Detector Numbers and Locations from Texas Specification

Detector Reference Numbers	
SIMPRO	Standard Specification
1	D1
2	D2
3	D2A
4	D3
5	D13
6	D5
7	D56
8	D6
9	D7
10	D7A

Fig B-1. Standard detector specification and SIMPRO equivalents.

70. Operation of the modified controller assumes that the minimum green interval is the sum of the initial interval plus the vehicle interval. Therefore the user should enter the value of the minimum interval minus the vehicle interval for the initial interval on the full-actuated signal controller phase line 2 columns 03 through 07 and the value of the vehicle interval on the full-actuated signal controller phase line 2 columns 08 through 12. The detector connection has been set to "OR" for the diamond interchange signal controller.

For the Texas Diamond the full-actuated signal controller phase line 3 input to SIMPRO has been deleted. This input normally defines the list of detectors connected to the phase. This list has been fixed for the diamond interchange signal controller with phase 1 connected to detector D1, phase 2 to detectors D2 and D2A, phase 3 to D3 and D13, phase 5 to detectors are D5 and D56, phase 6 to D6, and phase 7 connected to detectors D7 and D7A. A diamond interchange signal controller timer line input has been added to SIMPRO to allow the user to enter the values of the 12 special timer intervals (see Ref 14 note 2 intervals and timers). The value entered by the user is referred to as the timer setting and does not change during a simulation run. At the appropriate moment, the timer setting is loaded into a variable called the timer value which is decremented each time scan until the timer value becomes less than or equal to zero or until the timer is cancelled. The diamond controller timer line follows the full-actuated signal controller phase line 2 and precedes the diamond interchange signal controller option line. Special timer intervals, allowable durations, descriptions, applicable phases and columns of the phase line 2 in which they must be entered are shown in Table B-1.

TABLE B-1. DESCRIPTIONS OF TEXAS DIAMOND CONTROLLER SPECIAL INTERVALS

INT	VAL	Function of Option	Phases	Columns
1	YES	Enable detector 3 during phase 3-7	4 6 7	01-03
1	NO	Disable detector 3 during phase 3-7	4 6 7	01-03
2	YES	Enable detector 13 during phase 3-7	4 6 7	04-06
2	NO	Disable detector 13 during phase 3-7	4 6 7	04-06
3	YES	Enable detector 5 during phase 2-5	4 6 7	07-09
3	NO	Disable detector 5 during phase 2-5	4 6 7	07-09
4	YES	Enable detector 56 during phase 2-5	4 6 7	10-12
4	NO	Disable detector 56 during phase 2-5	4 6 7	10-12
5	YES	3-7 will follow 2-7 when 2 ends before 7	3	13-15
5	NO	1-7 will follow 2-7 when 2 ends before 7	3	13-15
6	YES	2-5 will follow 2-7 when 7 ends before 2	3	16-18
6	NO	2-6 will follow 2-7 when 7 ends before 2	3	16-18
7	YES	Simgap inhibited on 3-6, rest allowed on 1-6, and 3-6 clears to 1-6 (figure 6 option A)	6	19-21
7	NO	Simgap enforced on 3-6, rest not allowed on 1-6, and 3-6 clears to 1-5(figure 6 option A)	6	19-21
8	YES	Detector 2A is not cross-switched to 5 during 2-5 and 2-7 is actuated(figure 6 option B)	6	22-24
8	NO	Detector 2A is cross-switched to 5 during 2-5 and 2-7 not actuated (figure 6 option B)	6	22-24
9	YES	3-7 clears through 1-7 when going to 1-5 (figure 6 option C)	6	25-27
9	NO	3-7 clears through 3-5 when going to 1-5 (figure 6 option C)	6	25-27
10	YES	Simgap is inhibited on 1-5, rest is allowed on 1-6, and 1-5 clears to 1-6 (figure 7 option A)	7	28-30
10	NO	Simgap is enforced on 1-5, rest is not allowed on 1-6, and 1-5 clears to 3-6 (figure 7 option A)	7	28-30
11	YES	Detector 7A is not cross-switched to 3 during 3-7 and 2-7 is actuated (figure 7 option B)	7	31-33
11	NO	Detector 7A is cross-switched to 3 during 3-7 and 2-7 is not actuated (figure 7 option B)	7	31-33
12	YES	2-5 clears through 2-6 when going to 3-6 (figure 7 option C)	7	34-36
12	NO	2-5 clears through 3-5 when going to 3-6 (figure 7 option C)	7	34-36

TABLE B-2. TEXAS DIAMOND CONTROLLER SPECIFICATIONS

Int	Time	Special Timer Interval Usage	Phases	Columns
1	0.0-99.0	Phase 3-5 Clearance Green Timer	4 6 7	01-04
2	0.0-99.0	Phase 1-7 Advance Green Timer	3 4 6	05-08
3	0.0-99.0	Phase 2-6 Advance Green Timer	3 4 7	09-12
4	0.0- 9.9	Phase 2 Transfer Gap Timer	4 6 7	13-15
5	0.0- 9.9	Phase 7 Transfer Gap Timer	4 6 7	16-18
6	0.0-99.0	Phase 1-6 Advance Green Minimum Timer	6	19-22
7	0.0-99.0	Phase 1-6 Advance Green Maximum Timer	6	23-26
8	0.0-99.0	Phase 2-7 Advance Green Timer	6	27-30
9	0.0-99.0	Phase 1-6 Advance Green Minimum Timer	7	31-34
10	0.0-99.0	Phase 1-6 Advance Green mMaximum Timer	7	35-38
11	0.0-99.0	Phase 2-7 Advance Green Timer	7	39-42
12	0.0-99.0	Phase 3-5 Clearance Green Timer	3	43-46

A diamond interchange signal controller option card input has been added to SIMPRO to allow the user to enter the values of the 12 options (see Ref 14 note 4 I/O assignments). The diamond interchange signal controller option card follows the diamond interchange signal controller timer card and precedes the detector card 1. The options are described, along with input requirements in Table B-2.

Variable Names Added for Simulation of the Actuated Diamond Controller

The following paragraphs describe new variable names and functions added to SIMPRO to simulate the diamond interchange signal controller. Hold is a name used in the diamond interchange signal controller as a logical variable for each phase with a value of true or false. It is only valid when the phase is the current phase and means that the phase must remain at least until the hold is released. If the phase gaps out, maxes out, or times out (sets select true) and if hold is set true then the diamond interchange signal controller will not allow the next phase to be chosen and entered until hold is set false. Hold is set true when a special timer is initiated for the phase, when simultaneous gap out of a phase combination is required before choosing the next phase, and in certain special conditions defined in Ref 14. Hold is set false when a special timer is timed out or cancelled, when simultaneous gap out of a phase combination occurs as required, or in certain special conditions defined in Ref 14.

Call is a name used in the diamond interchange signal controller as a logical variable for each phase with a value of true or false. Call means that there is demand for a phase and the phase must be serviced. It is set true when there is detector actuation for the phase when the phase is the current phase in the yellow change or red clearance interval, when there is detector actuation for the phase when the phase is not the current phase, when the phase maxes out, and in certain special conditions defined in Ref 14. Call is set false when the phase enters the green interval for the phase. Call can be thought of as a memory feature for detector actuations. Select is a name used as a logical variable for each phase with a value of true or false. Select means that a phase has gapped out, maxed out, or timed out and means that the next phase should be chosen. Select is set true for a phase when the current phase gaps out, maxes out, or times out. Select is set false when the time remaining in the current phase is reset to the vehicle interval when there is detector actuation on the current phase while in the green interval and the time into the current phase is greater than the initial interval and set false when the phase becomes the current phase and enters the phase green interval.

Next is a name used as a logical variable for each phase with a value of true or false. Next means that a phase has been chosen to the be the next phase. Next is set true for a phase when the current phase gaps out, maxes out, or times out; chooses the phase to be next; and enters the yellow change interval for the current phase. Next is set false for a phase when the phase becomes the current phase and enters the green interval.

Rest means that in the absence of demand for any phase, the controller will remain in the current phase until there is demand for another phase. If a phase is not allowed to rest then the diamond interchange signal controller moves to the next phase in the preferential phase sequence. For "Figure 3", rest is allowed in all phase combinations. For "Figures 4, 6, and 7," rest is allowed in phase 1-5, phase 2-5, phase 3-6, phase 3-7, and optionally other phases defined by the diamond interchange signal controller options. For "Figure 6", rest is allowed in phase 1-6 if the "Figure 6" option A (Option 7) is "YES" (see Ref 14 "Figure 6" note 3 phase sequence options - option A = ON). For "Figure 7", rest is allowed in phase 1-6 if the "Figure 7" option A (Option 10) is "YES" (see Ref 14 "Figure 7" note 3 phase sequence options - option A = ON).

Simgap is a logical variable with a value of true or false. Simgap means that each phase in a phase combination has simultaneous gapped out, maxed out, or timed out (select is true for both phases). In all cases where simgap is to be enforced, hold is set true for both phases until simgap is reached. If one of the phases gaps out, maxes out, or times out before the other phase then the controller waits until the other phase gaps out, maxes out, or times out. When simgap is reached, simgap is set true, hold is set false for each phase, and a new phase is chosen for each ring.

Demand on red is a logical variable for each ring with a value of true or false. Demand on red means that there is demand for service for another phase in the ring and therefore the max out timer for the ring should be started and the phase should gap out or max out as soon as possible. Demand on red for a ring is set true when call is true for the current phase for the ring and the current phase for the ring is in the yellow change or red clearance interval and set true when call is true for any phase in the ring that is not the current phase.

System demand on red is a logical variable with a value of true or false. It means that there is demand for service for another phase in any ring and therefore when the current phase in a ring gaps out, maxes out, or times out then if demand on red for the ring is false and system demand on red is true or system demand on red is false and rest is false for the current phase then call is set true for the next preferential phase in the ring. This action may cause call to be set true for a phase in the other ring to eventually move the controller in the preferential sequence order to a phase combination which will service the demand. System demand on red is initialized to false each time scan and is set true if call is true for any phase in any ring, set true if there is detector actuation for the current phase for a ring and the current phase for the ring is in the yellow change or red clearance interval, and set true if there is detector actuation for any phase in the ring that is not the current phase.

Implemented Interpretations of "Figures 3, 4, 6, and 7"

For "Figure 3", the simulated diamond interchange signal controller starts in phase 1-6. The first phase is phase 1 and it may clear to phase 3. The second is phase 2 and it may clear to phase 1 and 3. The third is phase 3 and it may clear to phase 2 and 1. The fourth is phase 5 and it may clear to phase 7 and phase 6. The fifth is phase 6 and it may clear to phase 5 and, the sixth phase is phase 7 and it may clear to phase 6 and 5. Phase 3 normally has 1 detector labeled D3 (see Figure B-1) while detector D13 is active only during phase 2-5, 2-6, and 2-7 (see Ref 14 "Figure 3" note 1 detectors - D13). Phase 5 normally has 1 detector labeled D5 while detector D56 is active only during phase 1-7, 2-7, and 3-7 (see Ref 14 "Figure 3" note 1 detectors - D56).

For "Figure 4," the simulated controller starts in phase 1-5. Phase 1-5 may clear to phases 2-5, 3-6, and 3-7. Phase 2-5 may clear to phases 3-6, 3-7, and 1-5. Phase 3-6 may clear to phase 3-7, 1-5, and 2-5. Phase 3-7 may clear to phases 1-5, phase 2-5, and 3-6. Clearance from phase 1-5 to phase 3-6 is through phase 3-5. Clearance from phase 1-5 to phase 3-7 is through 3-5. Clearance from phase 2-5 to phase 3-6 is through phase 2-6. Clearance from phase 2-5 to 3-7 is through phase 3-5. Clearance from phase 3-6 to phase 1-5 is through 3-5. Clearance from phase 3-6 to 2-5 is through phase 3-5. Clearance from 3-7 to 1-5 is through phase 1-7. Finally, clearance from phase 3-7 to phase 2-5 is through phase 3-5. See Ref 14 "Figure 4" note 1 phase sequences - preferred phase sequence. Phase 2 normally has 1 detector and labeled (see Figure 1) D2 while detector D2A is active only during phase 2-5 (see Ref 14 "Figure 4" note 2 detector operation - D2 & D2A). Phase 7 normally has 1 detector labeled D7 while detector D7A is active only during phase 3-7 (see Ref 14 "Figure 4" note 2 detector operation - D7 & D7A).

Simulation of "Figure 6" begins with the controller in phase 1-5. Phase 1-5 may clear to phases 2-5, 3-7, and 3-6. Phase 2-5 may clear to phases 2-7, 3-6, and 1-5. Phase 2-7 may clear to 3-7. Phase 3-7 may clear to phases 3-6, 1-5, and 2-5. Phase 3-6 may clear to phase 1-5 (if the "Figure 6" phase 1-6 advance green minimum timer setting (special timer interval 6) is equal to 0.0 and the "Figure 6" option A (Option 7) is "NO" (see Ref 14 "Figure 6" note 3 phase sequence options - option A = OFF)) or to phase 1-6 (if the "Figure 6" phase 1-6 advance green minimum timer setting (special timer interval 6) is greater than 0.0 or the "Figure 6" option A (Option 7) is "YES" (see Ref 14 "Figure 6" note 3 phase sequence options - option A = ON)), phase 2-5, and phase 3-7. Phase 1-6 may clear to phase 1-5. When phase 1—5 clears to phase 3-6 the signal controller will clear through phase 3-5. Clearance from phase 1-5 to phase 3-7 is through phase 3-5. Clearance from phase 2-5 to phase 3-6 is through phase 2-6. Clearance from phase 2-5 to phase 3-7 is through phase 3-5. Clearance from phase 3-6 to phase 2-5 is through phase 3-5. Clearance from phase 3-7 to phase 1-5 is through phase 1-7 (if "Figure 6" option C (Option 9) is "YES" (see Ref 14 "Figure 6" note 3 phase sequence options - option C = ON)) or phase 3-5 (if "Figure 6" option C (Option 9) is "NO" (see Ref 14 "Figure 6" note 3 phase sequence options - option C = OFF)). Clearance from phase 3-7 to phase 2-5 is through phase 3-5. See Ref 14 "Figure 6" note 1 phase sequences. Phase 2 normally has 1 detector called D2 (see Figure A-1) while detector D2A is active only during phase 2-5 (see Ref 14 "Figure 6" note 4 alternate and overlap detectors - D2A). Phase 7 normally has 1 detector labeled D7 while detector D7A is active only during phase 3-7 (see Ref 14 "Figure 6" note 4 alternate and overlap detectors - D7A).

Simulation of "Figure 7" starts in phase 1-5 which may clear to phase 3-6 (if the "Figure 7" phase 1-6 advance green minimum timer setting is equal to 0.0 and the "Figure 7" option A (Option 10) is "NO" (see Ref 14 "Figure 7" note 3 phase sequence options - option A = OFF) or to phase 1-6 (if the "Figure 7" phase 1-6 advance green minimum timer setting is greater than 0.0 or the "Figure 7" option A (Option 10) is "YES" (see Ref 14 "Figure 7" note 3 phase sequence options - option A = ON)), phase 3-7, and phase 2-5. Phase 1-6 may clear to phase 3-6. Phase 3-6 may clear to phases 3-7, 2-5, and 1-5. Phase 3-7 may clear to 2-7, 1-5, and 3-6. Phase 2-7 may clear to phase 2-5. Phase 2-5 may clear to phase 1-5, 3-6, and 3-7. Clearance from 3-6 to phase 2-5 is through phase 3-5. Clearance from phase 3-6 clears to 1-5 is through phase 3-5. Clearance from phase 2-5 to 3-6 is through phase 2-6 (if figure 7 option C (Option 12) is "YES" (see Ref 14 "Figure 7" note 3 phase sequence options - option C = ON)) or phase 3-5 (if "Figure 7" option C (Option 12) is "NO" (see Ref 14 "Figure 7" note 3 phase sequence options - option C = OFF)). Clearance from phase 3-7 to phase 1-5 is through phase 1-7. Clearance from phase 2-5 to 3-7 is through phase 3-5. Clearance from phase 1-5 to 3-7 is through phase 3-5. See Ref 14 "Figure 7" note 1 phase sequences. Phase 2 normally has 1 detector labeled D2 while detector D2A is active only during phase 2-5 (see Ref 14 "Figure 7" note 4 alternate and overlap detectors - D2A). Phase 7 normally has 1 detector labeled D7 while detector D7A is active only during phase 3-7 (see Ref 14 "Figure 7" note 4 alternate and overlap detectors - D7A).

