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# TEXAS MODEL FOR INTERSECTION TRAFFIC VERSION 3.0 DOCUMENTATION (Updated for Version 3.20)

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## TEXAS MODEL FOR INTERSECTION TRAFFIC VERSION 3.20

The TEXAS Model for Intersection Traffic 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 or diamond interchange. 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 or diamond interchange on a monitor screen driven by an IBM (or compatible) microcomputer or by an Intergraph workstation.

The attached Appendices A through D describe the installation and use of the TEXAS Model for Intersection Traffic. Three new features of Version 3.20 that are not covered in these appendices are described below in the sections entitled Conversion of Preprocessor Data, Plotting Lane Geometry and Vehicle Paths, and Processing a Series of Replicate Runs.

### Structure of the TEXAS Model for Intersection Traffic

The TEXAS Model for Intersection Traffic includes nine main processors: DISFIT (Headway Distribution Fitting) a utility routine for fitting several traffic headway statistical distributions to user data, GEOPRO (Geometry Processor) for describing the geometric configurations, GEOPLOT (Geometry Plotting) for plotting the geometric configurations, DVPRO (Driver-Vehicle Processor) for describing the stochastically-arriving traffic, SIMPRO (Simulation Processor) for determining the behavior of traffic in response to the applicable traffic controls, EMPRO (Emissions Processor) for calculating the emissions generated by the traffic, SIMSTA (Simulation Statistics) for computing the simulation statistics from replicate runs, and DISPRE (Display Pre-Processor) and DISPRO (Display Processor) for viewing the animation. The structural relationship among these data processors is shown in Figure 1.

DISFIT (1) reads headway data, (2) computes the location and dispersion parameters for the data using a 1-second time interval size, (3) fits selected mathematical distributions to the empirical headway data based on the best-fit parameters calculated from the mean and variance of the data, (4) calculates Chi-Squared, alpha, and the confidence level for the Chi-Squared goodness-of-fit test, (5) determines the maximum cumulative difference for the Kolmogorov-Smirnov one-sample test, and (6) plots a histogram of the input headway data and of each distribution fitted. The input to DISFIT is (1) an 80-character title on line 1, (2) a 4 to 80-character FORTRAN format on line 2 for reading the headway data one value per line (must begin with a "(" and must end with a ")"), and (3) headway data in seconds with one value per line. The headway frequency distributions fitted are (1) Erlang (rounded down to the

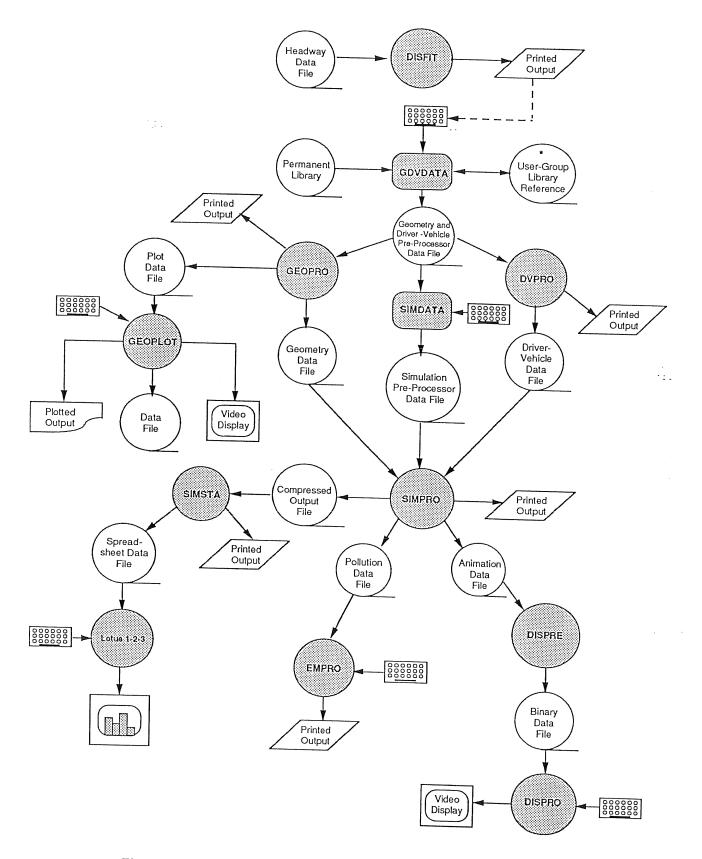


Figure 1. Flow chart of the structure of the user-friendly TEXAS Model

nearest integer value of K), (2) Erlang (rounded up to the nearest integer value of K), (3) gamma, (4) lognormal, (5) negative exponential, (6) shifted negative exponential, (7) uniform, and (8) normal. For each distribution fitted, the parameter required as input by SIMPRO is listed along with the Chi-Squared value, the number of degrees of freedom, the alpha value, the confidence value, and the maximum cumulative difference.

GEOPRO defines the geometry of the intersection or interchange 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.

GEOPLOT has the ability to read the plot-data file created by GEOPRO and translate it into different formats. The specific format is user-selectable with command-line parameters, and it may be used to interface with hardcopy devices or graphics-processing programs (CAD). GEOPLOT can also display the contents of the plot-data file on the computer's graphics CRT. GEOPLOT is not available for Intergraph workstations.

The GKS plot scheme is one option available in GEOPLOT. For the DOS implementation of this option, a license for incorporation of proprietary software into GEOPLOT is required. One term of this license requires that the software be delivered only to end-users who have purchased additional device drivers from the GKS vendor. Two versions of GEOPLOT exist. The version that is normally included on the distribution disk has the GKS option disabled and does not include the proprietary GKS code. For end-users who wish to use the GKS option and own, or are purchasing the device drivers, there is a version of GEOPLOT that has the GKS option active.

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 discrete 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 and bound between the extreme values which are set for each vehicle class. 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.

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 device influence area.

If there is no intersection control, each unit must yield the right-of-way to other vehicles within the intersection or other vehicles that have cleared sight-distance restrictions and intersection conflicts. The yielding unit may have to stop at the stop line and follow the stop sign control logic to gain entry into the intersection. If the intersection is controlled by signs or signals, units traveling on lanes which have no lane control have the right-of-way.

If yield signs control a lane, each unit on the lane must yield the right-of-way to other vehicles within the intersection or other vehicles that have cleared sight-distance restrictions and intersection conflicts. The yielding unit may have to stop at the stop line and follow the stop sign control logic to gain entry into the intersection.

If stop signs control a lane, 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 a lane, 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 left-turn-on-red and a right-turn-on-red option is provided.

If lane 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. When a detector is in presence mode, 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. When a detector is in pulse mode, a detector actuation is defined by the time interval during which the front bumper of a unit has crossed the start 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 or the current lane does not have an intersection path to the unit's desired outbound leg. 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 are written onto a file by the TEXAS Model for subsequent use in the animation processor (DISPRE and DISPRO) or 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 u-turn, left-turn, straight, right-turn, internal-then-left, and internal-then-right movements and by the total of these six permitted directional movements on each inbound approach (internal-then-left and internal-then-right are only applicable at diamond interchanges). Total delay is the difference between travel time for a vehicle through the system and the time it would have taken the vehicle to travel the same distance at its desired speed. Stop delay is the time spent by a vehicle which has a velocity less than 3 feet/second and has joined the queue of vehicles waiting to enter the intersection. Queue delay is the time spent by a vehicle in the queue of vehicles waiting to enter the intersection. Queue delay includes move-up time until the vehicle enters the intersection. 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 for each inbound lane. Both are measured in units of vehicles, not feet.

EMPRO, the emissions processor, incorporates models to predict the instantaneous vehicle emissions of Carbon Monoxide (CO), Hydrocarbons (HC), Oxides of Nitrogen (NO<sub>X</sub>), 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.

SIMSTA reads all replicate run output statistics files for a given job, calculates and prints statistics, optionally writes the statistics to a spreadsheet-compatible file, and optionally checks for a user-specified statistical tolerance being achieved (a feature used by the REPTOL processor). The statistics calculated for almost all parameters are the number of data values used in the calculation, the minimum value, the mean value, the maximum value, the variance, the standard deviation, and the standard deviation divided by the mean. The Student's T Distribution for the 95 percent confidence level is used to calculate the value of "xx.x" for the statement "there is a 95% probability that the population mean for aaa is within +/-xx.x % of yy.y sec/veh" where "aaa" is "overall average total delay", "overall average queue delay", "overall average stopped delay", or "overall average delay below zz.z mph"; "yy.y" is the mean value for "aaa" and "zz.z" is the user specified value for the Simulation Processor.

DISPRE reads the animation file produced by SIMPRO and prepares the data for DISPRO. DISPRO reads the file produced by DISPRE and allows the user to view the animation.

### Data Entry to the User-Friendly TEXAS Model

As shown in Figure 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).

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.

Data that are needed by the simulation processor, SIMPRO, are entered through the data-entry program called SIMDATA (see Figure 1). This program pairs the entered data required by LSIMPRO with data previously defined by using GDVDATA.

### Animated Graphics Display of TEXAS Model Output

Output from the TEXAS Model includes the instantaneous speed, location, and time relationship for every simulated vehicle. 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.

### Conversion of Preprocessor data

The data entry preprocessors GDVDATA and SIMDATA produce data files that are not compatible with the processors GEOPRO, DVPRO and SIMPRO. The conversion program GDVCONV converts the files created by GDVDATA to a form that is suitable for input to GEOPRO and DVPRO. SIMCONV performs a similar conversion to make files created by SIMDATA suitable for input to SIMPRO. The conversion logic of GDVCONV is built into GEOPRO and DVPRO and the conversion logic of SIMCONV is available to SIMPRO. This conversion is normally performed automatically when the processors GEOPRO, DVPRO and SIMPRO are executed.