Explanation of Diamond Interchange Controller States

A number of controller states which are generally associated with special timers or unique phase combinations are defined for each of the phase sequence patterns, "Figures 3,4, 6, and 7." These states are enumerated and described in the following paragraphs. For "Figure 3," state PC1536 exists when the diamond interchange signal controller is in phase 1-5 or in phase 3-6. State PC1737 is started when the signal controller leaves phase 2-7 and enters phase 1-7 or phase 3-7. State PC1737 is ended when the signal controller enters phase 1-6. State PC2526 is started when the controller leaves phase 2-7 and enters phase 2-5 or phase 2-6. State

PC2526 is ended when the controller enters phase 1-6. State PC17 is started when the controller enters phase 1-7, and is ended when the phase 1-7 advance green timer has timed out. See Ref 14 note 2 intervals and timers - interval 2. State PC25 is started when the controller leaves phase 3-5 and enters phase 2-5. State PC25 is ended when the controller enters phase 2-7. State PC26 is started when the controller enters phase 2-6, and is ended when the phase 2-6 advance green timer has timed out. See Ref 14 note 2 intervals and timers - interval 3. State PC27 is started when the controller enters phase 2-7. State PC27 is ended when the time into phase 2 is greater than or equal to the minimum interval for phase 2 and the time into phase 7 is greater than or equal to the minimum interval for phase 7. See Ref 14 "Figure 3" note 3.c phase sequence. State PC35 is started when the controller enters phase 3-5. State PC35 is ended when the "Figure 3" phase 3-5 clearance green timer has timed out if the "Figure 3" phase 3-5 clearance green timer setting (special timer interval 12) is not equal to 99.0 or State PC35 is ended when there is simultaneous gapout on phase 3 and phase 5 if the "Figure 3" phase 3-5 clearance green timer setting (special timer interval 12) is equal to 99.0. See Ref 14 "Figure 3" note 3.e phase sequence. State PC37 is started when the controller leaves phase 3-5 and enters phase 3-7, and is ended when the controller enters phase 2-7.

Signal controller states for "Figure 4" are defined in the following paragraphs. State PC17 is started when the controller enters phase 1-7, and is ended when the phase 1-7 advance green timer times out. See Ref 14 diamond operation note 2 intervals and timers - interval 2. State PC26 is started when the controller enters phase 2-6, and is ended when the phase 2-6 advance green timer times out. See Ref 14 diamond operation note 2 intervals and timers - interval 3. State PC35 is started when the controller enters phase 3-5, and is ended when the "Figure 4" phase 3-5 clearance green timer (special timer interval 1) times out. See Ref 14 "Figure 4" note 1 phase sequences - phase 3-5 clearance green timer.

Controller states applicable to "Figure 6" are defined in the following discussion. State PC16 is started when the controller enters the yellow change interval for phase 3-6 clearing to phase 1-6 if the "Figure 6" option A (Option 7) is "NO" and the "Figure 6" phase 1-6 advance green minimum timer is not equal to 0.0. State PC16 is ended when the controller enters the yellow change interval for phase 1-6 clearing to phase 1-5 or when the "Figure 6" phase 1-6 advance green maximum timer (special timer interval 7) times out. See Ref 14 "Figure 6" note 3 phase sequence options - option A = OFF. State PC17 is started when the controller enters phase 1-7, and is ended when the phase 1-7 advance green timer times out. See Ref 14 note 2 intervals and timers - interval 2. State PC27 is started when the controller enters phase 2-7 if the "Figure 6" option B (Option 8) is "NO". State PC27 is ended when the "Figure 6" phase 2-7 advance green timer (special timer interval 8) times out. See Ref 14 "Figure 6" note 3 phase sequence options - option B = OFF. State PC35 is started when the controller enters phase 3-5 (going from phase 3-7 to phase 1-5). State PC35 is ended when the "Figure 6" phase 3-5 clearance green timer (special timer interval 1) times out. See Ref 14 "Figure 6" note 3 phase sequence options - option C = OFF. State PC36 is started when the controller enters phase 3-6 and the "Figure 6" option A (Option 7) is "NO". State PC36 is ended when there is simultaneous gapout on phase 3 and phase 6. See Ref 14 "Figure 6" note 3 phase sequence options - option A = OFF.

States for "Figure 7" consist of the following. State PC15 is started when the controller enters phase 1-5 and the "Figure 7" option A (Option 10) is "NO". State PC15 is ended when there is simultaneous gapout on phase 1 and phase 5. See Ref 14 "Figure 7" note 3 phase sequence options - option A = OFF. State PC16 is started when the controller enters the yellow change interval for phase 1-5 clearing to phase 1-6 if the "Figure 7" option A (Option 10) is "NO" and the "Figure 7" phase 1-6 advance green minimum timer is not equal to 0.0. State PC16 is ended when the controller enters the yellow change interval for phase 1-6 clearing to phase 3-6 or when the "Figure 7" phase 1-6 advance green maximum timer (special timer interval 10) times out. See Ref 14 "Figure 7" note 3 phase sequence options - option A = OFF. State PC26 is started when the controller enters phase 2-6, and is ended when the phase 2-6 advance green timer times out. See Ref 14 diamond operation note 2 intervals and timers - interval 3. State PC27 is started when the controller enters phase 2-7 if the "Figure 7" option B (Option 11) is "NO". State PC27 is ended when the "Figure 7" phase 2-7 advance green timer (special timer interval 11) times out. See Ref 14 "Figure 7" note 3 phase sequence options - option B = OFF. State PC35 is started when the controller enters phase 3-5 (going from phase 2-5 to phase 3-6), and is ended when the "Figure 7" phase 3-5 clearance green timer (special timer interval 1) times out. See Ref 14 "Figure 7" note 3 phase sequence options - option C = OFF.

Special Timer Intervals

This implementation of the diamond interchange controller provides several special timer intervals which have varying effects for each of the sequence patterns, "Figures 3, 4, 6, and 7." These are described in the following paragraphs.

The "Figure 3" phase 1-7 advance green timer value is initialized to the "Figure 3" phase 1-7 advance green timer setting (special timer interval 2) when the controller is in phase 2-7 or phase 3-7 and enters the yellow change interval going to phase 1-7. In addition to initializing the timer value, hold is set true for phase 1 and phase 7. The timer value is decremented each time scan if the timer value is greater than 0.0. When it becomes less than or equal to 0.0, it is set to 0.0, hold is set false for phase 1 and phase 7, State PC17 is set false, if there is a call for phase 3, select is set true for phase 1, and if there is a call for phase 6, select is set true for phase 7. See Ref 14 "Figure 3" diamond operation note 2 intervals and timers - interval 2. The "Figure 3" phase 2-6 advance green timer value is initialized (special timer interval 3) when the controller is in phase 2-7 or phase 2-5 and enters the yellow change interval going to phase 2-6. In addition to initializing the timer value, hold is set true for phase 2 and phase 6. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0,it is set to 0.0, hold is set false for phase 2 and phase 6, State PC26 is set false, if there is a call for phase 1, select is set true for phase 2, and if there is a call for phase 5, select is set true for phase 6. See Ref 14 "Figure 3" diamond operation note 2 intervals and timers - interval 3. The "Figure 3" phase 3-5 clearance green timer value is initialized (special timer interval 12) when the controller enters the green interval for phase 3-5 and the timer setting is not equal to 99.0 (simgap not enforced). Hold is set true for phase 3 and phase 5 and State PC35 is set true. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0,it is set to 0.0, hold is set false for phase 3 and phase 5, and State PC35 is set false. If timer setting is equal to 99.0 (simgap is enforced) and State PC35 is set true then the controller waits until select is set true for both phase 3 and phase 5 and then hold is set false for phase 3 and phase 5, State PC35 is set false, simgap is set true, and a new phase is allowed to be selected. See Ref 14 "Figure 3" note 3.e phase sequence.

The "Figure 4" phase 3-5 clearance green timer value is initialized (special timer interval 1) when the controller enters the green interval for phase 3-5. In addition to initializing the timer value, hold is set true for phase 3 and phase 5 and State PC35 is set true. The timer value is decremented each time scan if State PC35 is set true. When it becomes less than or equal to 0.0, it is set to 0.0, hold is set false for phase 3 and phase 5, State PC35 is set false, if the next phase for ring 1 is phase 3, select is set true for phase 5, and if the next phase for ring 1 is not phase 3, select is set true for phase 3. See Ref 14 "Figure 4" note 1 phase sequences. The "Figure 4" phase 1-7 advance green timer value is initialized (special timer interval 2) when the controller is in phase 3-7 and enters the yellow change interval going to phase 1-7 and there is a call for phase 2, phase 3, phase 5, and phase 6. In addition to initializing the timer value, hold is set true for phase 1 and phase 7. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0, it is set to 0.0, hold is set false for phase 1 and phase 7, State PC17 is set false, and select is set true for phase 7. See Ref 14 "Figure 4" diamond operation note 2 intervals and timers - interval 2. The "Figure 4" phase 2-6 advance green timer value is initialized (special timer interval 3) when the controller is in phase 2-5 and enters the yellow change interval going to phase 2-6 and there is a call for phase 1, phase 3, phase 5, and phase 7. In addition to initializing the timer value, hold is set true for phase 2 and phase 6. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0 then it is set to 0.0, hold is set false for phase 2 and phase 6, State PC26 is set false, and select is set true for phase 2. See Ref 14 "Figure 4" diamond operation note 2 intervals and timers - interval 3. The "Figure 4" phase 2 transfer gap timer value is initialized (special timer interval 4) when the controller is in phase 2-5, call is true for phase 3, call is true for phase 6, and the timer value is equal to 0.0. When the controller enters phase 3-6,it is set to 0.0 and the detector D2 is connected to phase 2 as the only detector. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0,it is set to 0.0 and the detector D2A is connected to phase 2 as the only detector. See Ref 14 "Figure 4 note 2 detector operation - D2 & D2A. The "Figure 4" phase 7 transfer gap timer value is initialized (special timer interval 5) when the controller is in phase 3-7, call is true for phase 1, call is true for phase 5, and the timer value is equal to 0.0. When the controller enters phase 1-5,it is set to 0.0 and the detector D7 is connected to phase 7 as the only detector. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0,it is set to 0.0 and the detector D7A is connected to phase 7 as the only detector. See Ref 14 "Figure 4" note 2 detector operation - D7 & D7A.

The "Figure 6" phase 3-5 clearance green timer value is initialized (special timer interval 1) when the controller enters the green interval for phase 3-5 and the next phase is phase 1-5. In addition to initializing the timer value, hold is set true for phase 3 and phase 5 and State PC35 is set true. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0,it is set to 0.0, hold is set false for phase 3 and phase 5, and State PC35 is set false. See Ref 14 "Figure 6" note 3 phase sequence options - option C = OFF. The "Figure 6" phase 1-7 advance green timer value is initialized (special timer interval 2) when the controller is in phase 3-7 and enters the yellow change interval going to phase 1-7 and the "Figure 6" option C (Option 9) is "YES". In addition to initializing the timer value, hold is set true for phase 1 and phase 7. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0,it is set to 0.0, hold is set false for phase 1 and phase 7, State PC17 is set false, and select is set true for phase 7. See Ref 14 "Figure 6" note 3 phase sequence options - option C = ON. The "Figure 6" phase 2 transfer gap timer value is initialized (special timer interval 4) when the controller enters the green interval for phase 2-5 and when the controller is in phase 2-5, there has been a detection on detector D2, and the timer value is greater than 0.0. When the controller enters the green interval for a phase that is not phase 2-5,it is set to 0.0 and the detector D2 is connected to phase 2 as the only detector. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0 then it is set to 0.0 and the detector D2A is connected to phase 2 as the only detector if the "Figure 6" option B (Option 8) is "YES" or the detector D2A is connected to phase 5 as the only detector if the "Figure 6" option B (Option 8) is "NO". See Ref 14 "Figure 6" note 4 alternate and overlay detectors - D2A. The "Figure 6" phase 7 transfer gap timer value is initialized (special timer interval 5) when the controller enters the green interval for phase 3-7, "Figure 6" option C (Option 9) is "YES", call is true for phase 1, and call is false for phase 6 and when the controller is in phase 3-7, "Figure 6" option C (Option 9) is "YES", call is false for phase 6, there has been a detection on detector D7, and the timer value is greater than 0.0. When the controller is in phase 3-7, "Figure 6" option C (Option 9) is "YES", call is true for phase 6 then it is set to 0.0 and the detector D7 is connected to phase 7 as the only detector. When the controller enters the green interval for a phase that is not phase 3-7,it is set to 0.0 and the detector D7 is connected to phase 7 as the only detector. The timer value is decremented each time scan if it is greater than 0.0, and when it becomes less than or equal to 0.0, it is set to 0.0 and the detector D7A is connected to phase 7 as the only detector. See Ref 14 "Figure 6" note 4 alternate and overlap detectors - D7A. The "Figure 6" phase 1-6 advance green minimum timer value is initialized to the specified setting (special timer interval 6) when the controller is in phase 3-6 and enters the yellow change interval going to phase 1-6 and the "Figure 6" option A (Option 7) is "NO". In addition to initializing the timer value, hold is set true for phase 1 and phase 6 and State PC16 is set true. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0,it is set to 0.0, hold is set false for phase 1 and phase 6. See Ref 14 "Figure 6" note 3 phase sequence options - option A = OFF. The "Figure 6" phase 1-6 advance green maximum timer value is initialized (special timer interval 7) when the controller is in phase 3-6 and enters the yellow change interval going to phase 1-6 and the "Figure 6" option A (Option 7) is "NO". In addition to initializing the timer value, hold is set true for phase 1 and phase 6 and State PC16 is set true. When the controller enters the yellow change interval for phase 1-6 and State PC16 is true,it is set to 0.0 and State PC16 is set false. The timer value is decremented each time scan if it is greater than 0.0, and when it becomes less than or equal to 0.0, it is set to 0.0, State PC16 is set false, and select is set true for phase 6. See Ref 14 "Figure 6" note 3 phase sequence options - option A = OFF. The "Figure 6" phase 2-7 advance green timer value is initialized (special timer interval 8) when the controller enters the green interval for phase 2-7 and the "Figure 6" option B (Option 8) is "NO". In addition to initializing the timer value, hold is set true for phase 2 and phase 7 and State PC27 is set true. The timer value is decremented each time scan if State PC27 is true. When it becomes less than or equal to 0.0, it is set to 0.0, hold is set false for phase 2 and phase 7, State PC27 is set false, and select is set true for phase 2. See Ref 14 "Figure 6" note 3 phase sequence options - option B = OFF.

The "Figure 7" phase 3-5 clearance green timer value is initialized (special timer interval 1) when the controller enters the green interval for phase 3-5 and the next phase is phase 3-6. In addition to initializing the timer value, hold is set true for phase 3 and phase 5 and State PC35 is set true. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0,it is set to 0.0, hold is set false for phase 3 and phase 5, and State PC35 is set false. See Ref 14 "Figure 7" note 3 phase sequence options - option C = OFF. The "Figure 7" phase 2-6 advance green timer value is initialized (special timer interval 3) when the controller is in phase 2-5 and enters the yellow change interval going to phase 2-6 and the "Figure 7" option C (Option 9) is "YES". In addition to initializing the timer value, hold is set true for phase 2 and phase 6. The timer value is decremented each time scan if it is greater than 0.0, and when it becomes less than or equal to 0.0, it is set to 0.0, hold is set false for phase 2 and phase 6, State PC26 is set false, and select is set true for phase 2. See Ref 14 "Figure 7" note 3 phase sequence options - option C = ON. The "Figure 7" phase 2 transfer gap timer value is initialized (special timer interval 4) when the controller enters the green interval for phase 2-5, "Figure 7" option C (Option 12) is "YES", call is true for phase 6, and call is false for phase 1 and when the controller is in phase 2-5, "Figure 7" option C (Option 12) is "YES", call is false for phase 1, there has been a detection on detector D2, and the timer value is greater than 0.0. When the controller is in phase 2-5, "Figure 7" option C (Option 12) is "YES", call is true for phase 1 then it is set to 0.0 and the detector D2 is connected to phase 2 as the only detector. When the controller enters the green interval for a phase that is not phase 2-5,it is set to 0.0 and the detector D2 is connected to phase 2 as the only detector. The timer value is decremented each time scan if it is greater than 0.0, and when it becomes less than or equal to 0.0, it is set to 0.0 and the detector D2A is connected to phase 2 as the only detector. See Ref 14 "Figure 7" note 4 alternate and overlap detectors - D2A.

The "Figure 7" phase 7 transfer gap timer value is initialized (special timer interval 5) when the controller enters the green interval for phase 3-7 and when the controller is in phase 3-7, there has been a detection on detector D7, and the timer value is greater than 0.0. When the controller enters the green interval for a phase that is not phase 3-7,it is set to 0.0 and the detector D7 is connected to phase 7 as the only detector. The timer value is decremented each time scan if it is greater than 0.0, and when it becomes less than or equal to 0.0, it is set to 0.0 and the detector D7A is connected to phase 7 as the only detector if the "Figure 7" option B (Option 11) is "YES" or the detector D7A is connected to phase 3 as the only detector if the "Figure 7" option B (Option 11) is "NO". See Ref 14 "Figure 7" note 4 alternate and overlay detectors - D7A. The "Figure 7" phase

1-6 advance green minimum timer value is initialized (special timer interval 9) when the controller is in phase 1-5 and enters the yellow change interval going to phase 1-6 and the "Figure 7" option A (Option 10) is "NO". In addition to initializing the timer value, hold is set true for phase 1 and phase 6 and State PC16 is set true. The timer value is decremented each time scan if it is greater than 0.0. When it becomes less than or equal to 0.0, it is set to 0.0, hold is set false for phase 1 and phase 6. See Ref 14 "Figure 7" note 3 phase sequence options - option A = OFF. The "Figure 7" phase 1-6 advance green maximum timer value is initialized (special timer interval 10) when the controller is in phase 1-5 and enters the yellow change interval going to phase 1-6 and the "Figure 7" option A (Option 10) is "NO". In addition to initializing the timer value, hold is set true for phase 1 and phase 6 and State PC16 is set true. When the controller enters the yellow change interval for phase 1-6 and State PC16 is true,it is set to 0.0 and State PC16 is set false. The timer value is decremented each time scan if it is greater than 0.0, and if it becomes less than or equal to 0.0, it is set to 0.0, State PC16 is set false, and select is set true for phase 1. See Ref 14 "Figure 7" note 3 phase sequence options - option A = OFF. The "Figure 7" phase 2-7 advance green timer value is initialized (special timer interval 11) when the controller enters the green interval for phase 2-7 and the "Figure 7" option B (Option 11) is "NO". In addition to initializing the timer value, hold is set true for phase 2 and phase 7 and State PC27 is set true. The timer value is decremented each time scan if State PC27 is true. When it becomes less than or equal to 0.0, it is set to 0.0, hold is set false for phase 2 and phase 7, State PC27 is set false, and select is set true for phase 7. See Ref 14 "Figure 7" note 3 phase sequence options - option B = OFF.

Detector Connections

The detector connections for detector D3, D13, D5, and D56 for "Figure 4", "Figure 6", and "Figure 7" are complicated and best described for each phase combination. The detector connections are set when the controller enters the green interval for a new phase. The options effecting the detector connections are Option 1 (enable/disable detector 3 during phase 3-7), Option 2 (enable/disable detector 13 during phase 3-7), Option 3 (enable/disable detector 5 during phase 2-5), and Option 4 (enable/disable detector 56 during phase 2-5). See Ref 14 note 4 I/O assignments.

For "Figure 4", the following table describes the detector connections for each phase combination. See Ref 14 "Figure 4" note 2 detector operation - D3, D13, D5, and D56. The abbreviation"opt" means that the detector connection is based on Option 1, Option 2, Option 3, or Option 4. For "Figure 6", the following table describes the detector connections for each phase combination. See Ref 14 "Figure 6" note 4 alternate and overlap detectors - D3, D13, D5, and D56. The abbreviation"opt" means that the detector connection is based on Option 1, Option 2, Option 3, or Option 4, and "ph1" means that the detector is connected to phase 1 while "ph6" means that the detector is connected to phase 6.

TABLE B-3. "FIGURE 4" DETECTOR CONNECTIONS

Phase	D3	D13	D5	D56
1-5	Yes	No	Yes	Yes
1-6	N/A	N/A	N/A	N/A
1-7	No	No	No	No
2-5	Yes	Yes	Opt	Opt
2-6	No	No	No	No
2-7	N/A	N/A	N/A	N/A
3-5	Yes	Yes	Yes	Yes
3-6	Yes	Yes	Yes	No
3-7	Opt	Opt	Yes	Yes

For "Figure 7", the following table describes the detector connections for each phase combination. See Ref 14 "Figure 7" note 4 alternate and overlap detectors - D3, D13, D5, and D56. The abbreviation "opt" means that the detector connection is based on Option 1, Option 2, Option 3, or Option 4, and "ph1" means that the detector is connected to phase 1 while "ph6" means that the detector is connected to phase 6.

The controller is called each time scan by SIMPRO after all vehicles have been processed for the time scan. During the time scan, detector actuations are noted by SIMPRO for vehicles on an inbound link or on an internal link. The controller has an initialization phase that is processed on the first execution only and then the controller is processed sequentially in 13 stages.

Controller Stages

A brief explanation of the controller stages is as follows. During the initialization stage, operations associated with initialization are performed. During Stage 1, the timers for the phases are incremented and decremented. During Stage 2, detector actuations are checked for each phase for each ring and special calls are made as necessary. During Stage 3, all appropriate special timer values are decremented and the actions taken when the special timer value becomes less than or equal to 0.0. During Stage 4, each ring is processed to check for gap out, max out, or time out. During Stage 5, the next phase is chosen after gap out, max out, or time out. During Stage 6, simgap is checked as required and the appropriate action taken. During Stage 7, the current phase for each ring is processed for the green interval and the controller enters the yellow change interval if necessary. During Stage 8, the current phase for each ring is processed for the yellow change interval and the controller enters the red clearance interval if necessary. During Stage 9, the current phase for each ring is processed for the red clearance interval and the controller enters the green interval for the next phase if necessary. During Stage 10, detector changes that have to be checked each time scan are

TABLE B-4. "FIGURE 6" DETECTOR CONNECTIONS

Phase	D3	D13	D5	D56
1-5	Yes	No	Yes	Yes
1-6	Yes	No	Yes	No
1-7	Yes	No	Yes	No
2-5	Yes	Phl	Opt	Opt
2-6	Yes	No	Yes	No
2-7	Yes	No	Yes	No
3-5	Yes	Yes	Yes	Yes
3-6	Yes	Yes	Yes	No
3-7	Opt	Opt	Yes	Ph6

TABLE B-5. "FIGURE 7" DETECTOR CONNECTIONS

Phase	D3	D13	D5	D56
1-5	Yes	No	Yes	Yes
1-6	Yes	No	Yes	No
1-7	Yes	No	Yes	No
2-5	Yes	Phl	Opt	Opt
2-6	Yes	No	Yes	No
2-7	Yes	No	Yes	No
3-5	Yes	Yes	Yes	Yes
3-6	Yes	Yes	Yes	No
3-7	Opt	Opt	Yes	Ph6

processed. During Stage 11, a new cam stack is made if necessary. During Stage 12, changes that have to be made upon entry into the green interval for a new phase are processed. During Stage 13, all detectors are set false.

During the initialization stage the current phase for each ring is set to the starting phase, the interval for each ring is set to green, the cam stack for each ring is positioned to the green interval for the current phase , the next phase number for each ring is set equal to 0, the time into the current phase for each ring is set to 0.0, the time remaining on the gap out timer for the current phase for each ring is set to the minimum interval for the phase, the max out timer for the current phase for each ring is set to an extremely large number, the cam stack for each ring is merged into one cam stack position, and the overlap cam stacks are checked and merged if necessary.

During Stage 1, the timers for the phases are incremented and decremented. The time into the current phase for each ring is incremented by the time scan value, the time remaining on the gap out timer for the current phase for each ring is decremented by the time scan value, simgap is set false, new cam stack is set false, new phase for each ring is set false, and the next phase number for each ring is set equal to 0.

During Stage 2, detector actuations are checked for each phase for each ring and special calls are made as necessary. System demand on red is determined; call is set true for a phase if there is detector actuation for the phase, the phase is the current phase for a ring, and the phase is in the yellow change or red clearance interval; and call is set true for a phase if there is detector actuation for the phase and the phase is not the current phase for a ring. For "Figure 3", if the controller is in phase 1-6, 3-6, or 1-5 and call is set true for phase 2 or phase 7 then call is set true for phase 3 and phase 5 (see Ref 14 "Figure 3" note 3.b phase sequence). For "Figure 3", if the controller is in phase 2-7 and call is true for phase 1 then call is set true for phase 6 (see Ref 14 "Figure 3" note 3.d phase sequence - during phase 2-7). For "Figure 3", if the controller is in phase 2-7 and call is true for phase 6 then call is set true for phase 1 (see Ref 14 "Figure 3" note 3.d phase sequence - during phase 2-7).

During Stage 3, all appropriate special timer values are decremented and the actions taken when the special timer value becomes less than or equal to 0.0.

During Stage 4, each ring is processed to check for gap out, max out, or time out. For "Figure 3", Stage 5 is processed within the Stage 4 ring loop. For "Figure 4", "Figure 6", and "Figure 7", Stage 5 is processed after Stage 4 is completed. If simgap is true then the controller skips to Stage 5. If a special timer interval has timed out, the controller branches to the section for processing a gap out or a max out. If select is true for the current phase and hold is true for the current phase then the controller skips to the next ring. Demand on red for the ring is processed next. If the current phase is in the yellow change or red clearance interval then the controller skips to the next ring. If there has been detector actuation for the current phase for the ring and the time into the phase for the current phase is greater than the initial interval for the current phase then the time remaining on the gap out timer for the current phase is set to the vehicle interval for the current phase for the ring and select is set false for the current phase. If demand on red for the ring is true and the max out timer for the current phase for the ring is equal to an extremely large number then the max out timer for the current phase for the ring is set to the maximum of the time into the phase for the current phase for the ring plus the maximum interval for the current phase for the ring and the minimum interval for the current phase for the ring. If the max out timer for the current phase for the ring is not equal to an extremely large number and the time remaining on the gap out timer for the current phase for the ring is less than or equal to 0.0 then the controller branches to the section for processing a gap out. If the time into the current phase for the ring is greater than or equal to the max out timer for the current phase for the ring then the controller branches to the section for processing a max out. If the time into the current phase for the ring is greater than or equal to the vehicle interval for the current phase for the ring and there has been detector actuation for the current phase for the ring then call is set false for the current phase. The controller then skips to the next ring.

If gap out has occurred for the current phase for the ring then the following actions are taken. If select is already true for the current phase for the ring then the controller skips to the last paragraph for Stage 4. If there have been detector actuations for the current phase for the ring then the controller branches to the section for processing a max out. This test is made so that a time out will be counted as a gap out if there is no demand remaining for the phase or will be counted as a max out if there is demand remaining for the phase. If the time into the simulation is greater than the start-up simulation time then the total number of gap outs for the current phase for the ring is incremented by 1 and the time into the current phase for the ring is added to the total time into the current phase for gap outs for the ring. The controller then skips to the last paragraph for Stage 4.

If max out has occurred for the current phase for the ring then the following actions are taken. If select is already true for the current phase for the ring then the controller skips to the last paragraph for Stage 4. If the time into the simulation is greater than the start-up simulation time then the total number of max outs for the current phase for the ring is incremented by 1 and the time into the current phase for the ring is added to the total time into the current phase for max outs for the ring. The controller then skips to the last paragraph for Stage 4. For the final operation for Stage 4, select is set true for the current phase for the ring and call is set false for the current phase.

During Stage 5, the next phase is chosen after gap out, max out, or time out. Stage 5 for "Figure 3" is processed only if select is true for the current phase for the ring. If the current phase for any ring is in the yellow change or red clearance interval then the controller skips to the next ring. If hold is true for the current phase for the ring then the controller skips to the next ring.

If (1) phase 2-7 is not the current phase combination, (2) phase 2-7 is the current phase combination, phase 2 is the current phase for the ring, and Option 5 is "NO", or (3) phase 2-7 is the current phase combination, phase 7 is the current phase for the ring, and Option 6 is "NO", then the controller uses the normal clear-to sequence meaning that phase 1 can clear to phase 3, phase 2 can clear to phases 1 and 3, phase 3 can clear to phases 2 and 1, phase 5 can clear to phases 7 and 6, phase 6 can clear to phase 5, and phase 7 can clear to phases 6 and 5.

If (1) phase 2-7 is the current phase combination, phase 2 is the current phase for the ring, and Option 5 is "YES" or (2) phase 2-7 is the current phase combination, phase 7 is the current phase for the ring, and Option 6 is "YES", then the controller uses the reverse clear-to sequence meaning that phase 1 can clear to phase 3, phase 2 can clear to phases 3 and 1, phase 3 can clear to phases 1 and 2, phase 5 can clear to phases 6 and 7, phase 6 can clear to phase 5, and phase 7 can clear to phases 5 and 6.

If call is true for a phase to which the current phase for the ring can clear, the new phase combination is allowed, and the current phase combination is allowed to clear directly to the new phase combination, then the controller sets the next phase for the ring to the phase and the controller skips the the next ring.

If there is no demand for any phase to which the controller can clear and system demand on red is true then (1) if the controller is in phase 2-7, phase 3-7 after phase 2-7, phase 1-7, phase 2-5 after phase 2-7, or phase 2-6 then if the current phase for the ring is not phase 1 then call is set true for phase 1 and if the current phase for the ring is not phase 6 then call is set true for phase 6, (2) if the controller is in phase 3-5, phase 3-7 after phase 3-5, or phase 2-5 after phase 3-5 then if the current phase for the ring is not phase 2 then call is set true for phase 2 and if the current phase for the ring is not phase 7 then call is set true for phase 7, (3) if the controller is in phase 1-6, 3-6, or 1-5 then if the current phase for the ring is not phase 3 then call is set true for phase 3 and if the current phase for the ring is not phase 5 then call is set true for phase 5, and (4) the controller skips the the next ring. This action may cause call to be set true for a phase in the other ring to eventually move the controller in the preferential sequence order to a phase combination which will service the demand.

Stage 5 for "Figure 4", "Figure 6", and "Figure 7" is processed only if select is true for the current phase for one of the rings or for both rings. If the current phase for any ring is in the yellow change or red clearance interval then the controller skips to Stage 6. If select is true for the current phase of only one ring then the following operations are performed. If hold is true for the current phase in the ring that is in select then the controller skips to Stage 6. If the controller is in a clearance phase then (a) the next phase number for the ring that is in select is set to the destination phase number for the ring that is in select and (b) the controller skips to Stage 6.

If (a) call is true for a phase to which the current phase combination can clear, and the phase is in the same ring that is in select and (b) the current phase in the ring that is not in select is equal to the phase to which the current phase combination can clear, and the phase is in the ring that is not in select then (a) the next phase number for the ring that is in select is set to the phase to which the current phase combination can clear, and (b) the controller skips to Stage 6.

If (a) there is no demand for any phase to which the controller can clear, and (b) system demand on red is true then (a) if the current phase in ring 1 is not equal to the phase in ring 1 for the preferential sequence then call is set true for the phase in ring 1 for the preferential sequence, (b) if the current phase in ring 2 is not equal to the phase in ring 2 for the preferential sequence then call is set true for the phase in ring 2 for the preferential sequence, and (c) the controller skips to Stage 6.

If (a) there is no demand for any phase to which the controller can clear, (b) system demand on red is false, and

(c) rest is true for the current phase combination then the controller skips to Stage 6.

If select is true for the current phase of both rings then the following operations are performed. If hold is true for the current phase in either ring then the controller skips to Stage 6. If the controller is in a clearance phase then (a) the next phase number for each ring is set to the destination phase number for the ring and (b) the controller skips to Stage 6.

If (a) the phase in ring 1 to which the current phase combination can clear is not equal to the current phase in ring 1, (b) the phase in ring 2 to which the current phase combination can clear is not equal to the current phase in ring 2, (c) call is true for the phase in ring 1 to which the current phase combination can clear , and (d) call is true for the phase in ring 2 to which the current phase combination can clear, then (a) if there is no clearance phase defined, the next phase number for each ring is set to the phase to which the current phase combination can clear, or if there is a clearance phase defined then the next phase number for each ring is set to the clearance phase and the destination phase is set to the phase to which the current phase combination can clear, and (b) the controller skips to Stage 6.

If (a) the phase in ring 1 to which the current phase combination can clear, is not equal to the current phase in ring 1 and (b) call is true for the phase in ring 1 to which the current phase combination can clear, then (a) the next phase number for ring 1 is set to the phase to which the current phase combination can clear, and (b) the controller skips to Stage 6.

If (a) the phase in ring 2 to which the current phase combination can clear, is not equal to the current phase in ring 2 and (b) call is true for the phase in ring 2 to which the current phase combination can clear, then (a) the next phase number for ring 2 is set to the phase to which the current phase combination can clear, and (b) the controller skips to Stage 6.

If (a) there is no demand for any phase to which the controller can clear, and (2) system demand on red is true then (a) if the current phase in ring 1 is not equal to the phase in ring 1 for the preferential sequence then call is set true for the phase in ring 1 for the preferential sequence, (b) if the current phase in ring 2 is not equal to the phase in ring 2 for the preferential sequence then call is set true for the phase in ring 2 for the preferential sequence, and (c) the controller skips to Stage 6. If (a) there is no demand for any phase to which the controller can clear, (b) system demand on red is false, and (c) rest is true for the current phase combination then the controller skips to Stage 6.

During Stage 6 for the controller, simgap is checked as required and the appropriate action taken. For "Figure 3", if (a) the "Figure 3" phase 3-5 clearance green timer setting (special timer interval 12) is equal to 99.0, (b) State PC35 is true, (c) select is true for phase 3, and (d) select is true for phase 5, then (a) hold is set false for phase 3, (b) hold is set false for phase 5, (c) State PC35 is set false, (d) simgap is set true, and (e) the controller goes back to the start of Stage 4 (see Ref 14 "Figure 3" note 3.e phase sequence).

For "Figure 6", if (a) the "Figure 6" option A (Option 7) is "NO", (b) State PC36 is true, (c) select is true for phase 3, and (d) select is true for phase 6, then (a) hold is set false for phase 3, (b) hold is set false for phase 6, (c) State PC36 is set false, (d) simgap is set true, and (e) the controller goes back to the start of Stage 4 (see Ref 14 "Figure 6" note 3 phase sequence options - option A = OFF). For "Figure 7", if (a) the "Figure 7" option A (Option 10) is "NO", (b) State PC15 is true, (c) select is true for phase 1, and (d) select is true for phase 5, then (a) hold is set false for phase 1, (b) hold is set false for phase 5, (c) State PC15 is set false, (d) simgap is set true, and (e) the controller goes back to the start of Stage 4 (see Ref 14 "Figure 7" note 3 phase sequence options - option A = OFF).