The preprocessor data files are specially formatted and should only be revised by one of the TEXAS Model data entry preprocessors. Use of a text editor or word processor to make changes to the preprocessor data files will make them completely usable. If it is desirable to edit the data files outside of GDVDATA or SIMDATA, the conversion process must first be performed manually by executing GDVCONV or SIMCONV. The converted file may then be edited before input to a TEXAS Model processor.

### Plotting Lane Geometry and Vehicle Paths

The Geometry Processor GEOPRO has provision to plot the intersection plan view. Several plot pages are produced. The first is an overall view and will show the entire length of all lanes. The next will be a close up view of the intersection and only a section of the lanes nearest the intersection will be shown. The third will be similar to the second, but all of the possible vehicle paths through the intersection will also be shown. Plot devices with color capability will show left turn paths in red, straight paths in black (or white) and right turn paths in blue. For diamond interchanges, additional close-up views of each side of the diamond, with vehicle paths shown, will also be plotted.

Data to request creation of the geometry plot file are in the last two fields of the GDVDATA Parameter-Option data (Figure 2, data for diamond interchange is shown, but geometry plotting is valid for non-diamond interchanges also). The plot size entered in the last field specifies the dimensions of a square plotting surface, in inches. Please note that plotters usually cannot use the full paper width for plotting. The 7.5 default value will usually be satisfactory for plotters that use 8.5 inch wide paper. If the specified size exceeds the plotter's capacity, the result can be unpredictable, but usually the graphics that should appear beyond the plotters limit are simply not drawn and the plot appears as if part of it's right edge has been clipped off.

If requested, creation of the plot data file is done by GEOPRO. Plotting of the data is then done by the Geometry Plot Processor GEOPLOT.

```
PARAMETER-OPTION DATA FOR DIAMOND INTERCHANGE:
F(1) - TOTAL (STARTUP+SIMULATION) TIME IN MINUTES. <1 TO 65> [20]
F(2) - MINIMUM HEADWAY IN SECONDS. <1.0 TO 3.0> [1.0]
F(3) - NUMBER OF VEHICLE CLASSES. <12> [12]
F(4) - NUMBER OF DRIVER CLASSES. <3> [3]
F(5) - PERCENT OF LEFT TURNING VEHICLES TO ENTER IN MEDIAN LANE. <50 TO 100>[80]
F(6) - PERCENT OF RIGHT TURNING VEHICLES TO ENTER IN CURB LANE. <50 TO 100>[80]
F(7) - CREATE A GEOMETRY PLOT DATA FILE ? <"YES" OR "NO"> ["YES"]
F(8) - SIZE OF GEOMETRY PLOT (INCHES). <4.0 TO 34.0> [7.50]
EDIT EXAMPLE: "F(6)=75" CHANGES FIELD 6 TO "75", OTHER FIELDS REMAIN UNCHANGED
KEYIN "HELP" FOR ADDITIONAL ASSISTANCE
  DATA FIELDS:
                  20 1.0 12
                                 3 80
                                           80 YES 7.50
FIELD NUMBERS: \.1/\.2/\.3/\.4/\.5/\.6/\7/\.8./
```

Figure 2. Parameter option data for Diamond Interchange

### Processing a Series of Replicate Runs

A new computer operating system program (DOS batch file, UNIX shell script, or VMS command procedure) named REPRUN has been written to automate replicate run processing. The user is only required to supply the number of replicates (1 through 10), the name of the GDVDATA created file and the name of the SIMDATA created file. REPRUN will make the requested number of runs, with appropriate changes to the random number seeds between runs. Data files from each run will be identified by the suffix Rn where n is the replicate run number. To make 5 replicate runs using testg.dat as the GDVDATA file and tests.dat as the SIMDATA file, the following command would be entered:

```
reprun 5 testg.dat tests.dat
```

To make the 6th replicate run using testg.dat as the GDVDATA file and tests.dat as the SIMDATA file, the following command would be entered:

```
reprun 6 testg.dat tests.dat 6
```

To make the 7th and 8th replicate run using testg.dat as the GDVDATA file and tests.dat as the SIMDATA file, the following command would be entered:

```
reprun 8 testg.dat tests.dat 7
```

The replicate run processor will delete the files listed below before beginning the simulation processing. The "n" in the file names represents the group of files in which "n" is the number of the first replicate run through 10.

GDV.REP	GPDATA.REP	GEOLIST.REP	DVDATA.REP
SIM.REP	SIMSTAT.REP	PARAMS.REP	DVLIST.Rn
SIMPLST.Rn	SIMERR.Rn	SIMSTAT.Rn	POSDAT.Rn

### Replicate Runs with Tolerance Checking

REPTOL is an additional replicate run processor. It does not make a specified number of runs, but runs replicate 1,2, and 3 first and then continues to make replicate runs until a certain statistical criteria is met or until a maximum of 10 replicate runs are processed. The criteria is that, with 95% confidence, the mean of Overall Average Total Delay for the replicate runs is within a specified percent of the Overall Average Total Delay for the population. REPTOL always makes at least 3 runs. As with REPRUN, the files specified above are deleted before the beginning of simulation. REPTOL is the suggested method for making replicate runs of the TEXAS Model. To make replicate runs using a tolerance value of 10%, testg.dat as the GDVDATA file, and tests.dat as the SIMDATA file, the following command would be entered:

reptol 10 testg.dat tests.dat

### Replicate Run Statistics Processor

A new Simulation Statistics processor is called SIMSTA. SIMSTA reads all replicate-run output statistics files for a given job, calculates statistics, prints statistics, optionally writes the statistics to a spreadsheet-compatible file, and optionally checks for a user-specified statistical tolerance being achieved (a feature used by the REPTOL processor).

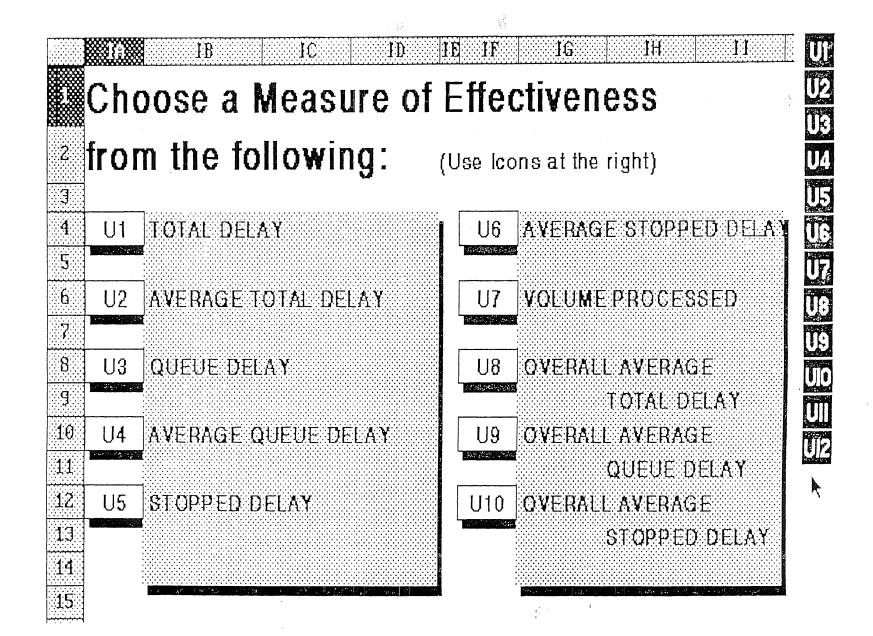
### PRESENT OUTPUT SUMMARY STATISTICS IN GRAPHICAL FORM (SPREADSHEET COMPATIBLE OUTPUT FORMAT)

The Simulation Statistics Processor SIMSTA has an option to write summary statistics to a file that can be read by the spreadsheet program Lotus 1-2-3 Version 2.4 or newer using the DOS operating system. This option is activated by including the "SS" parameter on the command line when running SIMSTA. To import a summary statistics file into Lotus 1-2-3, set the spreadsheet cell pointer to A1 then activate the main menu by keying in / , then select File from the menu, then select Import, then Numbers, then enter the name of the spreadsheet compatible summary statistics file. To view the spreadsheet data, set column A width to 54, set column B through I width to 9, and Detach WYSIWYG if necessary.

A set of spreadsheet macros has been written to aid in the display and analysis of these data. The macros are in a Macro Library file named \TEXAS\SYS\_DAT\TEXAS\_M1.MLB. This command sequence may be used to attach the Add-In named MACROMGR (Macro Manager) and load the macro when in the \TEXAS sub-directory: / Add-In Attach MACROMGR.ADN No-Key Invoke MACROMGR Load SYS\_DAT\ TEXAS\_M1.MLB Quit.In addition the Add-Ins ICONS and WYSIWYG must be attached. See the Lotus 1-2-3 manuals for complete instructions.

Once the summary statistics file has been imported into the spreadsheet and the macros installed, proceed as follows:

- 1) To start the macro, hold down the ALT key and press G. A screen with options will appear as shown in Fig 3.
- 2) To choose a measure of effectiveness, use the mouse to point and click on the appropriate label (U1 through U10) in the column on the right edge of the screen.
- 3) A menu as shown in Fig 4 will appear. To choose to examine one approach, several approaches or the entire intersection, press the first letter of the selection of your choice.
- 4) If you choose one approach, indicate your choice by using the left and right arrow keys to move the cursor at the top left of the screen to the approach number of your choice, then press the Return key. See Fig 5.
  - If you choose several approaches, you will be prompted for the approaches that you wish to examine. See Fig 6. For each approach, keyin it's number and press the Return key. When your list is complete, press 9 and then press the Return key.
- 5) The chosen graph will now appear. When finished viewing the graph, press the Return key. The prompt shown in Fig 7 will appear. Choose the desired option.



· Figure 3. Spreadsheet Prompt Screen Image

ONE APPROACH

SEVERAL APPROACHES

ENTIRE INTERSECTION?

Select from menu one, several, or entire.

Figure 4. Spreadsheet Prompt Screen; Image

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### 1 2 3 4 5 6 7 8 APPROACH 2

Which approach you want to examine? APPROACH 1 APPROACH 5 APPROACH 2 APPROACH 6 APPROACH 3 APPROACH 7 APPROACH 4 BAPPROACH 8

Figure 5. Spreadsheet Prompt Screen Image

### Enter approach number (1 to 8) or 9 to end >

APPROACH 1 APPROACH 2 APPROACH 3 APPROACH 4 APPROACH 5 APPROACH 6 APPROACH 7 APPROACH 8

You may examine 2 to 6 approaches at one time. Key in number 1-8 or 9 to quit and press ENTER.

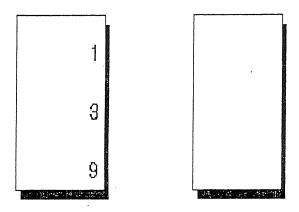


Figure 6. Spreadsheet Prompt Screen Image

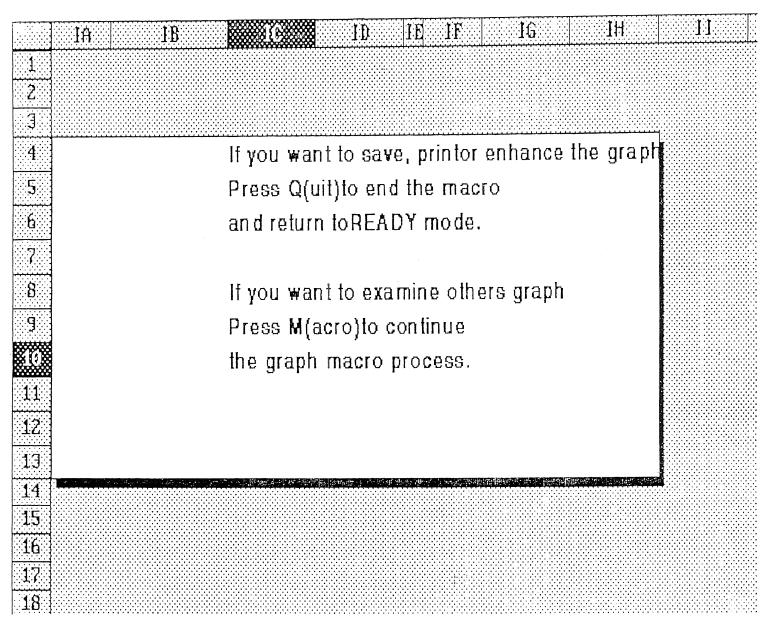


Figure 7. Spreadsheet Prompt Screen Image



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

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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 turn 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. This feature is also available on Intergraph UNIX workstations using the ENVIRON-V graphics system. 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 accurately and completely 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

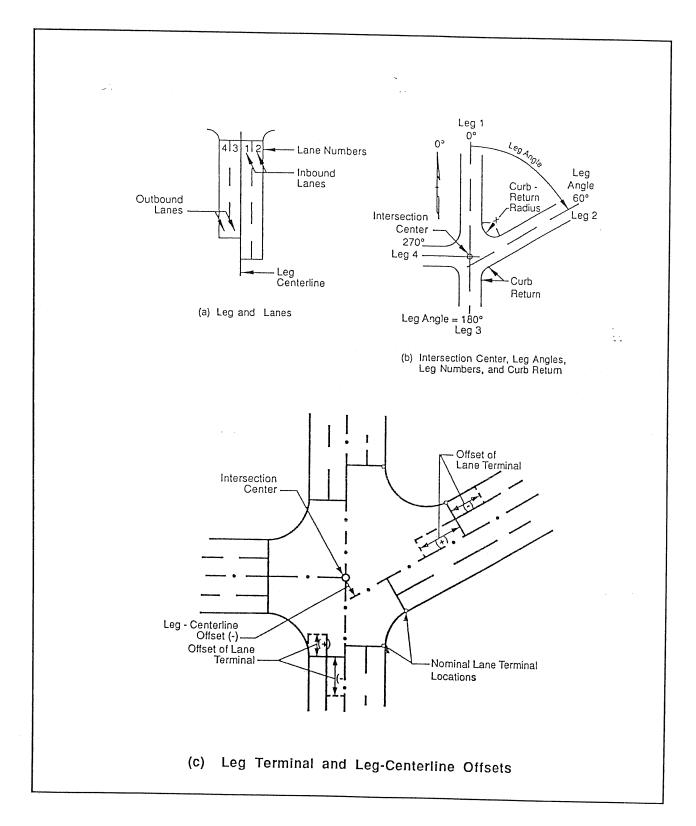


Figure A-1. Elements of intersection geometry.

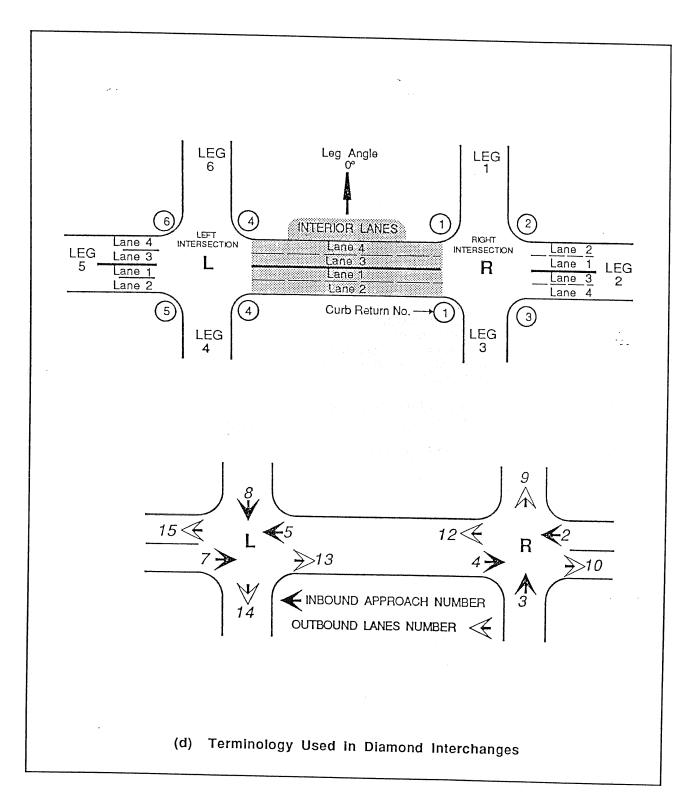


Figure A-1. Continued.

### TABLE A-1. DEFINITIONS

	TERM	DEFINITION
1.	Lane	An area of the traveled way designated for one-way use by vehicle entering or leaving an intersection. Each lane has a user-specified widtlend length and interfaces with the intersection at the lane terminal linbound 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. Or legs which carry only one-way traffic, the leg centerline is at the leftmos 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.
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.

### TABLE A-1. CONTINUED

	TERM	DEFINITION				
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).				
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.				

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 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 legs 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

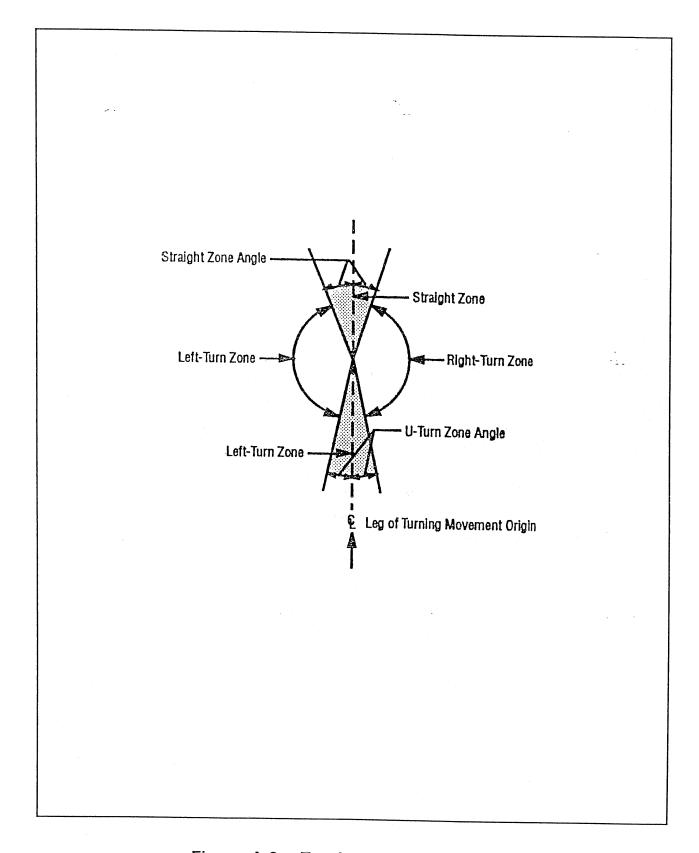


Figure A-2. Turning movement zones.