During Stage 7, the current phase for each ring is processed for the green interval and the controller enters the yellow change interval if necessary. If the next phase number is equal to 0 (the current phase for the ring has not gaped out, maxed out, or timed out or the current phase for the ring has gaped out, maxed out, or timed out but the next phase has not been chosen therefore stay in the green interval) then the controller skips to the next ring. If the next phase number is not equal to 0 (the current phase in the ring has gaped out, maxed out, or timed out and the next phase has been chosen therefore enter the yellow change interval) then next is set true for the next phase number, the max out timer for the current phase for the ring is set to an extremely large number, select is set false for the current phase, if the gap out timer for the current phase for the ring is greater than 0.0 (max out has occurred) then call is set true for the current phase, the gap out timer for the current phase for the ring is set to the yellow change interval for the current phase for the ring, the cam stack is positioned to the yellow change interval for the current phase, new cam stack is set true, and the interval for the current phase is set to yellow change.

For "Figure 3", (a) if the controller is in phase 2-7 or 3-7 and the next phase is 1-7 then the "Figure 3" phase 1-7 advance green timer (special timer interval 2) is started by initializing the "Figure 3" phase 1-7 advance green timer value to the "Figure 3" phase 1-7 advance green timer setting, hold is set true for phase 1, and hold is set true for phase 7 (see Ref 14 "Figure 3" diamond operation note 2 intervals and timers - interval 2) and (b) if the controller is in phase 2-7 or 2-5 and the next phase is 2-6 then the "Figure 3" phase 2-6 advance green timer (special timer interval 3) is started by initializing the "Figure 3" phase 2-6 advance green timer value to the "Figure 3" phase 2-6 advance green timer setting, hold is set true for phase 2, and hold is set true for phase 6 (see Ref 14 "Figure 3" diamond operation note 2 intervals and timers - interval 3).

For "Figure 4", (a) if the controller is in phase 3-7, the next phase is phase 1-7, call is true for phases 2, 3, 5, and 6 then the "Figure 4" phase 1-7 advance green timer (special timer interval 2) is started by initializing the "Figure 4" phase 1-7 advance green timer to its setting, hold is set true for phase 1, and hold is set true for phase 7 (see Ref 14 "Figure 4" diamond operation note 2 intervals and timers - interval 2) and (b) if the controller is in phase 2-5, the next phase is phase 2-6, call is true for phases 1, 3, 5, and 7, then the "Figure 4" phase 2-6 advance green timer is started by initializing it to its setting, hold is set true for phase 2, and hold is set true for phase 6 (see Ref 14 "Figure 4" diamond operation note 2 intervals and timers - interval 3).

For "Figure 6", (a) if State PC16 is true then the "Figure 6" phase 1-6 advance green maximum timer (special timer interval 7) is cancelled by setting it to 0.0 and State PC16 is set false (see Ref 14 "Figure 6" note 3 phase sequence options - option A = OFF), (b) if the controller is in phase 3-6, the next phase is phase 1-6, and the "Figure 6" option A (Option 7) is "NO", then the "Figure 6" phase 1-6 advance green minimum timer (special timer interval 6) is started by initializing it, the "Figure 6" phase 1-6 advance green maximum timer (special timer interval 7) is started by initializing it, hold is set true for phase 1, and hold is set true for phase 6 (see Ref 14 "Figure 6" note 3 phase sequence options - option A = OFF), and (c) if the controller is in phase 3-7, the next phase is phase 1-7, and the "Figure 6" option C (Option 9) is "YES", then the "Figure 6" phase 1-7 advance green timer (special timer interval 2) is started by initializing it, hold is set true for phase 1, and hold is set true for phase 7 (see Ref 14 "Figure 6" note 3 phase sequence options - option C = ON).

For "Figure 7", (a) if State PC16 is true then the "Figure 7" phase 1-6 advance green maximum timer (special timer interval 10) is cancelled by setting it to 0.0 and State PC16 is set false (see Ref 14 "Figure 7" note 3 phase sequence options - option A = OFF), (b) if the controller is in phase 1-5, the next phase is phase 1-6, and the "Figure 7" option A (Option 10) is "NO", then the "Figure 7" phase 1-6 advance green minimum timer (special timer interval 9) is initialized, the "Figure 7" phase 1-6 advance green maximum timer (special timer interval 10) is initialized, hold is set true for phase 1, and hold is set true for phase 6 (see Ref 14 "Figure 7" note 3 phase sequence options - option A = OFF), and (c) if the controller is in phase 2-5, the next phase is 2-6, and the "Figure 7" option C (Option 9) is "YES", then the "Figure 7" phase 2-6 advance green timer (special timer interval 3) is initialized, hold is set true for phase 2, and hold is set true for phase 6 (see Ref 14 "Figure 7" note 3 phase sequence options - option C = ON).

During Stage 8, the current phase for each ring is processed for the yellow change interval and the controller enters the red clearance interval if necessary. If the gap out timer for the current phase is greater than 0.0, the controller skips to the next ring. If the gap out timer for the current phase is less than or equal to 0.0, the gap out timer for the current phase is set to the red clearance change interval for the current phase, the cam stack is positioned to the red clearance interval for the current phase, new cam stack is set true, and the interval for the current phase is set to red clearance.

During Stage 9, the current phase for each ring is processed for the red clearance interval and the controller enters the green interval for the next phase if necessary. If the gap out timer for the current phase for the ring is greater than 0.0 then the controller skips to the next ring. If the gap out timer for the current phase is less than or equal to 0.0 then the current phase for the ring is set to the next phase, the time into the current phase for the ring is set to 0.0, the gap out timer for the current phase is set to the minimum interval for the current phase for the ring, the cam stack is positioned to the green interval for the current phase for the ring, demand on red is set false for the current phase for the ring, call is set false for the current phase for the ring, next is set false for the current phase , the next phase number is set to 0 for the current phase for the ring, new cam stack is set true, new phase is set true, and the interval for the current phase is set to green.

During Stage 10, detector changes that must be checked each time scan are processed. For "Figure 4", (a) if the controller is in phase 2-5, call is true for phase 3, call is true for phase 6, and the "Figure 4" phase 2 transfer gap timer value (special timer interval 4) is equal to 0.0 then the "Figure 4" phase 2 transfer gap timer is started by initializing it (see Ref 14 "Figure 4" note 2 detector operation - D2 & D2A) and (b) if the controller is in phase 3-7, call is true for phase 1, call is true for phase 5, and the "Figure 4" phase 7 transfer gap timer value (special timer interval 5) is equal to 0.0 then the "Figure 4" phase 7 transfer gap timer is initialized (see Ref 14 "Figure 4" note 2 detector operation - D7 & D7A).

During Stage 11, a new cam stack is made if necessary. If new cam stack is true then the old cam stack pointer is set to the new cam stack pointer, a new cam stack is made in the new cam stack pointer position by merging the cam stack entries for the current interval for the current phase in ring 1 and the cam stack entries for the current interval for the current phase in ring 2, and the overlap cam stack entries are merged if necessary.

During Stage 12, changes that have to be made upon entry into the green interval for a new phase are processed. If new phase is true for ring 1 or ring 2 then the following operations are performed.

For "Figure 3", the following operations are performed. State PC17 is set false and if the controller is in phase 1-7 then State PC17 is set true. State PC25 is set false and if the controller is in phase 2-5 and the old phase is phase 3-5 then hold is set true for phase 2 and State PC25 is set true. State PC37 is set false and if the controller is in phase 3-7 and the old phase is 3-5 then hold is set true for phase 7 and State PC37 is set true. State PC26 is set false and if the controller is in phase 2-6 then State PC26 is set true. State PC27 is set false and if the controller is in phase 2-7 then (a) hold is set true for phases 2 and 7, and State PC27 is set true (see Ref 14 "Figure 3" note 3.c phase sequence) and (b) if call is true for phase 1 then call is set true for phase 6 and if call is true for phase 6 then call is set true for phase 1 (see Ref 14 "Figure 3" note 3.d phased sequence). State PC35 is set false and if the controller is in phase 3-5 then (a) if the "Figure 3" phase 3-5 clearance green timer setting (special timer interval 12) is not equal to 99.0 then it is initialized, and (b) hold is set true for phases 3, and 5, and State PC35 is set true (see Ref 14 "Figure 3" note 3.e phase sequence). State PC1536 is set false and if the controller is in phases 1-5 or 3-6, then State PC1536 is set true. If the controller is in phase 1-6 then State PC1737 is set false and State PC2526 is set false. If the controller is in phases 1-7 or 3-7 and the old phase is 2-7 then State PC1737 is set true. If the controller is in phases 2-5 or 2-6 and the old phase is 2-7 then State PC2526 is set true. If the controller is in phase 2, then the number of detectors for phase 3 is set to 2 so that detectors D3 and D13 are connected, else the number of detectors for phase 3 is set to 1 so that detector D3 is connected (see Ref 14 "Figure 3" note 1 detectors - D13). If the controller is in phase 7 then the number of detectors for phase 5 is set to 2 so that detectors D5 and D56 are connected else the number of detectors for phase 7 is set to 1 so that detector D5 is connected (see Ref 14 "Figure 3" note 1 detectors - D56). If the controller is in phases 1-6, 3-6, or 1-5, and call is true for phase 2 or 7 then call is set true for phases 3 and 5 (see Ref 14 "Figure 3" note 3.b phase sequence).

For "Figure 4", the following operations are performed. State PC17 is set false and if the controller is in phase 1-7 then State PC17 is set true. State PC26 is set false and if the controller is in phase 2-6 then State PC26 is set true. State PC35 is set false and if the controller is in phase 3-5 then the "Figure 4" phase 3-5 clearance green timer (special timer interval 1) is initialized, hold is set true for phase 3, hold is set true for phase 5, and State PC35 is set true (see Ref 14 "Figure 4" note 1 phase sequence). If the controller is in phase 3-6 then the "Figure 4" phase 2 transfer gap timer (special timer interval 4) is cancelled by setting it to 0.0 and the detector D2 is connected to phase 2 as the only detector (see Ref 14 "Figure 4" note 2 detector operation - D2 & D2A). If the controller is in phase 1-5 then the "Figure 4" phase 7 transfer gap timer (special timer interval 5) is cancelled by setting it to 0.0 and the detector D7 is connected to phase 7 as the only detector (see Ref 14 "Figure 4" note 2 detector operation - D7 & D7A).

The following table describes the detector connections made for each phase combination. See Ref 14 "Figure 4" note 2 detector operation - D3, D13, D5, and D56. "opt" means that the detector connection is based on Options 1, 2, 3, or 4.

TABLE B-6. DETECTOR CONNECTIONS AND PHASE COMBINATIONS UNDER "FIGURE 4" OPERATION

Phase	D3	D13	D5	D56
1-5	Yes	No	Yes	Yes
1-6	N/A	N/A	N/A	N/A
1-7	No	No	No	No
2-5	Yes	Yes	Opt	Opt
2-6	No	No	No	No
2-7	N/A	N/A	N/A	N/A
3-5	Yes	Yes	Yes	Yes
3-6	Yes	Yes	Yes	No
3-7	Opt	Opt	Yes	Yes

The following operations are performed during "Figure 6" operation. State PC17 is set false and if the controller is in phase 1-7 then State PC17 is set true (see Ref 14 "Figure 6" note 3 phase sequence options - option C = ON). If the controller is in phase 2-5 then the "Figure 6" phase 2 transfer gap timer (special timer interval 4) is initialized and if the controller is not in phase 2-5 then the "Figure 6" phase 2 transfer gap timer (special timer interval 4) is cancelled by setting it to 0.0 and the detector D2 is connected to phase 2 as the only detector (see Ref 14 "Figure 6" note 4 alternate and overlap detectors - D2A). State PC27 is set false and if the controller is in phase 2-7 and the "Figure 6" option B (Option 8) is "NO" then the "Figure 6" phase 2-7 advance green timer (special timer interval 8) is initialized, hold is set true for phases 2, and 7, and State PC27 is set true (see Ref 14 "Figure 6" note 3 phase sequence options - option B = OFF). State PC35 is set false and if the controller is in phase 3-5 and the next phase is phase 1-5 then the "Figure 6" phase 3-5 clearance green timer (special timer interval 1) is initialized, hold is set true for phases 3, and 5, and State PC35 is set true (see Ref 14 "Figure 6" note 3 phase sequence options - option C = OFF). If the controller is in phase 3-6 and the "Figure 6" option A (Option 7) is "NO" then hold is set true for phases 3, and 6, and State PC36 is set true (see Ref 14 "Figure 6" note 3 phase sequence options - option A = OFF). If the controller is in phase 3-7, if the "Figure 6" option C (Option 9) is "ON", call is true for phase 1, and call is false for phase 6 then the "Figure 6" phase 7 transfer gap timer (special timer interval 5) is initialized, and if the controller is not in phase 3-7 then the "Figure 6" phase 7 transfer gap timer (special timer interval 5) is cancelled by setting it to 0.0, and the detector D7 is connected to phase 7 as the only detector (see Ref 14 "Figure 6" note 4 alternate and overlap detectors - D7 & D7A).

The following table describes the detector connections made for each phase combination. See Ref 14 "Figure 6" note 4 alternate and overlap detectors - D3, D13, D5, and D56. "opt" means that the detector connection is optional bases on Option 1, Option 2, Option 3, or Option 4. "ph1" means that the detector is connected to phase 1 while "ph6" means that the detector is connected to phase 6.

For "Figure 7", the following operations are performed. If the controller is in phase 1-5 and the "Figure 7" option A (Option 10) is "NO" then hold is set true for phases 1, and 5,

TABLE B-7. DETECTOR CONNECTIONS AND PHASE COMBINATIONS UNDER "FIGURE 6" OPERATION

Phase	D3	D13	D5	D56
1-5	Yes	No	Yes	Yes
1-6	Yes	No	Yes	No
1-7	Yes	No	Yes	No
2-5	Yes	Ph1	Opt	Opt
2-6	Yes	No	Yes	No
2-7	Yes	No	Yes	No
3-5	Yes	Yes	Yes	Yes
3-6	Yes	Yes	Yes	No
3-7	Opt	Opt	Yes	Ph6

TABLE B-8. DETECTOR CONNECTIONS AND PHASE COMBINATIONS UNDER "FIGURE 7" OPERATION

Phase	D3	D13	D5	D56
1-5	Yes	No	Yes	Yes
1-6	Yes	No	Yes	No
1-7	Yes	No	Yes	No
2-5	Yes	Ph1	Opt	Opt
2-6	Yes	No	Yes	No
2-7	Yes	No	Yes	No
3-5	Yes	Yes	Yes	Yes
3-6	Yes	Yes	Yes	No
3-7	Opt	Opt	Yes	Ph6

and State PC15 is set true (see Ref 14 "Figure 7" note 3 phase sequence options - option A = OFF). If the controller is in phase 2-5, if the "Figure 7" option C (Option 12) is "ON", call is true for phase 6, and call is false for phase 1 then the "Figure 7" phase 2 transfer gap timer (special timer interval 4) is initialized and if the controller is not in phase 2-5 then the "Figure 7" phase 2 transfer gap timer (special timer interval 4) is cancelled by setting it to 0.0 and the detector D2 is connected to phase 2 as the only detector (see Ref 14 "Figure 7" note 4 alternate and overlap detectors - D2 & D2A). State PC26 is set false and if the controller is in phase 2-6 then State PC26 is set true (see Ref 14 "Figure 7" note 3 phase sequence options - option C = ON). State PC27 is set false and if the controller is in phase 2-7 and the "Figure 7" option B (Option 11) is "NO" then the "Figure 7" phase 2-7 advance green timer (special timer interval 11) is initialized , hold is set true for phases 2, and 7, and State PC27 is set true (see Ref 14 "Figure 7" note 3 phase sequence options - option B = OFF). State PC35 is set false and if the controller is in phase 3-5 and the next phase is 3-6, then the "Figure 7" phase 3-5 clearance green timer (special timer interval 1) is started by initializing it, hold is set true for phase 3, hold is set true for phase 5, and State PC35 is set true (see Ref 14 "Figure 7" note 3 phase sequence options - option C = OFF). If the controller is in phase 3-7 then the "Figure 7" phase 7 transfer gap timer (special timer interval 5) is initialized and if the controller is not in phase 3-7 then the "Figure 7" phase 7 transfer gap timer (special timer interval 5) is cancelled by setting it to 0.0 and the detector D7 is connected to phase 7 as the only detector (see Ref 14 "Figure 7" note 4 alternate and overlap detectors - D7A).

The following table describes the detector connections made for each phase combination. See Ref 14 "Figure 7" note 4 alternate and overlap detectors - D3, D13, D5, and D56. The abbreviation"opt" means that the detector connection is based on Option 1, through 4, and "ph1" means that the detector is connected to phase 1 while "ph6" means that the detector is connected to phase 6.