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 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

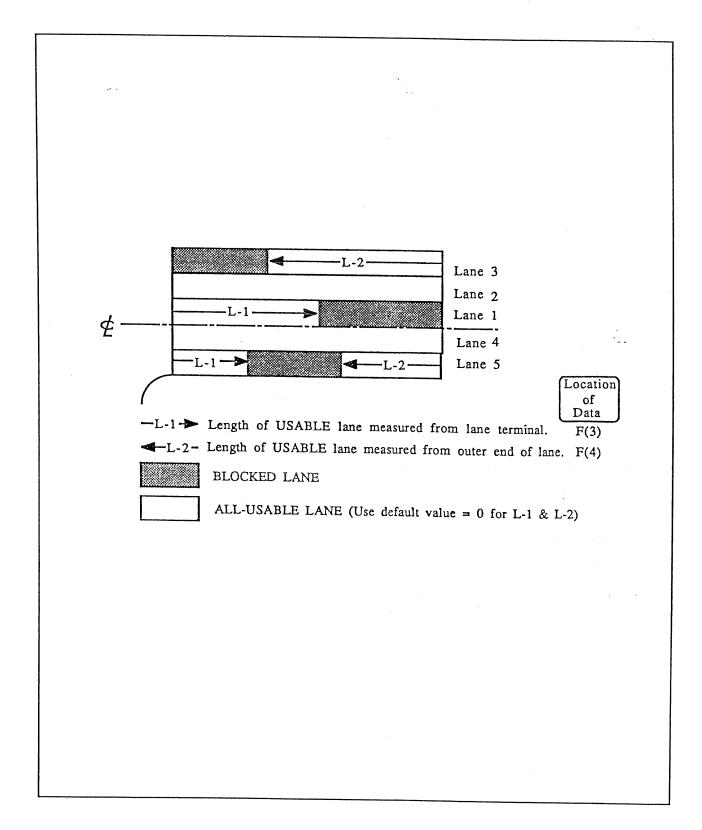


Figure A-3. Partially-blocked lane configurations.

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 Head- way Frequency Distri- bution	Allows user to select a descriptive frequency distribution for headways of vehicles entering the system.	See Table A-3	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 A-3	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
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 n 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 percentages must equal 100.	0-100	"NO" (Preset Mix)
Percent of Inbound Fraffic to Leg Destina- ions	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

			Progra				V	ehicle 7	уре						
											Tri	icks			
									Singl	e-Uni	<u> </u>	Trac	tor Se	mi-Tr	ailer
					Passeng	ger Cars		Gas	Gasoline Die			el Gasoline		Diesel	
Vehic	le Chai	racteri	stic	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 (	Charact	eristics	Factor	115	90	100	110	85	80	80	75	70	65	. 75	70
Maximum 1	Deceler	ation, i	t/sec/sec	14	13	- 13	8	7	5	7	5	6	4	6	4
Maximum A	Acceler	ation, f	t/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, %			am, %	1.5	22.5	23.3	44.7	2.6	2.6	0.2	0.2	0.2	0.2	1.0	1.0
						Percentag	e of Driv	er Clas	s in Ea	ch Ve	nicle	Туре			
											Tru	cks			
									Single	-Unit		Trac	tor Se	ni-Tra	iler
					Passeng	er Cars		Gasoline		Diesel		Gasoline		Diesel	
	Drive	er		Sports	Compact	Medium	Large	PL*	FL#	PL	FL	PL	FL	$\overline{\text{PL}}$	FL
Туре	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

<sup>\*</sup> Partially-loaded truck # Fully-loaded truck

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

TABLE A-3. FREQUENCY DISTRUBUTIONS FOR HEADWAYS

NAME OF DISTRIBUTION	DISTRIBUTOR PARAMETER
UNIFORM	Standard Deviation
LOGNRML	Standard Deviation
NEGEXP	
SNEGEXP	Minimum Headway
G A M M A	Mean <sup>2</sup> /Variance
ERLANG	Integer Value of Parameter for Gamma
CONSTAN	(can be rounded up or down) -

#### 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 chooses 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



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.

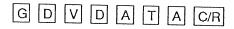
The process of using GDVDATA interactively to deal with these various situations is illustrated in the following series of examples.

#### 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



The program will display:

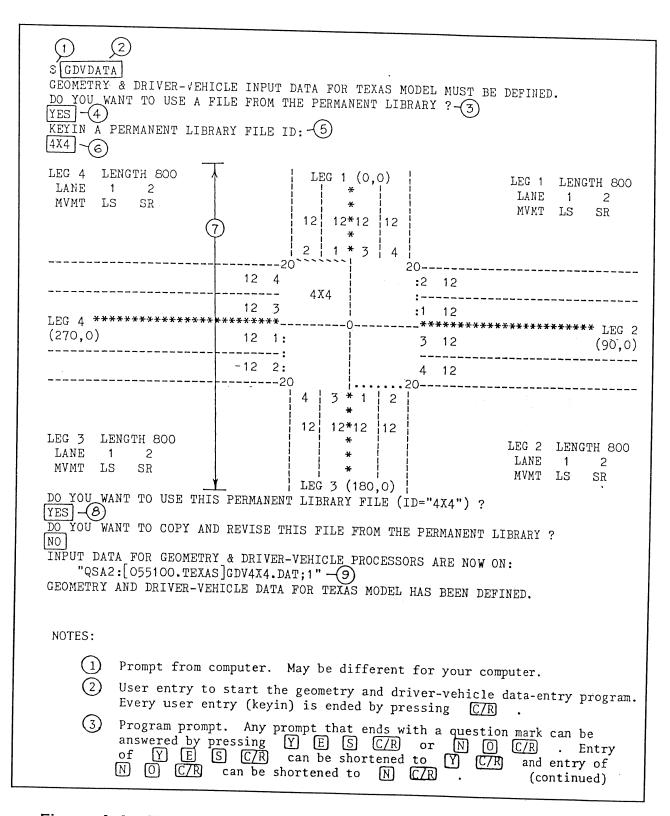


Figure A-4. Example of CASE 1, Action 1a - Choosing a file from the permanent library and using it without revisions.

#### NOTES (continued):

- 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.
- 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.

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:

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



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.

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

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



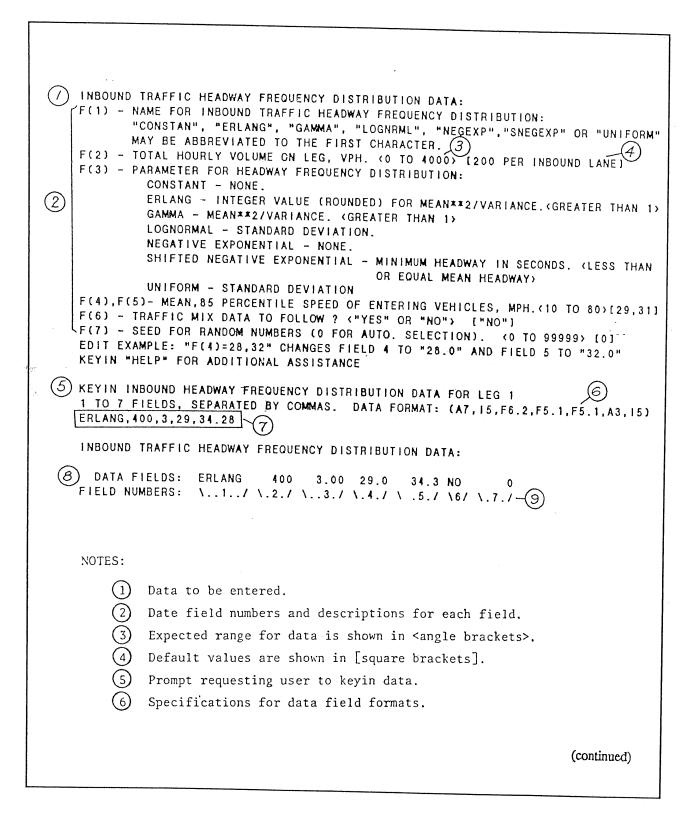


Figure A-5. Example of prompts and keying in requested data.

#### NOTES:

- 7) User keyin. To make the keyin, press the keys that correspond to each character in the  $\overline{BOX}$ , from left to right. End the keyin by pressing  $\overline{C/R}$ .
- 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 "O" for field 7 per spec. 15.
- 9 Data field numbers with field delimiters. For example: '\ 1 /'' shows that the size of field 1 is 7 characters, per spec. A7.

```
TITLE TEXT (UP TO 55 ALPHANUMERIC CHARACTERS)
PARAMETER-OPTION DATA:
F(1) - TOTAL NUMBER OF LEGS. <3 TO 6> [4]
F(2) - TOTAL (STARTUP+SIMULATION) TIME IN MINUTES. <1 TO 65> [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]
F(8) - CREATE A GEOMETRY PLOT DATA FILE ? <"YES" OR "NO"> ["NO"]
F(9) - SIZE OF GEOMETRY PLOT (INCHES). <4.0 TO 34.0> [7.50]
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 ANGLE. POSITIVE IS CLOCKWISE FROM NORTH = 0 (ZERO) DEGREES.
       <0 TO 359, IN INCREASING ORDER> [EQUAL ANGLES]
F(2) - LENGTH OF INBOUND LANES. <400 TO 1000> [800]
F(3) - 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(4) - NUMBER OF INBOUND LANES. <0 TO 6> [2]
F(5) - NUMBER OF OUTBOUND LANES. <0 TO 6> [2]
F(6) - SPEED LIMIT ON INBOUND LANES IN MPH. <10 TO 80> [30]
F(7) - SPEED LIMIT ON OUTBOUND LANES IN MPH. <10 TO 80> [30]
F(8) - LEG CENTERLINE OFFSET FROM INTERSECTION CENTER. POSITIVE IS TO THE RIGHT
       WHEN FACING IN DIRECTION OF INBOUND TRAFFIC. <-200 TO 200> [0]
F(9) - MEDIAN WIDTH. WILL BE CENTERED ON INTERSECTION CENTERLINE. <0 TO 100>[0]
F(10) - LIMITING ANGLE FOR STRAIGHT MOVEMENT. <0 TO 45 DEGREES> [20]
F(11) - LIMITING ANGLE FOR U-TURN. <0 TO 45 DEGREES> [10]
INTERNAL LEG GEOMETRY DATA:
F(1) - DISTANCE BETWEEN INTERSECTION CENTER R AND CENTER L. <100 TO 1000> [300]
F(2) - NUMBER OF LANES INBOUND TO CENTER R. <1 TO 6> [2]
F(3) - NUMBER OF LANES INBOUND TO CENTER L. <1 TO 6> [2]
F(4) - SPEED LIMIT ON LANES INBOUND TO CENTER R (MPH). <10 TO 80> [30]
F(5) - SPEED LIMIT ON LANES INBOUND TO CENTER L (MPH). <10 TO 80> [30]
F(6) - MEDIAN WIDTH. WILL BE CENTERED ON LEG CENTERLINE. <-40 TO 100> [0]
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. <-350 TO 100> [0]
F(6) - PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE.
       <O TO 100, SUM FOR LEG=100, O FOR OUTBOUND OR LANE WITH F(4) NOT= 0>
```

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

```
INTERNAL LEG LANE DATA:
F(1) - WIDTH OF LANE. <8 TO 15> [12]
F(2) - MOVEMENT CODE AT END NEAR CENTER R. <"L" (LEFT) AND/OR "S" (STRAIGHT)
F(3) - MOVEMENT CODE AT END NEAR CENTER L. <"L" (LEFT) AND/OR "S" (STRAIGHT)
F(4) - LENGTH OF USABLE LANE FROM CENTER R. [0, FOR OPEN LANE]
F(5) - LENGTH OF USABLE LANE FROM CENTER L. [0, FOR OPEN LANE]
F(6) - OFFSET OF LN. TERM. NEAR CENTER R, + IS TOWARD CNTR. R.<-350 TO 100>[0]
F(7) - OFFSET OF LN. TERM. NEAR CENTER L, + IS TOWARD CNTR. L.<-350 TO 100>[0]
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 999999> [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 LEG 0 TO LEAVE THE INTERSECTION VIA THE
             SPECIFIED (BY FIELD NUMBER) LEG. <0 TO 100 AND SUM = 100>
SIGHT DISTANCE RESTRICTION LOCATION DATA:
F(1) - REFERENCE LEG USED WHEN LOCATING RESTRICTION |
                                                                    Х
       POINT. (USE 0 FOR INACTIVE) <0, 1 TO 6> [0]
F(2) - SETBACK FROM INTERSECTION CENTER,
                                                 1
      ALONG REF. LEG CENTERLINE. <0 TO 250> [0]
                                                  1
F(3) - OFFSET FROM REF. LEG CENTERLINE.
                                                ---|
                                                          |----
       (+ IS TO RIGHT WHEN LOOKING IN DIRECTION
                                                       ----F(2)--->|
       OF INBOUND TRAFFIC) <-250 TO 250> [0]
                                                ---|
                                                        |-----
                                                          1
```

Figure A-6. Continued.

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

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

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.

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

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

```
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:
   "I302" - LEG WITH 3 INBOUND AND 2 OUTBOUND LANES, DEFAULTS FOR ALL OTHER DATA
   "I3L9502" - 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*1302" - 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
```

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.

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.

#### Sight Distance Restrictions

GDVDATA now has provision for defining up to 8 sight distance restriction points. The prompts for entering these data are shown in Figure A-8. The position of a point is defined by specifying three data items: a reference leg, a setback from the intersection center along the centerline of the reference leg, and an offset from the reference leg's centerline. For a diamond interchange, the reference leg must be an external leg. Points cannot be referenced from the internal lanes. Specifying 0 (zero) for the reference leg causes the point to be inactive. Initially, all 8 points are inactive by default.

The reference legs are only used in locating the points. The effect of points on traffic operation will be determined later and is dependent on the geometric relationship between points and all traffic lanes.

```
SIGHT DISTANCE RESTRICTION LOCATION DATA:
F(1) - REFERENCE LEG USED WHEN LOCATING RESTRICTION |
                                                                     Χ
       POINT. (USE 0 FOR INACTIVE) <0, 1 TO 6> [0]
                                                                     1
F(2) - SETBACK FROM INTERSECTION CENTER,
                                                            1
                                                                     1
      ALONG REF. LEG CENTERLINE. <0 TO 250> [0]
                                                   1
                                                                    F(3)
F(3) - OFFSET FROM REF. LEG CENTERLINE.
                                                 ---|
                                                           |----- | -
       (+ IS TO RIGHT WHEN LOOKING IN DIRECTION
                                                       ----F(2)--->
       OF INBOUND TRAFFIC) <-250 TO 250> [0]
                                                 ---1
                                                           |-----
SDR(1): 0 0
               0 (INACTIVE)
               0 (INACTIVE)
0 (INACTIVE)
0 (INACTIVE)
0 (INACTIVE)
   (2): 0 0
(3): 0 0
   (4): 0 0
   (5): 0 0
   (6): 0 0 (INACTIVE)
   (7): 0 0
                0 (INACTIVE)
   (8): 0 0 (INACTIVE)
   FLD: \1 \2/ \.3/
```

Figure A-8. Sight distance restriction points.

Sight distance restriction data cannot be added to a file that was created by a previous version of GDVDATA. When revising such a file, an informative message will be issued in place of the sight distance restriction data prompts.

#### 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.

Figure A-9 shows the form of each of the four edit requests. Similar information will be displayed in response to an entry of

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

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.
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 IDENTITY OF THE FIRST PHASE TO BE EDITED. [A OR 1]
fj - DATA TO REPLACE DATA THAT IS CURRENTLY IN THE FIRST FIELD TO BE EDITED.
     ADDITIONAL REPLACEMENT DATA ITEMS MAY FOLLOW fj, SEPARATED BY COMMAS.
     USE MULTIPLE COMMAS TO SKIP PHASES, FOR EXAMPLE: "FC(6,2)=xx,,,yy" WILL
     CHANGE (FOR FIELD 6) PHASE 2 TO "xx" AND PHASE 5 TO "yy" AND LEAVE ALL
     OTHER DATA UNCHANGED.
```

Figure A-9. Forms of data edit requests.

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 prompt is shown in Figure A-10. 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.