During Stage 13, all detectors are set false. To make a new cam stack, the controller merges the cam stack position of the current interval for the current phase in ring 1 with the cam stack position of the current interval for the current phase in ring 2 into the new can stack position. If Overlap A is active then the controller merges the cam stack position of the current interval for Overlap A with the new cam stack position into the new cam stack position. If Overlap B is active then the controller merges the cam stack position of the current interval for Overlap B with the new cam stack position into the new cam stack position. To merge a cam stack, the controller takes the signal indication three-character code (a number between 1 and 26) for each lane for the current interval for the first phase, takes the signal indication three-character code for each lane for the current interval for the second phase, and performs a table look-up to arrive at the merged signal indication three-character code. The table was developed by (a) breaking each signal indication three-character code into the signal indication (green, yellow, red, and protected green) for a left turn, a straight movement, and a right turn, (b) merging the signal indications for each turn type independently by applying the precedence order of (1) protected green, (2) green, (3) yellow, and (4) red, and (c) assigning the resultant merged signal indication to the proper signal indication three-character code.

To determine if an overlap is active, the controller uses the following procedures. The overlap is green when (1) any phase on the definition list is green or (2) any phase on the definition list is in yellow change and any phase on the definition list is the next phase. The overlap is yellow change when any phase on the definition list is yellow change and no phase on the definition list is green. The overlap is inactive (red) when the overlap is not green and overlap is not yellow change.

APPENDIX C

TEXAS Model For Intersection Traffic Version 3.0 [Diamond Interchanges]

INSTALLATION INSTRUCTIONS

AND

PRIMER

Note: Some information contained herein does not appear in the user's Guide. File this pamphlet with the Guide* for future reference.*

*"The TEXAS Model Version 3.0 [Diamond Interchanges] Guide to Data Entry." Appendix A to Center for Transportation Research Report Number 443-1F, The University of Texas at Austin, August 1989.

Introduction

This pamphlet has been prepared as a supplement to the user's Guide and provides important instructions for installation and use of the TEXAS Model for Intersection Traffic. The document is composed of five sections which address 1) installation of the system on micro-computers equipped with fixed disks, 2) the use of example data files provided in the installation package, 3) coding and running of example case study problems, and 4) documentation for the animated screen graphics system, and 5) FORTRAN run-time errors.

Sections 1 through 3 essentially constitute a primer for TEXAS Model users. All users must work carefully through Section 1 in order to successfully install the package on fixed-disk-equipped micro-computers. Working through at least one of the example data sets of Section 2 and at least one of the example coding problems of Section 3 is strongly advised.

Table of Contents

Section 1

TEXAS Model Fixed Disk Installation Instructions

Note: Successful utilization of the TEXAS Model Version 3.0 will require the following hardware:

1. IBM-PC or compatible computer, equipped with fixed disk, and running under DOS 3.1 or greater, and 640 K of RAM.
2. Math co-processor.
3. Graphics adaptor for your monitor, either IBM VGA, color, or enhanced color graphics adaptor or compatible.

These instructions are written assuming that your computer has been switched "on" and you have responded to the DOS prompts for time and date. Now you must follow the step-by-step instructions below:

1. Insert in drive A: the diskette labeled "TEXAS_MDL_1".

2. Type **A:INSTALL**.

NOTE: The installation program will begin installing on drive C:, which is normally your fixed disk. If you have more than one fixed disk and wish to install TEXAS on your second fixed disk, which is known to DOS as drive D:, type **A:INSTALLD** instead of **A:INSTALL**. Batch file will always go in C:\BATCH.

3. Obey the screen prompts and insert diskettes 2 through 6 and EXAMPLES when directed. Then remove the EXAMPLES disk from drive A.

4. At the end of the automatic installation procedure, you will see a screen prompt reminding you that certain modifications or additions must be made to your CONFIG.SYS and AUTOEXEC.BAT files. You can make those modifications in the following manner:

a. Your CONFIG.SYS file must contain statements specifying that the number of buffers and files which can be concurrently used is 20. If you have a CONFIG.SYS file, it will be located in your root directory. To examine and edit it as necessary follow these instructions:

a.1. Type the command **CD C:** which changes the current directory to the root directory, then type **TYPE CONFIG.SYS** which will cause the CONFIG.SYS file to be displayed on the screen if it exists.

a.2. If the CONFIG.SYS file is displayed skip to item a.5.

a.3. If no CONFIG.SYS file is displayed and text appears telling you that the file could not be found, execute a.1 again to be sure it does not exist.

a.4. If you have confirmed that no CONFIG.SYS file exists, you must create one. You can do this with any text editor, including the DOS line editor called Edlin. To accomplish the task with Edlin, type **EDLIN CONFIG.SYS** which loads Edlin into memory and tells it to create a new file called CONFIG.SYS. Then type **I** for insert, then at the prompt, type **BUFFERS=20** followed by a carriage return then type **FILES=20** followed by a carriage return, followed by holding down the **Ctrl** key and pressing the **Break** key which ends the insert mode. Then type **E** which ends your Edlin session and saves the new file. Skip to item b.

a.5. If your CONFIG.SYS file does appear on the screen, examine it to see if it contains the following two lines:

BUFFERS = 20
FILES = 20

If it contains both BUFFER and FILE statements, and the numbers to the right of the equal sign are 20, your file is okay, no modification is necessary. SKIP TO ITEM b.

a.6. If your CONFIG.SYS file does appear but does not contain either of the two lines shown in item a.5 or if the either of the numbers is less than 20, you must edit the file. You can do this with any text editor, or you can use the DOS line editor called Edlin. To edit your file using Edlin, type **EDLIN CONFIG.SYS** which will load Edlin and your file into memory. Then type **L** which will cause your file to be displayed on the screen with line numbers. Note the line number of the line(s) to be edited and type the number of the first line you wish to edit. The line whose number you typed will be displayed with the line number and another copy of the line number and a colon. It will appear like this if line 2 contained the BUFFERS statement and you typed **2**

2:BUFFERS=6

2:

Now type the correct statement after the colon like this:

2:BUFFERS=6

2:**BUFFERS=20**

End your instruction with a carriage return and proceed to modify the other line(s) as necessary. Refer to item a.4 if you have forgotten what the two lines should specify.

If you need to add a line to your CONFIG.SYS file, instead of typing the line number of the line to be edited, type **#I** for " Insert after last line", followed by a carriage return and enter the required line(s). To leave the insert mode, hold down the **Ctrl** key and while holding it down, press the **Break** key.

When you have finished inserting or editing, type **E** which will exit Edlin and save your file.

b. Now you must enter or modify your PATH command in your AUTOEXEC.BAT file. You can do this with any chosen editor, or use the DOS resident line editor called Edlin. If you wish to use Edlin, type **EDLIN AUTOEXEC.BAT** which loads Edlin and your AUTOEXEC.BAT file into memory. Then type **L** which will cause your AUTOEXEC.BAT file to be displayed on the screen. Examine the file and search for a line that begins with the characters PATH. If it is present, do as you did in item a. above; type the line number of the line containing the PATH specification. On the second line of the display, after the colon, type all characters exactly as they appear on the top line followed by **;C:\BATCH** followed by a carriage return, followed by **E** which ends the Edlin session and saves your AUTOEXEC.BAT file. If you have no existing path command in your AUTOEXEC.BAT file, and are still using Edlin, type **#I** for "Insert after last line". Then type **PATH C:\BATCH;C:** <u>if DOS is located in your root directory</u>. If DOS is <u>not</u> located in your root directory but it is in a subdirectory, type **PATH C:\BATCH;C:** <u>with the name of the subdirectory following the last backslash and no spaces</u>. Then type **E** to end your Edlin session and save your AUTOEXEC.BAT file.

NOTE: Some application programs like IBM's Fixed Disk Organizer do not allow anything in the AUTOEXEC.BAT file except the commands that it uses and will replace your PATH command the next time you boot your system. If this happens to you, there are several options which can solve the problem. First, you can enter the PATH command directly from DOS just before you enter the TEXAS modeling system. The PATH specification will be in effect until you remove power or reboot the system. The second option could consist of putting your PATH specification into a batch file that you name and executing that batch file before entering the TEXAS Modeling system. This technique offers the advantage of requiring that you remember only a simple batch file name rather than the entire PATH command.

5. This completes installation of the TEXAS modeling system. You must now re-boot your system to cause your specifications for CONFIG.SYS and AUTOEXEC.BAT to become effective. This can be accomplished by holding down the **Ctrl** and **Alt** keys and pressing the **Del** key. Once the system is re-booted you may enter the TEXAS Modeling System by typing **GDVDATA** to enter the first of the pre-processors.

Happy Computing!!

Section 2

USE OF EXAMPLE DATA FILES
PROVIDED IN THE **TEXAS** MODEL
INSTALLATION PACKAGE

Demonstration Graphics Files

One of the significant capabilities of the TEXAS Modeling System is the ability to view a simulated intersection operation through animated screen graphics. If this capability is of interest, a quick demonstration might be very desirable. Three demonstration data files have been provided so that you can see the animated graphics in action before learning more about the total system.

If you have completed the installation process as described in the installation instructions you are ready to view the demonstration graphics. This can be accomplished through execution of the following instructions:

1. First, you must determine the type of graphics adapter and monitor you have available for use with the demonstration. If you don't already know, you can type **VIDEOCHK** which is the name of a program which has been installed with the rest of the system. VIDEOCHK will report the type(s) of graphics adapter(s) and monitor(s) which are currently installed.

2. Next, insert in drive A: the diskette labeled TEXAS_MDL_DISPLAY. This diskette contains four files named DISDAT.CG, DISDAT.EG, DISDAT.EGM, and DISDAT.VGA. In each case the DISDAT portion of the file name identifies the files as animated graphics display files and the suffixes identify the type of hardware for which the file has been prepared. The file with suffix CG has been prepared to run on a machine equipped with IBM or compatible color graphics adapter and monitor, while the EG is for IBM or compatible enhanced graphics adapter and color monitor, EGM is for enhanced graphics adapter and monochrome monitor and VGA is for VGA monitor and adapter. The demonstration files can be expected to operate reliably <u>only</u> on one of these adapter-monitor combinations.

3. Having identified your hardware type in step 1, you are almost ready to view the demonstration. <u>If you have more than one graphics adapter and or more than one monitor connected to your system, be sure to execute whatever hardware or software actions are necessary to make the chosen adapter-monitor combination become your active adapter-monitor combination.</u> Now type **DISPRO A:DISDAT.CG** if you have IBM or compatible color graphics adapter and monitor, or **DISPRO A:DISDAT.EG** if you have IBM or compatible enhanced graphics adapter and color monitor, etc.

4. The animated graphics screen demonstration will appear on the selected monitor and will have a duration of approximately 2 1/2 minutes. You may view it again by typing DISPRO and you may pause and restart the action by pressing any key. You may also press **S** to pause and restart after single updates.

Example Data Sets

Example files containing both input and output data have been provided for six typical simulation problems. Four of the example problems consist of four leg intersections controlled by two-way stop signs, semi-actuated signals, three-phase pre-time signals, and three-phase pre-time signals with permissive left-turns. Examples 1 and 2 are the two parts of a before and after study in which an intersection with the same traffic and geometrics, is controlled first by two-way stop signs and then by a semi-actuated signal. Examples 3 and 4 are likewise the parts of a before and after study in which an intersection with the same traffic and geometrics is first controlled by three-phase pre-time signals with protected-only left turns and then protected-permissive left turns. Examples 5 and 6 are diamond interchanges with four phase pretimed signalization. Example 6 includes overlap signal intervals while 5 does not.

Pre-processor input files have been installed on your fixed disk if you have followed the instructions for fixed disk installation. Output files for the six examples produced by the pre-processors and the basic model processors themselves have been included on a diskette labeled TEXAS_MDL_E of the installation package.

New users of the TEXAS Modeling System can familiarize themselves with the operation of the system without being required to generate any input data by executing the following sequence of commands:

1. After following the instructions for installing the package, enter the system by typing TEXAS. The Texas Model banner will appear with a prompt to "Strike a key when ready". Next the menu screen will appear with the standard DOS prompt at the bottom. The menu screen provides a description of each of the model processors and helps guide the user through the system. At the DOS prompt keyin **GDVDATA.**

2. The next prompt which you should see on the screen looks like this:

DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY?

You should respond by typing **N** for no. (Remember that your Caps Lock key should be in the all-capital-letters mode.)

3. The next prompt you should see will look like this:

DO YOU WANT TO USE AN EXISTING DATA FILE?

You should respond by typing **Y** for yes.

4. Next the system will prompt you for the name of the existing data file. You should respond by typing the name of the example data file you wish to use. Since the four example problems only involve two different sets of traffic and intersection geometrics, if you wish to run Example 1 or 2 you should type **GD_PRE.S1** however if you wish to run Example 3 or 4 you should type **GD_PRE.S3,** or **GD_PRE.S5** for examples 5 or 6, which are the names of the pre-processor files for Examples 1 and 2, or 3 and 4, or 5 and 6 respectively.

5. The pre-processor will prompt you for any desired changes to the input file. You should respond to the prompts by indicating that no changes are desired.

6. Next, run the geometry and driver-vehicle processors by typing **GDVPRO** which is the name of the batch file that runs these two programs. This operation will take several minutes, so please wait patiently.

7. You should now enter the second pre-processor by typing SIMDATA, which is the name of the simulation pre-processor, at the DOS prompt below the menu screen.

8. After the Texas Model banner, you will then see a prompt that looks like this:

DO YOU WANT TO USE AN EXISTING SIMULATION DATA FILE?

You should respond by typing **Y** for yes.

9. Next you will see a prompt that says:

KEY IN AN EXISTING DATA FILE NAME:

You should respond by typing the name of the example data file you wish to use. Because all four examples have different traffic control schemes which are input through the simulation processor, there are four different files for the four examples. All have the same name but different two-character suffixes. The names are SIM_PRE.S1, SIM_PRE.S2, SIM_PRE.S3, SIM_PRE.S4, SIM_PRE.S5, and SIM_PRE.S6. If you are running Example 1 you should type **SIM_PRE.S1** as the name of the simulation data file, etc.

10. Review the data file and respond to the prompts by indicating that no changes are desired.

11. When complete, you should run the simulation processor by typing **SIMPRO** which is the name of the batch file that controls this operation. After several seconds you will see numbers on the screen which report the status of the simulation. The left column of numbers is the elapsed time into the simulation, while the right column represents the number of vehicles currently being monitored by the simulation processor.

12. You may now examine the output generated by your run by typing **TYPE SIMPLST** which will display the output on the screen or you can type **PRINT SIMPLST** which will send the output to your printer.

13. If you have chosen to run Example 2, 3, 4, 5, or 6 your work has produced a file which can be viewed using the animated graphics processor. If you wish to view the animated graphics produced by these examples, you should do the following:
a. Type **DISPRE** which is the name of the pre-processor that prepares the graphics data for display. This pre-processor will take several minutes to complete its task, so be patient. While you are waiting, you may wish to browse through the documentation for the animated graphics system included as Section 4 in this package.

b. When complete, you may view the graphics by typing **DISPRO** which is the name of the graphics processor.

A plan view of the intersection will appear on your graphics screen followed by the simulated traffic generated by your simulation run.

You may also wish to compare your output files to those provided with the distribution package. Example output files for all processors for the four examples have been provided on a diskette labeled TEXAS_MDL_EXAMPLES. You can examine these files on your monitor or print them using the usual DOS TYPE OR PRINT commands. The files and their descriptions are provided as follows:

File Name	Description
GDV.S1	Converted geometry-driver-vehicle data file, Example 1 and 2
GDV.S3	Converted geometry-driver-vehicle data file, Example 3 and 4
GDV.S5	Converted geometry-driver-vehicle data file, Example 5 and 6
SIM.S1	Converted simulation data file, Example 1
SIM.S2	Converted simulation data file, Example 2
SIM.S3	Converted simulation data file, Example 3
SIM.S4	Converted simulation data file, Example 4
SIM.S5	Converted simulation data file, Example 5
SIM.S6	Converted simulation data file, Example 6
GDVLIST.S1	Output listing from geometry-driver-vehicle pre-processor, Examples 1 and 2
GDVLIST.S3	Output listing from geometry-driver-vehicle pre-processor, Examples 3 and 4
GDVLIST.S5	Output listing from geometry-driver-vehicle pre-processor, Examples 5 and 6
SIMDLIST.S1	Output listing from simulation pre-processor, Example 1
SIMDLIST.S2	Output listing from simulation pre-processor, Example 2
SIMDLIST.S3	Output listing from simulation pre-processor, Example 3
SIMDLIST.S4	Output listing from simulation pre-processor, Example 4
SIMDLIST.S5	Output listing from simulation pre-processor, Example 5
SIMDLIST.S6	Output listing from simulation pre-processor, Example 6
DVLIST.S1	Output listing from driver-vehicle processor, Examples 1 and 2
DVLIST.S3	Output listing from driver-vehicle processor, Examples 3 and 4
DVLIST.S5	Output listing from driver-vehicle processor, Examples 5 and 6
GEOLIST.S1	Output listing from geometry processor, Examples 1 and 2
GEOLIST.S3	Output listing from geometry processor, Examples 3 and 4
GEOLIST.S5	Output listing from geometry processor, Examples 5 and 6
SIMPLST.S1	Output listing from simulation processor, Example 1
SIMPLST.S2	Output listing from simulation processor, Example 2

SIMPLST.S3	Output listing from simulation processor, Example 3
SIMPLST.S4	Output listing from simulation processor, Example 4
SIMPLST.S5	Output listing from simulation processor, Example 5
SIMPLST.S6	Output listing from simulation processor, Example 6

Section 3

STEP-BY STEP **INSTRUCTIONS** FOR EXAMPLE PROBLEMS

If you have completed your installation process, and have finished experimenting with the example input files, you should be ready to gain experience in inputting data to the pre-processors. Step-by-step coding instructions have been provided on the following pages for the first two example problems described in the previous section. Once again Example 2 is the second part of a before and after study and only traffic control features change from Example 1 to 2. Therefore, the coding instructions assume that you will work Example 1 immediately before Example 2. Included after the coding instructions are sketches of geometry, signal timing schemes, and traffic demands for Examples 5 and 6.