```
SIMULATION PARAMETER-OPTION DATA:
F(1) - START-UP TIME IN MINUTES. (STATISTICS NOT GATHERED) <2.0 TO 5.0> [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", "F", "N">
       "U" - UNCONTROLLED.
                                             "Y" - YIELD.
       "ST" - STOP, LESS THAN ALL WAY.
                                             "A" - ALL-WAY STOP.
       "P" - PRETIMED SIGNAL.
                                 "SE" - SEMITACIONILL
L. "N" - NEMA ACTUATED SIGNAL.
"N" OF "MO"> ["YES"
                                             "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) - VEHICLE POSITION (DISPLAY/POLLUTION) DATA ? <"YES", "NO", "POL">["YES"]
F(9) - VEHICLE POSITION DATA ENDING TIME IN MINUTES. <0.0 TO 70.0> [5.0]
F(10) - PRINTED OUTPUT USES 132 COLUMNS ("NO" USES 80) ? <"YES" OR "NO">["YES"]
F(11) - LEFT TURNING VEHICLES PULL INTO INTERSECTION ? <"YES" OR "NO"> ["NO"]
DATA: 5.00 15.00 0.50 NEMA 8 YES YES NO YES 5.0 YES NO
FLD: \.1/ \.2./ \.3/ \...4../ \5/ \6/ \7/ \8/ \.9/ \10 \11
```

Figure A-10. Simulation parameter-option data.

### 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 (Field 1) and simulation time (Field 2) 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 (Field 3), "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 (Field 6) and individual turning movement (Field 5). The chosen output can be printed in wide or narrow format (Field 10).

Narrow output will fit within 80 columns and prints a new page for each column of statistics (1 per turn code plus total). Wide output will use up to 132 columns, but all columns of related statistics are printed on a single page. For example, when printing statistics concerning approaches, a four leg intersection using narrow output will generally use four pages for approach statistics. Wide output will use only one page but will require the ability to view 132 columns of data. Wide output will produce a more compact and readable file, so is the recommended choice. Virtually all dot matrix printers can be set for compressed printing to process 132 columns on 8.5 inch wide paper.

These options can be selected by keying in "YES" or "NO" for the desired approach or turning-movement statistical summaries, and for wide/narrow output format. Default values set in SIMDATA are "YES" for the statistical summaries and "YES" for the 132 column (wide) output.

#### Animation and Pollution Data

Field 8 provides options for requesting the creation of a data file containing individual vehicle information for input into the Animation Preprocessor DISPRE or the Emissions Processor EMPRO. The

"YES" option requests a data file for input to DISPRE and the "POL"option requests a data file for input to EMPRO. The "NO" option requests that a file of individual vehicle information not be created and will decrease execution time for the Simulation Processor.

Collection of animation data will begin at time = 0.0 and will end at the time specified in Field 9. Collection of emission data will not begin until after the startup time, as specified in Field 1 and will continue until the end of simulation. A file created with the "YES" option can only be read by DISPRE and a file created with the "POL" option can only be read by EMPRO.

## Permitting Left Turning Vehicles to Pull into Intersection

Field 11 provides the option of permitting left-turning vehicles at signalized intersections to pull into the intersection while waiting for an acceptable gap. If "NO", left-turning vehicles will wait at the stop line. If "YES", the first vehicle may pull into the intersection to within 10 feet of the first point of potential intersection conflict and wait at that point. Additional vehicles may also cross the stop line and pull into the intersection as far as allowed by car-following algorithms. Any vehicles that have crossed the stop line more than 4 feet will proceed to complete the left-turn maneuver when the yellow change signal indication is displayed.

### 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.

### 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 0.8 seconds lead and 0.8 seconds lag are provided by SIMDATA.

#### 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) "NEMA controller",
- (5) "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:

- "Blocked" (specified in GDVDATA entry),
- (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.

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 All-way Stop	Blocked*, Uncontrolled, Yield or Stop
	Blocked*, Yield, or Stop

<sup>\* &</sup>quot;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.

### 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. Default traffic phases are designated by NEMA standard phase numbers and consist of intervals during which specified traffic movements may occur (See Figure A-11a). 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-11b). The procedure for specifying pretimed signal control for a diamond interchange is the 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-12 through A-15.

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.

## 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 of 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. (designed by a number for NEMA and TEXAS Diamond controllers and a letter for other controllers)

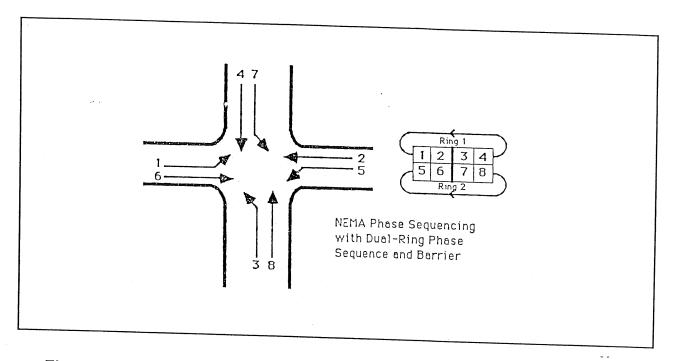


Figure A-11a. Default traffic (NEMA) phases for single intersection.

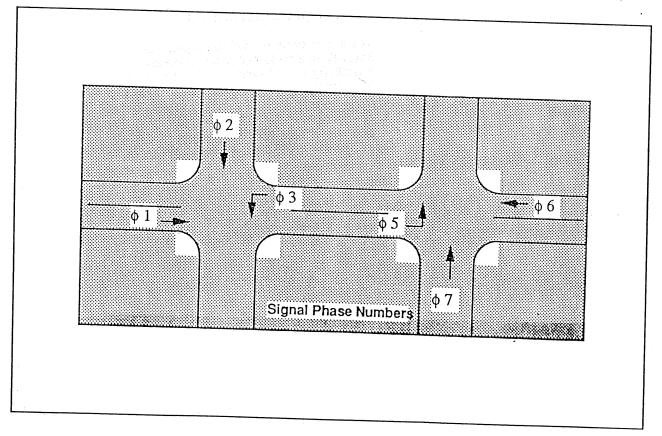


Figure A-11b. Phases for diamond intersection.

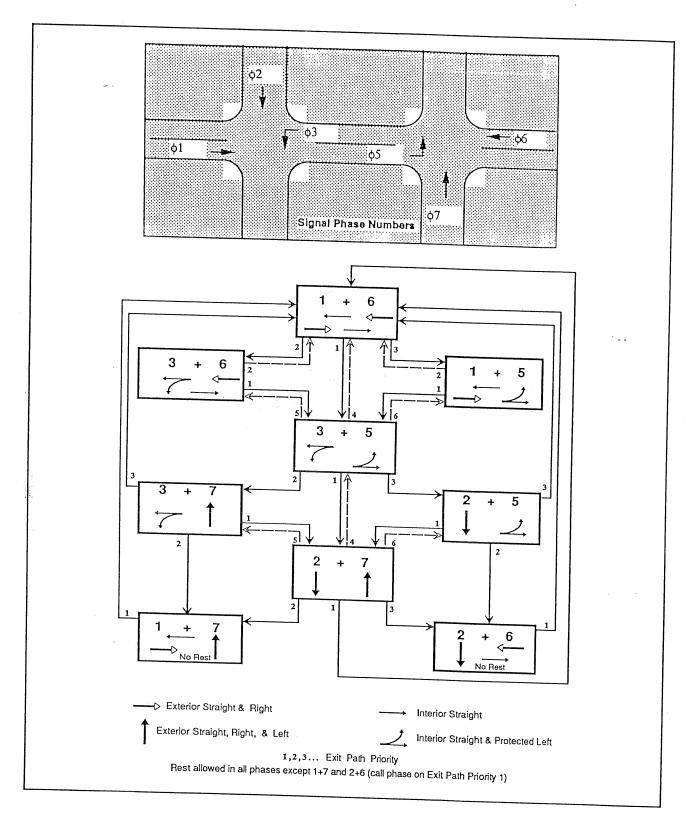


Figure A-12. Phase sequence diagram for "Figure 3" operation.

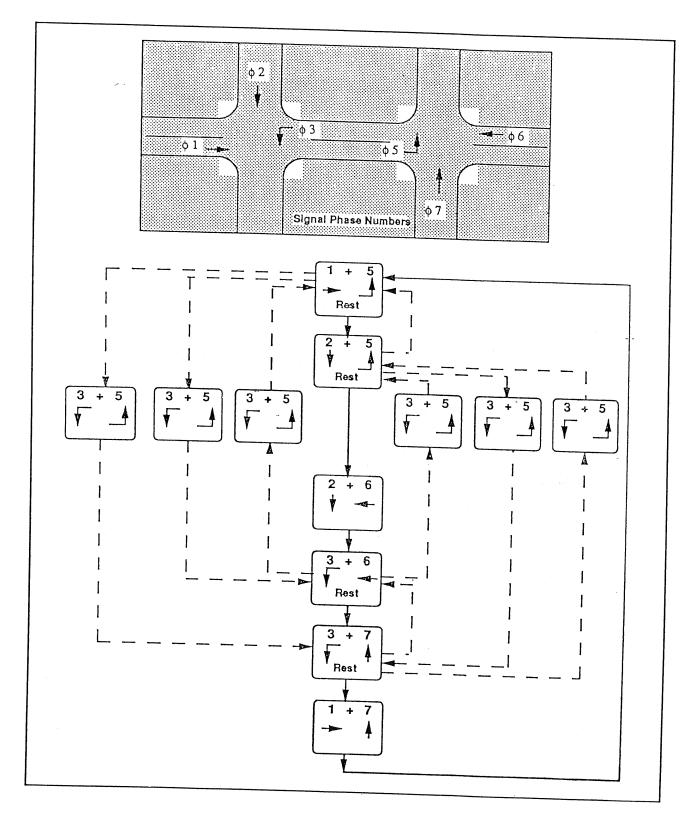


Figure A-13. Phase sequence diagram for "Figure 4" operation.

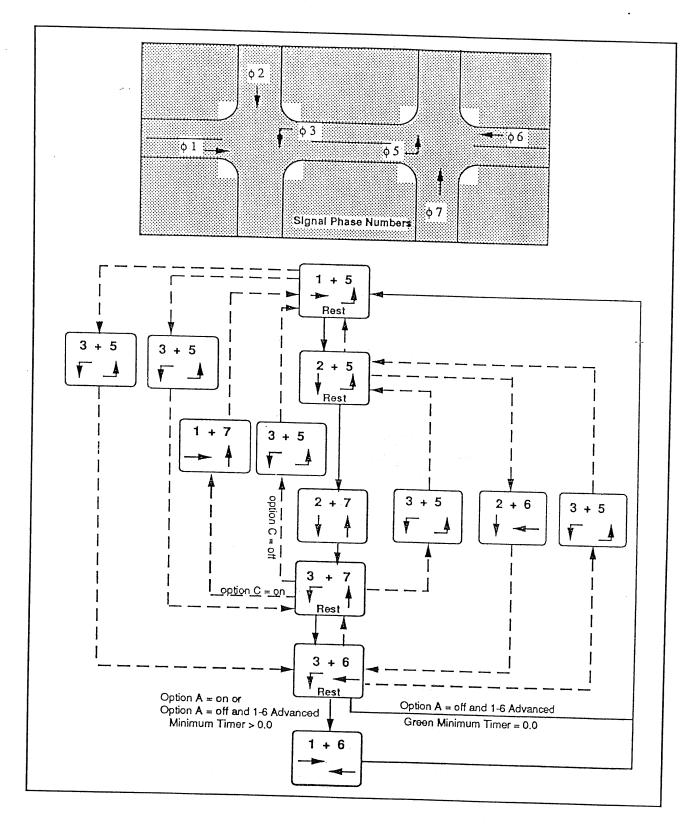


Figure A-14. Phase sequence diagram for "Figure 6" operation.

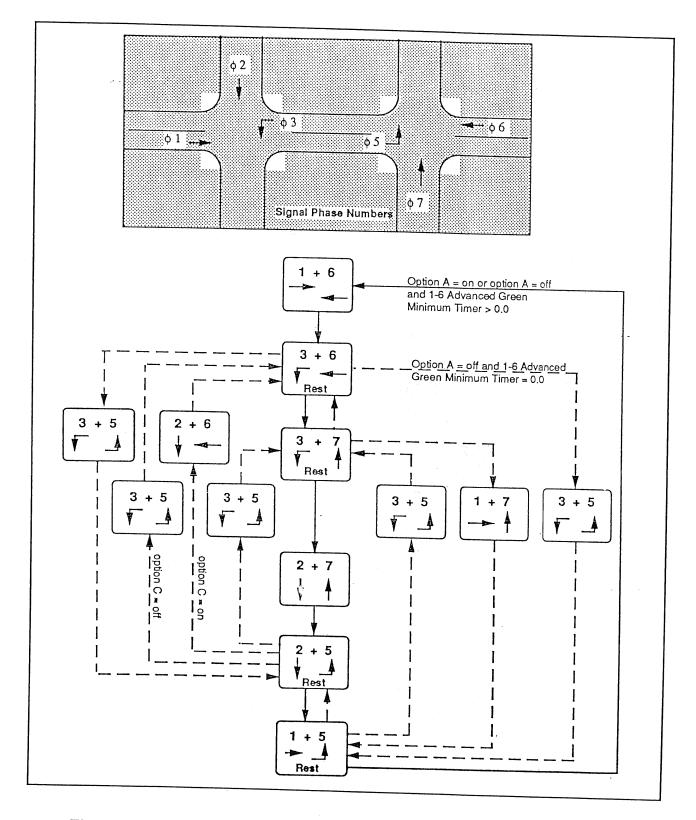


Figure A-15. Phase sequence diagram for "Figure 7" operation.

#### Alternate Traffic Phase Numbering

An optional line has been added to the TEXAS Model configuration file. If this file has only seven lines (see Fig A-16(a)), the default traffic phase numbering will be used. The defaults are shown in Fig A-16(b) for a 4-leg intersection and in Fig A-16(c) for a diamond interchange.

To use an alternate traffic phase numbering plan, use a text editor to add Line 8 to the configuration file. The first eight columns in this line are for specifying alternate traffic phase numbering for 4-leg intersections and the second eight columns are for diamond interchanges. To make changes for only one of the two types of intersections, supply exactly eight digits for that type intersection and leave the other eight columns blank. Only digits 1 through 8 are acceptable and there must be no duplication among the eight digits for either type of intersection. Figure A-17(a) shows the configuration file with this optional line. The particular traffic phase numbering in Fig A-17(a) is provided to show the relationship of the order of the digits in the configuration file and the traffic phase designations on the diagrams shown in Figs A-17(b) and A-17(c).

# SIGNAL TIMING FOR ALL CASES EXCEPT ACTUATED DIAMOND INTERCHANGES AND NEMA CONTROLLER

#### 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

```
6 21 6 2 -1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0
C:\TEXAS\SYS DAT\
                              C:\TEXAS\SYS_DAT\
C:\TEXAS\USER_DAT\SIMDATA
C:\TEXAS\USER_DAT\GDDATA
C:\TEXAS\USER_DAT\
                               C:\TEXAS\USER_DAT\
 UG_LIB
                               17
CON
                               10
 IBMPC
                                5
(a) - Configuration file (DOS version)
TRAFFIC PHASES:
           LEG 1
            4 7
                 --2 LEG
    LEG 1-/
     4 6--
             \ :
             3 8
             LEG 3
(b) - 4-Leg intersection
TRAFFIC PHASES:
      | LEG 6 |
      1
      1 2
LEG 5 /- 3 5 -/
                               LEG 2
                 -----
                        i 7
      | LEG 4 |
                        LEG 3
(c) - Diamond interchange
```

Figure A-16 Default traffic phase designations.

```
6 21 6 2 -1 2 0 0 0 0 0 0 0 0
 C:\TEXAS\SYS_DAT\
                              C:\TEXAS\SYS_DAT\
 C:\TEXAS\USER_DAT\GDDATA
                            C:\TEXAS\USER_DAT\SIMDATA
C:\TEXAS\USER_DAT\
                               C:\TEXAS\USER_DAT\
 UG LIB
                              17
 CON
                              10
 IBMPC
                               5
 1234567812345678
 (a) - Configuration file (DOS version)
TRAFFIC PHASES:
           LEG 1
           1 5
       8-/ /-6 2
    LEG
    4
        4--
             \ :
             7 3
            LEG 3
(b) - 4-leg intersection
TRAFFIC PHASES:
                    | LEG 1 |
     1
           -- 4 INTERNAL
                7 -/ LEG 2
               _____
          1 2 1
     i
                       -
      LEG 4
                      | LEG 3 |c
(c) - Diamond interchange
```

Figure A-17 An alternate traffic phase designation plan.

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", "S", "R" - LEFT, STRAIGHT, RIGHT GREEN ARROW. PROTECTED MOVEMENTS.
 *** 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 1 2 3 1 2 3 1 2 3
 MC: L S SR L S SR L S SR L S SR
 LC: SI SI RT SI SI RT SI SI RT SI SI RT
P(A): C C C
                         C C
 (B): L
                   R L
 (C):
             r c c
 (D):
FLD: \1 \2 \3 \4 \5 \6 \7 \8 \9 10 11 12
```

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. Movement codes and lane control for each lane are specified in the rows labeled "MC" and "LC", respectively. 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 "SI" or "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

## 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.

## 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-18) for the nomenclature of detector placement used in SIMDATA.

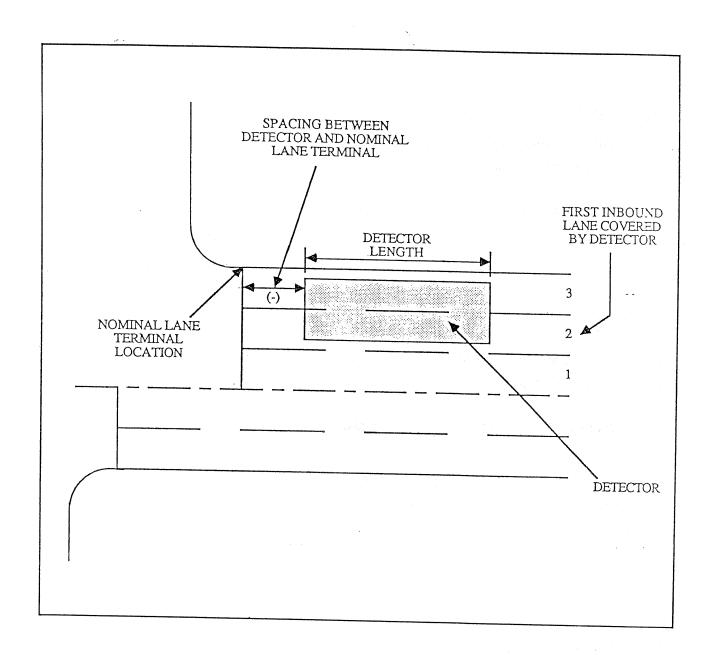


Figure A-18. Nomenclature for detector placement.

# **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".

# NEMA 8 PHASE DUAL RING CONTROLLER

## **NEMA Signal Controller**

The Simulation Processor SIMPRO has been revised to model a NEMA 8-phase dual-ring controller, with volume-density options available on a per-phase basis. The desire to use this controller can be indicated in SIMDATA by entering "N" for Field 4 of the Simulation Parameter-Option Data prompts (Fig A-19). Later, SIMDATA will prompt for the number of controller phases in the range of 2 through 8. Choosing 8 (phases) will select a dual-ring controller with two phase groups (barriers). A choice of less than 8 (phases) will select a single-ring controller. The controller will have four programmable overlaps unless 2 or 3 (phases) are requested. A 3-phase controller will have three overlaps and a 2-phase controller will have no overlaps.

The method used by SIMDATA for prompting for further controller data will depend on the controller configuration (single-ring or dual-ring) and the intersection geometry (single intersection or diamond interchange, and number of legs). One or two types of data must be defined: 1) The relationship between controller phases (including overlaps) and traffic phases. This relationship will then be used to create the Signal Sequence Data. Signal Sequence Data is equivalent to a diagram showing the connections between controller load switches and traffic signal faces. The Signal Sequence Data will later be shown in prompts for review and possible revision. 2) For a dual-ring controller only, the method depends on the phase selection priority to be used in each ring when a barrier is crossed.

```
SIMULATION PARAMETER-OPTION DATA:
F(1) - START-UP TIME IN MINUTES. (STATISTICS NOT GATHERED) <2.0 TO 5.0> [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", "F", "N">
       "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.
                                          "N" - NEMA 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) - VEHICLE POSITION (DISPLAY/POLLUTION) DATA ? <"YES", "NO", "FOL">["YES"]
F(9) - VEHICLE POSITION DATA ENDING TIME IN MINUTES. <0.0 TO 70.0> [5.0]
F(10) - PRINTED OUTPUT USES 132 COLUMNS ("NO" USES 80) ? <"YES" OR "NO">["YES"]
F(11) - LEFT TURNING VEHICLES FULL INTO INTERSECTION ? <"YES" OR "NO"> ["NO"]
DATA: 5.00 15.00 0.50 NEMA 8 YES YES NO YES 5.0 YES NO
 FLD: \.1/ \.2./ \.3/ \...4../ \5/ \6/ \7/ \8/ \.9/ \10 \11
```

Figure A-19 Simulation parameter-option data.