Example Problem Number 1

I. Background

Work to be done through this example offers the first opportunity for new users to communicate with the TEXAS Model through the keyboard. This example and subsequent examples will be structured around a case study of a 4-leg intersection (4 x 4) located in an urban area. In addition to learning to interact with the model through the keyboard and the CRT screen, the user will have an opportunity to utilize the output from the TEXAS Model as the basis for analyzing traffic behavior and intersection performance under specified conditions.

II. Case Study Scenario I

The urban 4-leg intersection shown in Fig. C-1 is currently operating under 2-way stop control. Traffic demands upon the intersection have grown steadily, and signalization is now being considered. The indicated traffic values were observed during a recent AM peak traffic period. This scenario will serve as a base condition in the case study.

III. Instructions

Use the preprocessors GDVDATA and SIMDATA to develop and enter all required input information for the intersection situation that is described in Example I. Initiate a run of the TEXAS Model utilizing this input data.

Specific instructions for Geometry and Driver-Vehicle processors: (GDVDATA)

1. Use the 4 x 4 Permanent Library geometry.
2. Use all default values except for traffic demands.
3. Use the traffic demand shown in Fig. C-1.

Specific instructions for the Simulation processor: (SIMDATA)

1. Use 2-way stop control as indicated in Fig. C-1.
2. Use 5-minute start-up and 15-minute run times (defaults).

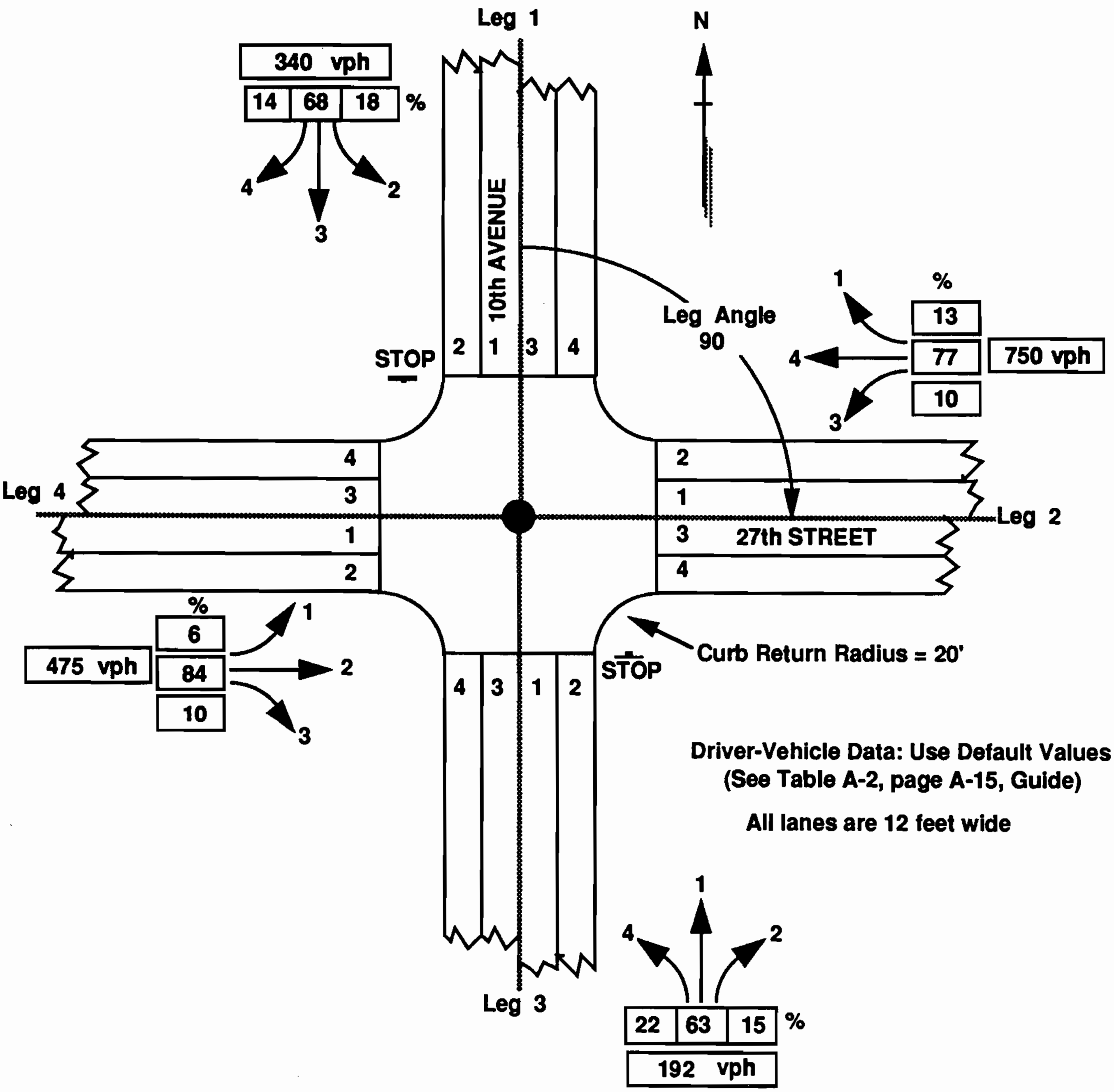


Fig. C-1. Urban 2-way stop intersection, 4 x 4.

STEP-BY-STEP INSTRUCTIONS

CASE STUDY *Example I*

1. Key in **GDVDATA**

2. You will use a file from the Permanent Library.

3. Use the 4X4 Permanent Library file. NOTE: The graphics from this file will appear only once.

4. You will need to copy and revise the file from the Permanent Library with revisions to the traffic data only.

5. Save the revised data.

6. Choose a name for the revised data, using 8 characters or less. (e.g., GDCS1, note that the computer will add a prefix to your file name)WRITE THIS NAME DOWN: ____________________

7. Choose a title for the GDVDATA file as you would like for it to appear on the printout. Key in text title.

8. Use the default values for parameter-option data, for curb return radii, and for geometry on all 4 legs of the intersection.

9. Use the default values for inbound traffic headway frequency- distribution data EXCEPT for volumes (Field 2) on each leg. (Key in **,340** for Leg 1.)

10. Key in the appropriate outbound traffic destination data (percent of the inbound traffic going to various outbound destinations) for each leg. (see Fig. C-1) (**0,18,68,14** for Leg 1)

THIS COMPLETES DATA ENTRY FOR GDVDATA

11. Key in **GDVPRO**

12. Key in **SIMDATA**

13. No simulation data file exists for this Scenario; therefore, type **N**

14. Key in new data , save and name the file. Write down the name of the file "________________________________"

15. Use the GDVDATA reference file from 6 above.

16. Edit the title so that it will appear on the printout of the Simulation Processor output as you would like it. (e.g., 2-way Stop) Suggestion: Key in **T(60) = 2-Way Stop**

17. Default values will be used for parameter-option data except Fields 4 and 8. Use commas to indicate the end of data fields that will use default values, and enter "ST" for stop-sign control. (Key in **,,,ST**) Change Field 8 to"YES" so that a data tape for animated graphics display will be written. (Key in **F(8)=Y**)

18. Use default values for all simulation parameter-option data 2.

19. Put stop signs on Legs 1 and 3.

20. Use lane control data without changes.

THIS COMPLETES DATA ENTRY FOR SIMDATA

21. Key in **SIMPRO** to run the simulation processor. The numbers appearing on the screen are the simulation time (in seconds) and the number of vehicles in the simulation. This will continue until the elapsed simulation time reaches 1200 seconds (20 minutes). Your simulation processor output statistics will be written to a file called SIMPLST which you may examine by executing a DOS **TYPE** OR **PRINT** command.

Note: If you wish to verify that your run has produced appropriate statistical information, you may compare it to a "school solution" by executing a DOS **TYPE** or **PRINT** of the file SIMPLST.S1 on the diskette labeled TEXAS_MDL_EXAMPLES. That diskette also contains "school solutions" for all input and output files created by all processors. All files pertaining to this example have a file name suffix of S1. (See page 12 of this pamphlet for a complete listing.)

Example Problem Number 2

I. Background

This example is devoted to the second scenario in the case study of traffic operations at the urban intersection that was described in Example 1. The 2-way stop-sign control will be replaced with 2-phase, semi-actuated signal control. A somewhat more detailed description of the signalized intersection situation will be required in order to communicate with the TEXAS Model for the latter control condition. Users will utilize the SIMDATA preprocessor to enter all necessary data interactively in response to prompts and instructions. It would only be necessary to enter the GDVDATA pre-processor if you have processed a data file other than that for Example 1 prior to running Example 2 because SIMDATA will utilize the most recently used GDVDATA file.

II. Case Study Example 2

The 4-leg urban intersection, which was the subject of the case study in Example 1 while operating under 2-way stop-sign control, is now being considered for future operation under 2-phase, semi-actuated signal control in Example 2. The proposed detector configuration and signal timing for Example 2 are shown in Fig. C-2. Intersection geometry and traffic are the same as for Example 1. By comparing the TEXAS Model outputs from the two scenarios, the effects of this change can be evaluated directly in a before-and-after type comparison.

III. Instructions

Use the preprocessors GDVDATA and SIMDATA to develop and enter all required TEXAS Model input for the intersection situation that is described above as Example 2. Fig. C-2 serves as a basic sketch of the intersection situation and also contains the proposed signal timing data. Make notes or scratch calculations on this sheet as desired to help you respond appropriately to the prompts and instructions that appear on the screen. Initiate a run of the TEXAS Model for Example 2.

Specific instructions for Driver-Vehicle and Geometry processors: (GDVDATA)

Use the same file which was built for Example I without changes.

You will, therefore, use an existing file.

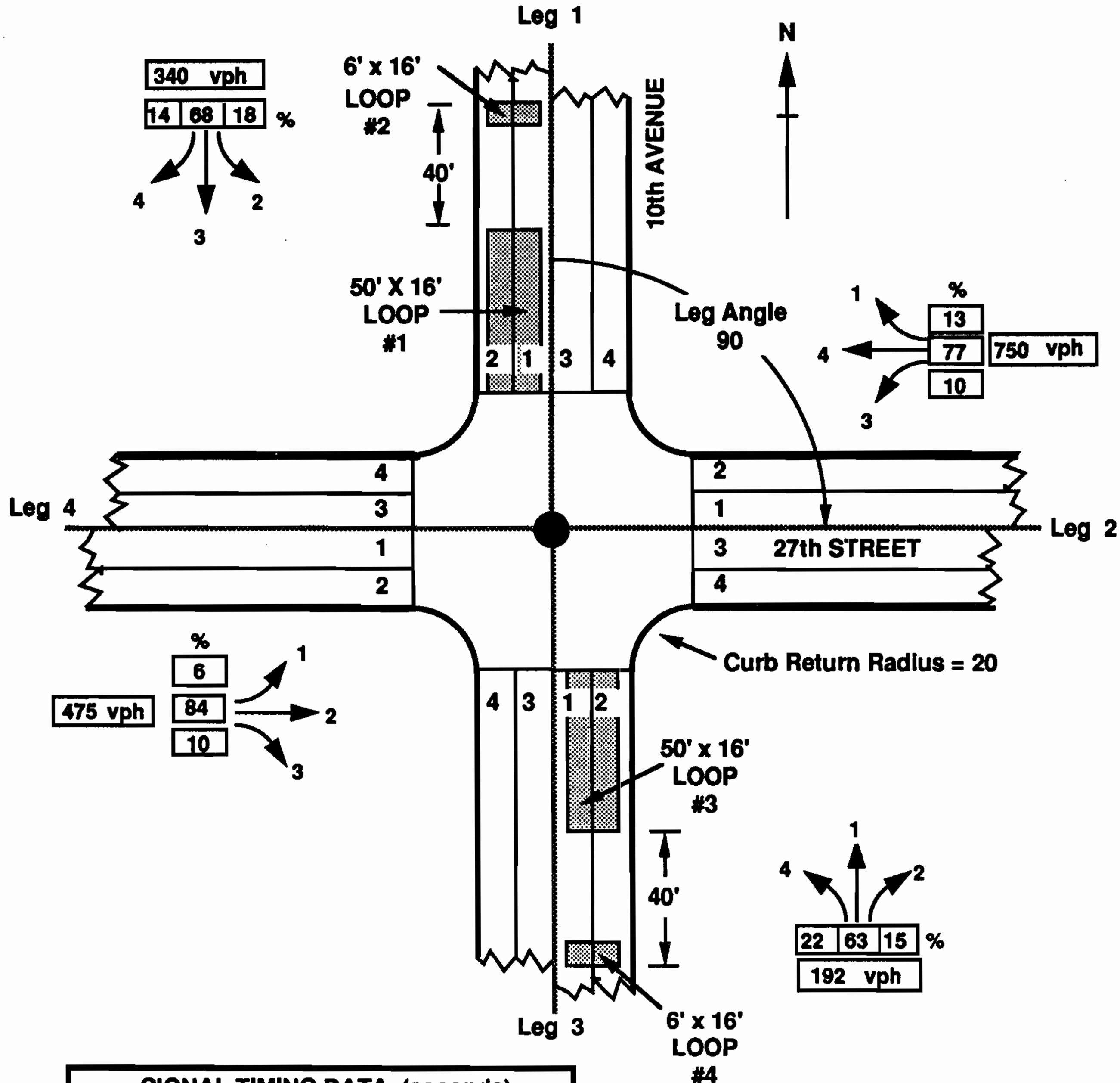
Specific instructions for the Simulation processor: (SIMDATA)

1. Use 2-phase, semi-actuated signal control.

2. Use the NEMA numbering scheme for traffic phases (see screen prompts or Fig. A-10, p.42, in the "Guide to Data Entry").

3. Refer to Fig. A-11, p.46, in the "Guide to Data Entry" for nomenclature related to detector placement. Locate detectors as shown in Fig C-2.

4. Connect the detectors appropriately for 2-phase operation.
5. Use the signal timing data shown in Fig. C-2.
6. Use a 1.0-sec time increment for simulation.
7. Use 5-minute start-up and 15-minute run times.



SIGNAL TIMING DATA (seconds)			
Actuated Phase		**Non-Actuated Phase**	
Initial Interval	4	Min. Green	20
Vehicle Interval	1	Yellow Change	3
Max. Extension	25	Red-Clearance	0
Yellow-change	3		
Red-Clearance	0		

Driver-Vehicle Data: Use Default Values (See Table A-2, p. A-15, Guide)

All lanes are 12 feet wide.

Fig. C-2. Urban 4 x 4 Intersection, 2-Phase Semi-Actuated Signal.

STEP-BY-STEP INSTRUCTIONS
CASE STUDY *Example 2*

1. Key in **SIMDATA**

2. No data file exists for this Scenario; therefore, in response to the question DO YOU WANT TO USE AN EXISTING SIMULATION DATA FILE? key in N. In response to the question DO YOU WANT TO KEY IN NEW DATA? key in **Y**. (As a shortcut, you may key in **KEY** in response to the first question.)

3. Save the new data. In response to the question DO YOU WANT TO SAVE THE NEW DATA? ,key in **Y**. Choose a name for the new data file, note it here ______________________, and key it in. Confirmation will be displayed.

4. The program will display the title text from the most recently-used GDVDATA file, in this case, STANDARD 4 X 4. Use this file as the reference file; key in **Y** in response to the question.

5. The program will confirm the file name as GDV4 X4 and then display the title text STANDARD 4 X 4 from the reference file. Edit this title for use with the SIMDATA file. For example, you may add the text SEMI-ACTUATED SIGNAL starting at column number 40 by keying in **T(40)=SEMI-ACTUATED SIGNAL**. Key in **HELP** for assistance in editing if necessary. Confirmation will be displayed, and you may respond to the question IS TITLE TEXT OK? by keying in **Y** when you are happy with the title.

6. The field locations for the first eight items of SIMULATION PARAMETER-OPTION DATA: will be displayed in a table on the screen. The data format for each of the 8 data fields is also displayed on the screen following the instruction KEY IN SIMULATION PARAMETER-OPTION DATA:

7. For this scenario, key in simulation parameter-option data as follows: **,,1,SE,,,,Y** This will set Field 3 for a 1.0 second simulation time increment, Field 4 for SEMI-ACTUATED signal control, and Field 8 to YES for the program to prepare data for later use by the animation preprocessor. Confirmation will be displayed. Edit if necessary, and key in **Y** when correct.

8. SIMULATION PARAMETER-OPTION DATA 2: will be displayed on the screen to show seven additional items needed by the simulation processor. For this scenario, all default values will be used; therefore, press the **ENTER** key in response to the command KEY IN SIMULATION PARAMETER-OPTION DATA 2; Confirmation will be displayed, and you can key in **Y**.

9. You will now be asked DO YOU WANT TO PERMIT RIGHT TURNS ON RED? For this scenario, the response is **Y**.

10. Use LANE CONTROL DATA as contained in the default values for this scenario.

11. The program will now confirm that a SEMI-ACTUATED controller has been chosen and will prompt for additional information that is needed.

12. For this scenario, 2-phase signal control will be used; therefore, enter **2** in response to the command KEY IN THE NUMBER OF CONTROLLER PHASES. Confirm that this is correct by keying in **Y**.

13. The numbering convention for the TRAFFIC PHASES will be displayed in a diagram on the screen, and you will be instructed to make CONTROLLER PHASE A unactuated. You must now KEY IN THE TRAFFIC PHASES TO BE IN CONTROLLER PHASE A. For this scenario, include traffic phases 2 and 6 in controller phase A and traffic phases 4 and 8 in controller phase B. Respond to the prompts as they occur.

14. SEMI-ACTUATED SIGNAL TIMING DATA FOR UNACTUATED CONTROLLER PHASE A; for this scenario will utilize a MINIMUM GREEN INTERVAL of 20 seconds, and the default values for the other timing parameters. Therefore, simply key in **20** and confirmation will be displayed.

15. SEMI-ACTUATED SIGNAL TIMING DATA FOR CONTROLLER PHASE B, for this scenario will use an INITIAL INTERVAL of 4 seconds, a VEHICLE INTERVAL of 1 second, and a MAXIMUM EXTENSION of 25 seconds along with default values for the other parameters (see Fig. C-2). To enter these values in the proper fields, key in **4,1,,,25** Confirmation will be displayed. Edit as necessary.

16. Use the GREEN INTERVAL SEQUENCE DATA that are supplied by the program.

17. For this scenario, four detectors will be used (see Fig. C-2). Key in **4** in response to the prompt.

18. Data for each detector must be supplied. Refer to Fig. C-2 for the number and location of each detector. Key in the following items in response to the series of screen prompts:

For Detector #	Key in
1	**,,2,,50**
2	**,,2,-84,6**
3	**3,,2,,50**
4	**3,,2,-84,6**

19. For this scenario, all 4 detectors must be connected to Phase B. Key in **1,2,3,4** in response to the prompt and confirm by keying in **Y**.

THIS COMPLETES DATA ENTRY FOR SIMDATA

20. Key in **SIMPRO** to run the simulation processor. Wait for the program to finish. Your statistical output information will be written to a file called SIMPLST and you can examine it by executing a DOS **TYPE** or **PRINT** command.

Note: If you wish to verify that your run has produced appropriate statistical information, you may compare it to a "school solution" by executing a DOS **TYPE** or **PRINT** of the of the file SIMPLST.S2 on the diskette labeled TEXAS_MDL_EXAMPLES. That diskette also contains "school solutions" for all input and output files created by all processors. All files pertaining to this example have a file name suffix of S2.(See page 12 of this pamphlet for a complete listing.)

21. Key in **DISPRE** to run the Animation Preprocessor. The numbers appearing on the screen are simulation time in seconds, the number of vehicles in the simulation, and the number of vehicles in the animation window. This display will continue until the time reaches 300 seconds.

22. Key in **DISPRO** to run the animation processor. This program will draw a plan-view sketch of the intersection , show signal indications by colored dots at the end of each lane line, and display instantaneous vehicle positions. The signal indications and the vehicle positions will be updated for each successive simulation-time interval. Press any key to pause and to restart the animation. Press **S** to restart and pause after a single update. This animation will run for 300 seconds.

Examples 5 and 6

A sketch of the geometric features of the compact diamond interchange of Example 5 along with traffic demands and signal timing are presented in Figure C-3. The signal phase sequence arrangement for this example is presented in Figure C-4. Example 6 is the same as Example 5 except the signal timing has been modified to provide overlaps. This case is presented in Figures C-5 and C-6.

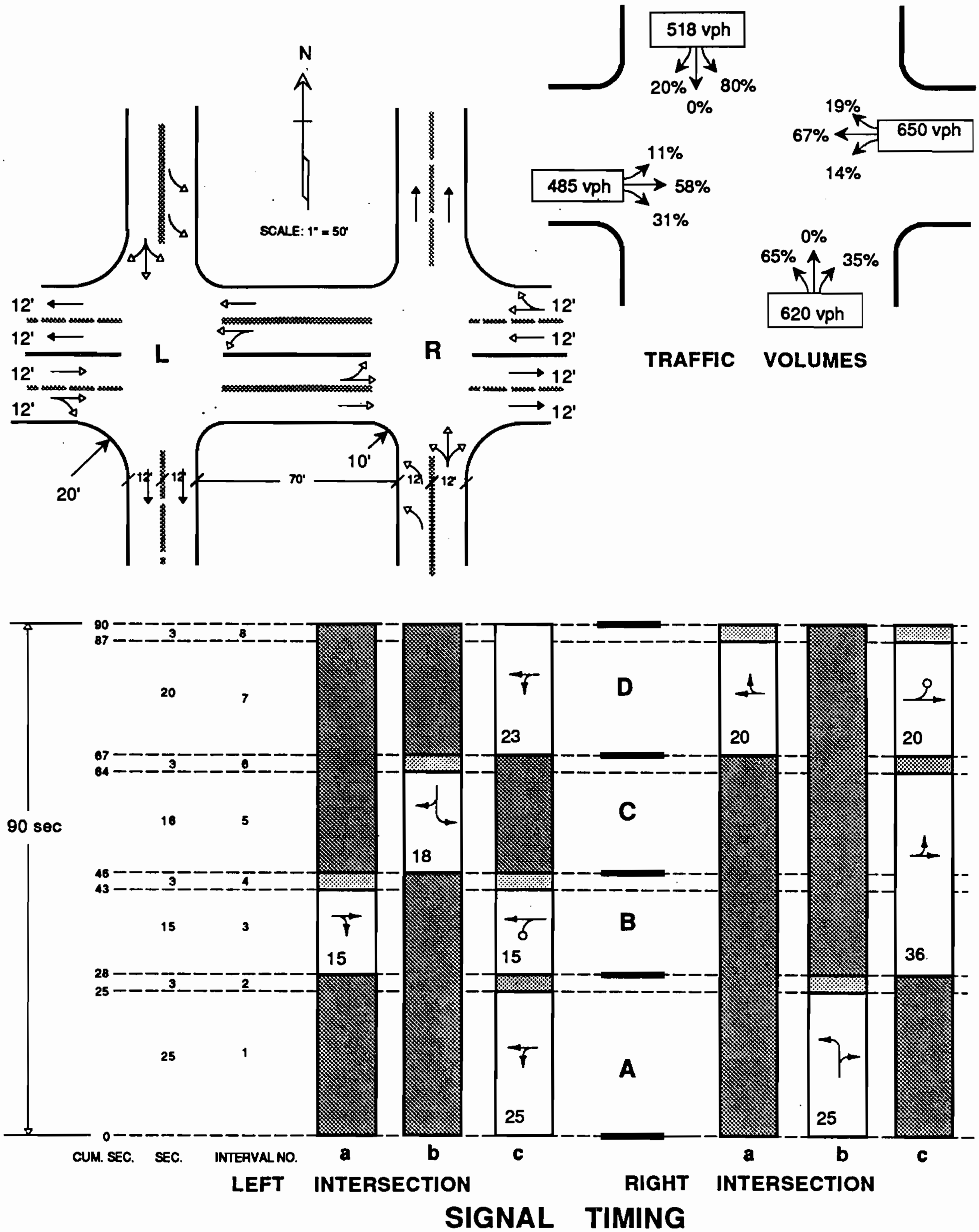


Figure C-3. Compact Diamond, 4-Phase Pretimed Signal Control. (Example 5).

4 - Phase, Pretimed, Diamond Signal

Interior left-turn at L leads Opposing Arterial
Interior left-turn at R leads Opposing Arterial

LEAD - LEAD Phase Sequence
abc - abc

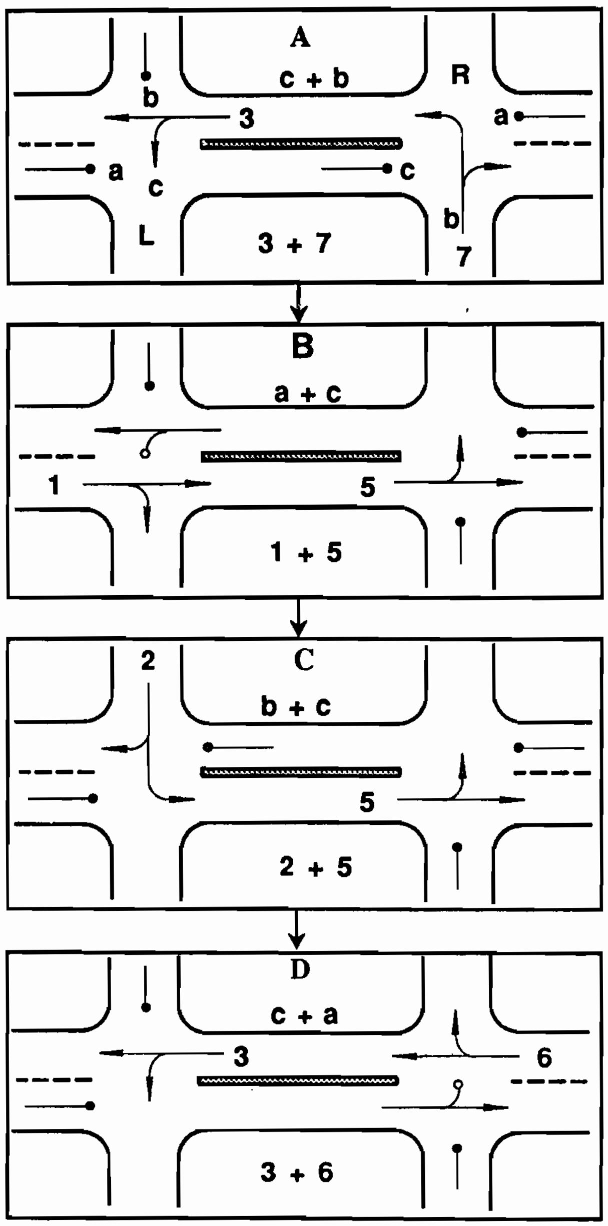


Figure C-4. Signal Phase Sequence for Compact Diamond (Example 5).

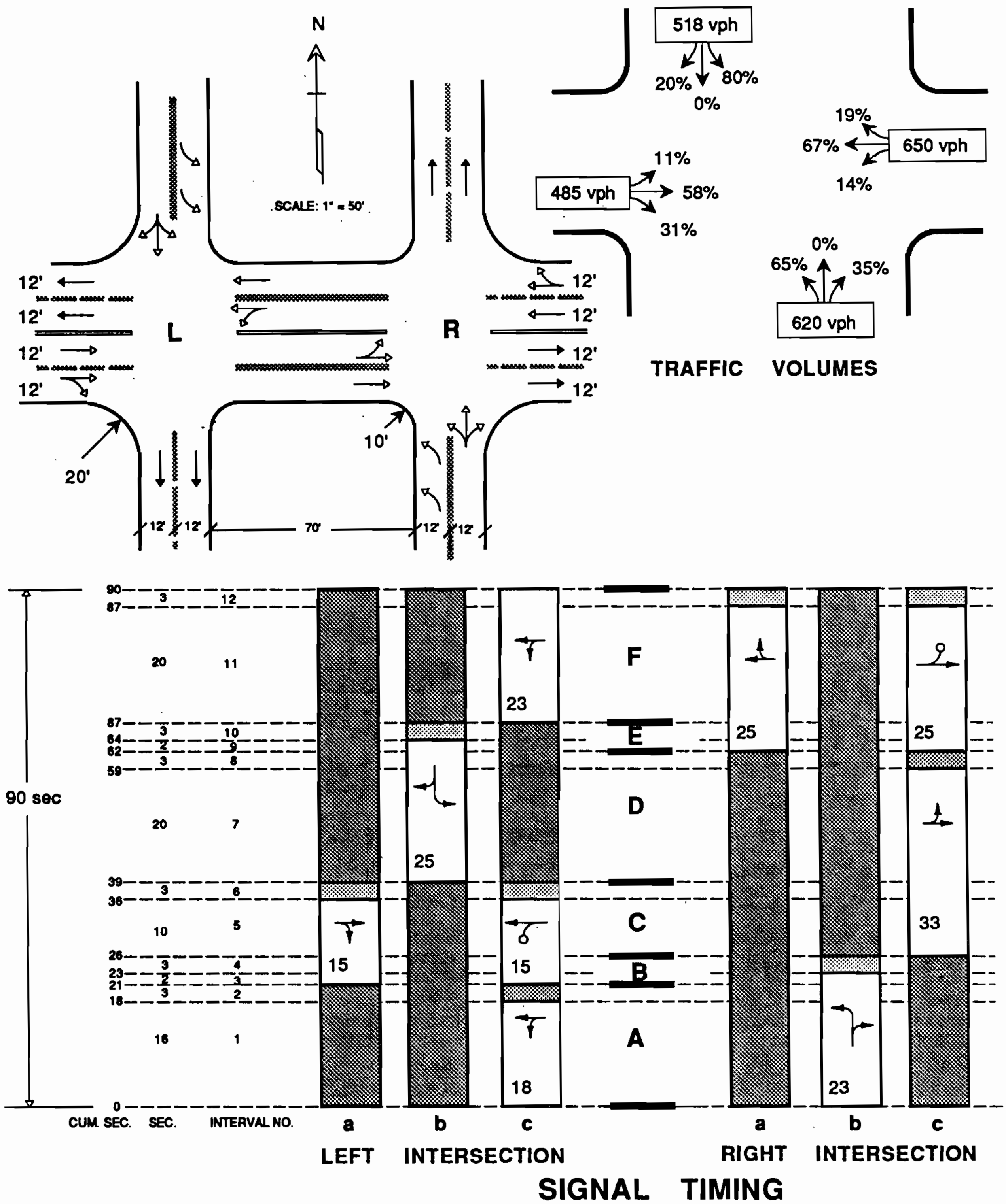


Figure C-5. Compact Diamond, 4-Phase with Overlaps (6-Phases in TEXAS 3.0), Pretimed Signal Control. (Example 6).

4 - Phase w/ Overlaps, Pretimed Diamond Signal

Interior left-turn at L leads Opposing Arterial
Interior left-turn at R leads Opposing Arterial

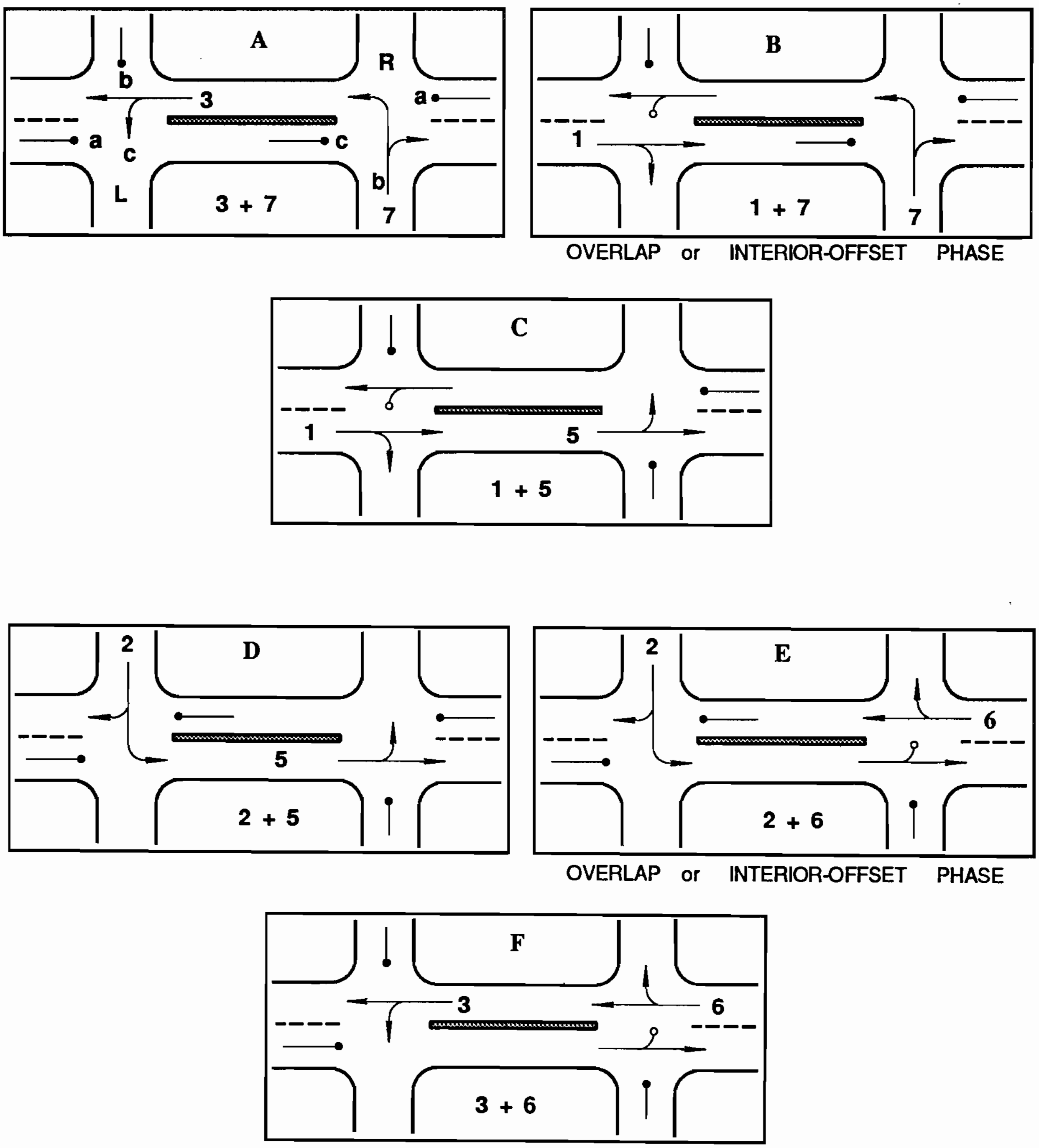


Figure C-6. Phase Sequence for 4-Phase with Overlaps, Pretimed Diamond Signal (Example 6).

Section 4

USER INSTRUCTIONS FOR **TEXAS** MODEL
ANIMATION PROCESSOR

The animation processor may be used to produce an animated graphical view of the simulated traffic with a plan view of the intersection shown to scale and traffic operations depicted in real time. A decision to utilize the animation must be made before running the simulation by responding affirmatively to the prompt "Create pollution/display tape?" within the pre-processor "SIMDATA". An affirmative response to this prompt will cause the simulation processor to generate a file consisting of position, velocity, and acceleration data for all simulated vehicles for every simulation time increment. The following instructions are provided assuming that the user has created the appropriate file during the simulation and now wishes to produce an animated graphical view of the simulated intersection traffic operations.

DISPRE and the Pre-Processor

As with all basic processors within the TEXAS Model, the Animation Processor requires the use of a pre-processor prior to its use. This pre-processor is most easily accessed through a batch file called DISPRE.BAT. Execution of this file can be accomplished by typing **DISPRE** which simply tells DOS to find and execute a batch file called DISPRE. There are two optional parameters which may be specified for operation of DISPRE.

1. The first optional parameter is the name of the input file which was generated by the simulation processor. (Input file name can be specified by **PVA+NAME** at any position on the input line). The default name assigned by the simulation processor to this file is POSDAT, and DISPRE will always look for a file called POSDAT unless told otherwise through specification of this parameter. In other words, specification of this parameter is not necessary unless the user wishes to have several raw pollution/display files simultaneously available. To accomplish this, the user would rename the file created by the simulation processor called POSDAT after each simulation processor run because each run of the simulation processor will destroy the previous pollution/display file if it is named POSDAT. (For example, if two raw files were to be retained, the first POSDAT produced by the simulation processor could be renamed POSDAT1, and the second could be renamed POSDAT2, or any other name acceptable to DOS.) If specified, the parameter must consist of the complete name including any name extension, for the file to be used. Note, the first optional parameter can be specified while omitting the second (leaving the second blank).

2. The second optional parameter is the name of the output file created by the pre-processor. (Input file name can be specified by **DIS+NAME** at any position on the input line). If omitted, DISPRE will use the default file name DISDAT each time it runs. This effectively means that each DISPRE run destroys any previous animation files if their names have not been changed. Specification of this parameter is not necessary unless the user wishes to have several animation files simultaneously available for display. However, once specified, a new output file name remains in effect until changed by the user or the system is re-booted. Note, the second optional parameter cannot be specified unless the first is also used.

An example of the use of both optional parameters might look like the following, if the name of the input file was RUN99.DAT and the name of the output file was RUN99.CAT:

You would type **DISPRE RUN99.DAT RUN99.CAT** followed by a carriage return.

Users may optionally tailor their graphics by modifying a file called DISPAR which is shipped with the modeling system and installed in the TEXAS subdirectory. Modification of this file which consists of two lines, must be accomplished using a text editor such as the DOS resident Edlin. Specific field specifications for the two lines are as follows: (This file can be specified as third command line parameter **PAR+NAME**).

FIRST LINE

Columns	Data Description	Default Value
1 -10	X coordinate measured from intersection center (in feet) which will appear at center of screen. (For example, if 100 is specified, a location 100 feet to the right of the intersection center will appear at the center of the screen.)	0
11 - 20	Y coordinate measured from intersection center (in feet) which will appear at center of screen.	0
21 - 30	Scale factor: intersection units/ inch on screen	50
31 - 35	Type of display: 0 - Program selects display 1 - Enhanced graphics adaptor and monochrome display or VGA and monochrome monitor 2 - EGA or color adapter and color display 3 - EGA and enhanced color display 4 - VGA and color display	0
36 - 40	Reserved for system use	
41 - 50	Time in seconds for display to be shown. Maximum value is the duration of pollution/display file generated by SIMPRO.	Duration of file Generated by SIMPRO**

Special Note: The duration of the display file normally generated by SIMPRO is 5 minutes. That is, only the first five minutes of the simulation are normally provided for use by the animation processor. If the user wishes to view more than 5 minutes of the simulation through the animation processor he can edit the file named **SIM which is the output file created by a conversion program called **SIMCONV** which is not normally accessed by users. Therefore, in order to create a display file of more than five minutes duration, the user should do the following:

1. After finishing input through SIMDATA and exiting that program, at the DOS prompt type **SIMCONV** which will "manually" execute the conversion program.
2. **SIMCONV** will identify the name of the output file at completion (it is currently called **SIM**). You must edit this output file using a text editor. Load your text editor and the output file (**SIM**) into memory and modify the second line of the file by entering the desired duration of the animation in columns 67 through 70 of the second line with your specification in units of minutes with a period.

SECOND LINE

Enter the numbers corresponding to the vehicle classes for any vehicle classes which are to be given special graphical representation in the animation. Twelve (12) fields of five columns each are available for the 12 vehicle classes used in the simulation. See Table A-2 page 17 of the Users Guide for a description of the 12 vehicle classes. For example, if you wanted vehicle classes 3, 7 and 11 to be given special distinctive representation on the graphics screen you would enter **3 7 11** in columns 5, 10, and 14-15 respectively as your second line. The default for this specification is none, that is, no vehicle classes will be given special graphical representation.

DISPRO and the Animation Processor

Once the pre-processor has generated the data file needed by the basic animation processor, the graphics may be viewed. **Note: Users with more than one display must switch to the display that will be used for the animation <u>before</u> running the animation processor.** Execution of the animation processor can be accomplished by typing the name of the batch file **DISPRO** which manipulates the animated graphics processor. While viewing the animation, users will see " READING DATA" occasionally displayed in the lower right corner of the screen. While "READING DATA" is displayed the machine is reading additional data from the input data file and loading it into memory. While the display is active, pressing any key will cause the animation to pause, until any key is pressed a second time. **DISPRO** user file specified on command line (**DIS+NAME**) default is **DISDAT**.

Section 5

FORTRAN Run-time Errors
RM/FORTRAN Version 2.4
Ryan McFarland Corporation, 1987

1000 Incorrect ACOS argument
1001 Incorrect DACOS argument
1002 Incorrect ASIN argument
1003 Incorrect DASIN argument
1004 Incorrect ATAN2 argument
1005 Incorrect DATAN2 argument
1006 Incorrect COSH argument
1007 Incorrect DCOSH argument
1008 Incorrect EXP argument
1009 Incorrect DEXP argument
1010 Incorrect ALOG10 argument
1011 Incorrect DLOG10 argument
1012 Incorrect ALOG argument
1013 Incorrect DLOG argument
1014 Incorrect CLOG argument
1015 Incorrect MOD argument
1016 Incorrect AMOD argument
1017 Incorrect DMOD argument
1018 Incorrect CDLOG argument
1022 Incorrect SINH argument
1023 Incorrect DSINH argument
1024 Incorrect SQRT argument
1025 Incorrect DSQRT argument
1026 Incorrect TAN argument
1027 Incorrect DTAN argument
1102 Incorrect AINT argument
1104 Incorrect DINT argument
1106 Incorrect ANINT argument
1108 Incorrect DNINT argument
1110 Incorrect NINT argument
1112 Incorrect NINT argument
1114 Incorrect IDNINT argument
1116 Incorrect IDNINT argument
1121 Incorrect ABS argument
1122 Incorrect DABS argument
1124 Incorrect CABS argument
1125 Incorrect CDABS argument
1126 Incorrect ISIGN argument
1128 Incorrect ISIGN argument
1130 Incorrect SIGN argument
1132 Incorrect DSIGN argument
1134 Incorrect IDIM argument
1136 Incorrect IDIM argument
1138 Incorrect DIM argument
1140 Incorrect DDIM argument
1142 Incorrect MAX0 argument
1144 Incorrect MAX0 argument
1146 Incorrect AMAX1 argument
1148 Incorrect DMAX1 argument
1150 Incorrect AMAX0 argument

1152 Incorrect AMAX0 argument
1154 Incorrect MAX1 argument
1156 Incorrect MAX1 argument
1158 Incorrect MIN0 argument
1160 Incorrect MIN0 argument
1162 Incorrect AMIN1 argument
1164 Incorrect DMIN1 argument
1166 Incorrect AMIN0 argument
1168 Incorrect AMIN0 argument
1170 Incorrect MIN1 argument
1172 Incorrect MIN1 argument
1174 Incorrect LEN argument
1176 Incorrect LEN argument
1178 Incorrect INDEX argument
1180 Incorrect INDEX argument
1182 Incorrect AIMAG argument
1184 Incorrect CONJG argument
1186 Incorrect CSQRT argument
1187 Incorrect CDSQRT argument
1188 Incorrect CEXP argument
1189 Incorrect CDEXP argument
1190 Incorrect SIN argument
1192 Incorrect DSIN argument
1194 Incorrect CSIN argument
1195 Incorrect CDSIN argument
1196 Incorrect COS argument
1198 Incorrect DCOS argument
1200 Incorrect CCOS argument
1201 Incorrect CDCOS argument
1202 Incorrect ATAN argument
1204 Incorrect DATAN argument
1206 Incorrect TANH argument
1208 Incorrect DTANH argument
1210 Incorrect ISHL argument
1212 Incorrect ISHA argument
1214 Incorrect ISHC argument
1216 Incorrect IBCLR argument
1218 Incorrect IBSET argument
1220 Incorrect IBCHNG argument
1222 Incorrect BTEST argument
1224 Incorrect INTEGER*2 ** INTEGER*2 argument
1226 Incorrect INTEGER*4 ** INTEGER*4 argument
1228 Incorrect FLOATING POINT ** INTEGER argument
1230 Incorrect FLOATING POINT ** FLOATING POINT argument
1232 Incorrect COMPLEX ** (INTEGER OR FLOATING POINT) argument
1234 Incorrect COMPLEX ** COMPLEX argument
1236 Array size too large
2000 BACKSPACE on direct access
2001 BACKSPACE on non-existent file
2002 BACKSPACE on unconnected file

2003 CLOSE of scratch file with KEEP status
2004 ENDFILE on unconnected unit
2005 ENDFILE on direct access
2006 Formatted I/O not allowed
2007 Incorrect BLANK argument
2008 Incorrect FORM argument
2009 Incorrect STATUS argument
2010 OPEN specifies BLANK with unformatted I/O
2011 OPEN RECL too large
2012 OPEN specifies RECL with sequential access
2013 OPEN STATUS is NEW but file exists
2014 OPEN STATUS is NEW but FILE not specified
2015 OPEN STATUS is OLD but file does not exist
2016 OPEN STATUS is OLD but FILE not specified
2017 OPEN STATUS is SCRATCH but file is named
2018 REC argument missing
2019 REC argument not allowed
2020 REWIND on unconnected unit
2021 REWIND on direct access
2022 Unformatted I/O not allowed
2023 Unit not connected
2024 OPEN ACCESS is DIRECT but no RECL specified
2025 Incorrect REC argument
2026 OPEN RECL is negative or zero
2500 Apostrophe edit descriptor in input
2501 Apostrophe field overflow
2502 D or E exponent magnitude too large
2503 Format specifier exponent width too large
2504 Format specifier field exceeds record
2505 Format specifier fraction width too large
2506 Format specifier integer negative
2507 Format specifier integer too large
2508 Format specifier integer zero
2509 Format specifier minimum field width too large
2510 H edit descriptor not allowed on input
2511 Incorrect blanks edit descriptor
2512 Incorrect character after format specifier field width
2514 Incorrect integer in input
2515 Incorrect format specifier item start
2516 Incorrect format specifier start
2517 Incorrect integer character
2518 Incorrect logical iolist item
2519 Incorrect exponent in input
2520 Incorrect repeated edit descriptor
2521 Incorrect scale factor
2523 Internal file overflow
2525 Iolist item not integer
2526 Iolist item not logical
2527 Iolist item neither real nor double
2528 P missing in format specifier

2529 Premature end of format specifier
2530 Read after end of field
2531 Record integer too large
2532 Record position too high
2533 Repeat count zero
2534 Scale factor too large
2535 Scale factor too small
2536 Separator missing in format specifier
2537 Too many parentheses in format specifier
2539 Write after ENDFILE
2540 Incorrect hexadecimal in input
2541 Incorrect character constant in list directed input
2542 Incorrect complex constant in list directed input
2543 List directed output field too large
2544 Separator missing in list directed input
2545 Premature end of list directed input record
2548 No repeatable edit descriptor in format specifier
2549 Read after endfile reported
3000 Memory allocation failure
3001 Backspace on wrongly positioned formatted file
3002 Backspace unable to find preceding formatted record
3003 Backspace unable to read preceding formatted record
3004 Formatted backspace unable to complete
3005 Backspace on wrongly positioned unformatted file
3006 Backspace unable to find preceding unformatted record
3007 Backspace unable to read unformatted record's trailer
3008 Unformatted backspace unable to complete
3009 Invalid file handle for CLOSE
3010 Invalid file handle for DELETE
3011 File deletion failure
3012 File opening failure
3013 Formatted direct record length 1 not found
3014 Read error on formatted direct record length 1
3015 Formatted direct record not found
3016 Read error on formatted direct record
3017 Unformatted direct record not found
3019 Read error on unformatted sequential record's header
3020 Read error on unformatted sequential record
3023 End of file before newline on reading formatted sequential record
3024 Formatted sequential input record too long
3025 Rewind failure
3026 Unable to position to write formatted direct record length 1
3027 Write error on formatted direct record length 1
3028 Unable to position to write formatted direct record
3029 Write error on formatted direct record
3030 Unable to position to write unformatted direct record
3032 Write error on printer control characters
3033 Write error on formatted sequential record
3035 No workspace for filename
3036 Error in releasing default filename's storage space to operating system

3037 Undefined unit for Operating System Interface
3038 Too many units for Operating System Interface
3039 Undefined unit for Operating System Interface
3040 Read error in PAUSE processing
3041 Unable to position after reading unformatted direct record
3042 Unable to position to read unformatted sequential record's trailer
3043 Read error on unformatted sequential record's trailer
3044 Unformatted sequential record length error
3045 Unable to position to write unformatted direct record
3046 Attempt to read beyond the end of an unformatted record
3047 Read error on unformatted record
3048 Unable to position to write an unformatted sequential record
3049 Write error on unformatted sequential record's header
3050 Attempt to write beyond the end of an unformatted record - see /r option
3051 Write error on unformatted record
3052 Write error on unformatted sequential record's trailer
3053 Unable to position to write unformatted sequential record's header
3054 Write error on unformatted sequential record's header
3055 Unable to position after writing unformatted sequential record
3070 Error in reading PSP's parameter area
3071 No workspace for I/O record buffer
3072 Unable to release unused memory to operating system
3073 Error in invoking a user command in PAUSE processing
3074 Error in releasing previously allocated memory to operating system
3075 Undefined unit for opening a file
3076 Write error on final use of standard output
3077 Error in releasing a filename's storage space to operating system
3078 Cannot find Command Processor name in PAUSE processing
3079 Error in getting operating system version
3080 Endfile write error
3081 Read error on unformatted direct record
3082 Read error on unformatted sequential record
3083 Unformatted sequential record length error
3084 Write error on unformatted direct record
3085 Write error on unformatted sequential record
3086 Unformatted record too long
3087 Read error on formatted sequential record
3088 Incorrect maximum record length option
3089 File positioning failure for appending
3110 Error in getting file information
4000 Runtime Error
4001 RMFORT requires math coprocessor
4002 Incorrect DOS Version
5001 I/O error closing Debug file
5002 I/O error reading Debug file
5003 Unexpected EOF on Debug command file
5004 I/O error writing Debug file
5005 Must have a /t compiled main program for Debug
5006 Internal error in Debug