For a standard 4-leg intersection with left-turn bays on each leg, there is a one-to-one relationship between traffic phases and controller phases, so this case is handled automatically.

For other cases such as a diamond interchange or an intersection with other than four legs, the user will be prompted to keyin data to describe this relationship. The prompts for a diamond interchange and a 4-phase, 4-overlap controller are shown in Fig A-20.

For the case of a standard 4-leg intersection with left-turn bays on each leg, the procedure for selecting the dual-ring phase sequencing is shown in Figs A-21(a), (b), and (c). The procedure for other cases is very similar. Figure A-21(a) shows the selection of leading left turns for the E-W street (Leg 2 and Leg 4). Figure A-21(b) shows the selection of lagging left turns for the N-S street (Leg 1 and Leg 3). Figure A-21(c) reports the result of these two choices. Note that the order of phases in the Ring-Group diagram have been rearranged from the usual to indicate the choices. In particular, phases in Group 2 have been reordered to indicate that Phases 4 and 8 (the straight movements) will have first priority to be served when the barrier is crossed.

# Volume-Density Option for NEMA Signal Controller

Prompting for phase timing data will result in a screen display as shown in Fig A-22. Notice that Field 11 indicates the desire to use the controller's volume-density options. If "YES" appears in Field 11 for any phase, then the volume-density data prompts shown in Figure A-23 will be presented. If Field 11 is "NO" for all phases, then the volume-density data prompt will be skipped.

```
TRAFFIC PHASES:
         LEG 6 |
                                | LEG 1 |
         1
         - 1
                -- 4
                       INTERNAL
                        5 -/
   1 ---
                       LANES 8 --
                 -----
                 1
                               1 7
         1
                                - 1
         LEG 4
                               | LEG 3 |
 KEYIN THE TRAFFIC PHASES TO BE IN CONTROLLER PHASE 1. (OR "NONE")
 1 TO 4 INTEGERS, SEPARATED BY COMMAS:
 1 C/R
 TRAFFIC PHASE 1 IS TO BE IN CONTROLLER PHASE 1. IS THIS OK ?
 KEYIN THE TRAFFIC PHASES TO BE IN CONTROLLER PHASE 2. (OR "NONE")
 1 TO 4 INTEGERS, SEPARATED BY COMMAS:
 2 | C/R
 TRAFFIC PHASE 2 IS TO BE IN CONTROLLER PHASE 2. IS THIS OK ?
 Y C/R
 KEYIN THE TRAFFIC PHASES TO BE IN CONTROLLER PHASE 3. (OR "NONE")
 1 TO 4 INTEGERS, SEPARATED BY COMMAS:
 6 C/R
 TRAFFIC PHASE 6 IS TO BE IN CONTROLLER PHASE 3. IS THIS OK ?
 Y C/R
KEYIN THE TRAFFIC PHASES TO BE IN CONTROLLER PHASE 4. (OR "NONE")
1 TO 4 INTEGERS, SEPARATED BY COMMAS:
 7 | C/R
TRAFFIC PHASE 7 IS TO BE IN CONTROLLER PHASE 4. IS THIS OK ?
 Y C/R
KEYIN THE TRAFFIC PHASES TO BE IN CONTROLLER OVERLAP A. (OR "NONE")
1 TO 4 INTEGERS, SEPARATED BY COMMAS:
 8 C/R
TRAFFIC PHASE 8 IS TO BE IN CONTROLLER OVERLAP A. IS THIS OK ?
 Y | C/R |
KEYIN THE TRAFFIC PHASES TO BE IN CONTROLLER OVERLAP B. (OR "NONE")
1 TO 4 INTEGERS, SEPARATED BY COMMAS:
4 C/R
TRAFFIC PHASE 4 IS TO BE IN CONTROLLER OVERLAP B. IS THIS OK ?
Y | C/R
KEYIN THE TRAFFIC PHASES TO BE IN CONTROLLER OVERLAP C. (OR "NONE")
1 TO 4 INTEGERS, SEPARATED BY COMMAS:
5 C/R
TRAFFIC PHASE 5 IS TO BE IN CONTROLLER OVERLAP C. IS THIS OK ?
KEYIN THE TRAFFIC PHASES TO BE IN CONTROLLER OVERLAP D. (OR "NONE")
1 TO 4 INTEGERS, SEPARATED BY COMMAS:
3 C/R
TRAFFIC PHASE 3 IS TO BE IN CONTROLLER OVERLAP D. IS THIS OK ?
Y C/R
```

Figure A-20 Associating traffic phases with controller phases.

```
THE CONTROLLER HAS 8 TIMED PHASES AND 4 PROGRAMMABLE OVERLAPS.
THE CONTROLLER HAS 2 RINGS AND 2 PHASE GROUPS.
THE PHASE GROUPS ARE SEPARATED BY BARRIERS.
         LEG 1
          4 7
          : \
               --2 LEG
                                   GROUP GROUP
LEG
     1-/
               /-5 2
                                    1
                                          2
4
     6--
           \ :
                           RING 1
                                   1-----
                           RING 2 | _ _ |
           LEG 3
SELECT PHASE SEQUENCING FOR GROUP 1 (PHASES 1, 2, 5 AND 6).
1 - LEFT TURN MOVEMENTS 1 AND 5 FIRST.
2 - LEAD-LAG LEFTS WITH MOVEMENTS 2 AND 5 FIRST.
3 - LEAD-LAG LEFTS WITH MOVEMENTS 1 AND 6 FIRST.
4 - STRAIGHT MOVEMENTS 2 AND 6 FIRST.
KEYIN THE NUMBER OF THE DESIRED PHASE SEQUENCE:
1 C/R
PHASE SEQUENCE NUMBER 1 IS SELECTED. IS THIS OK ?
Y C/R
```

Figure A-21(a) Selecting phase sequence for phases in Group (Barrier) 1.

```
LEG 1
         4 7
               --2 LEG
                                 GROUP GROUP
LEG
     1-/
              /-5
                                   1 2
     6--
                                 |----|
           \ :
                          RING 1 | 1 2 | _ |
           3 8
                                 |----|
                          RING 2 | 5 6 | _ _ |
          LEG 3
                                 |----|
SELECT PHASE SEQUENCING FOR GROUP 2 (PHASES 3, 4, 7 AND 8).
1 - LEFT TURN MOVEMENTS 3 AND 7 FIRST.
2 - LEAD-LAG LEFTS WITH MOVEMENTS 4 AND 7 FIRST.
3 - LEAD-LAG LEFTS WITH MOVEMENTS 3 AND 8 FIRST.
4 - STRAIGHT MOVEMENTS 4 AND 8 FIRST.
KEYIN THE NUMBER OF THE DESIRED PHASE SEQUENCE:
4 C/R
PHASE SEQUENCE NUMBER 4 IS SELECTED. IS THIS OK ?
Y C/R
```

Figure A-21(b) Selecting phase sequence for phases in Group (Barrier) 2.

```
LEG 1
        4 7
         : \
              --2
                  LEG
                                GROUP GROUP
LEG
     1-/
             /-5
                   2
                                1
     6--
                        RING 1
                              1121431
          3 8
                               1----|
                        RING 2 | 5 6 | 8 7 |
         LEG 3
                               |----|
PRESS THE <RETURN> KEY TO CONTINUE . . .
C/R
```

Figure A-21(c). Selected sequence for phases in both groups (Barriers).

```
NEMA ACTUATED CONTROLLER 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> [0.5]
F(5) - MAXIMUM EXTENSION. <0 TO 99> [30]
F(6) - DUAL ENTRY PHASE. (0 = SINGLE ENTRY PERMITTED) <0 TO 8> [0]
F(7) - PROVISION FOR STORING DEMAND ? <"YES" OR "NO"> [YES]
F(8) - ENABLE MAXIMUM RECALL ? < "YES" OR "NO"> [NO]
F(9) - ENABLE MINIMUM RECALL ? < "YES" OR "NO"> [NO]
F(10) - PLACE CALL ON MAX-OUT ? <"YES" OR "NO"> [YES]
F(11) - USE VOLUME DENSITY OFTIONS ? <"YES" OR "NO"> [NO]
** DATA IN FIELDS 1 THROUGH 4 WILL BE AUTOMATICALLY ROUNDED TO THE NEAREST "DT".
P(1): 3.0 2.0 3.0 0.5 30 0 YES NO NO YES NO
 (2): 3.0
            2.0 3.0 0.5 30 0 YES NO NO
            2.0 3.0 0.5 30 0 YES NO NO
 (3):
       3.0
                                         YES NO
            2.0 3.0 0.5 30 0 YES NO
 (4):
       3.0
                                     NO
                                         YES YES
            2.0 3.0 0.5 30 0 YES NO
 (5):
       3.0
                                     NO
                                         YES NO
            2.0 3.0 0.5 30 0 YES NO
 (6):
       3.0
                                     ΝО
                                         YES NO
 (7):
       3.0
            2.0 3.0 0.5 30 0 YES NO
                                     NO
                                         YES NO
      3.0 2.0 3.0 0.5 30 0 YES NO
 (8):
                                     NO
                                        YES YES
 FLD: \.1/ \.2/ \3/ \4/ \5 \6 \7/ \8/ \9/ \10 \11
IS NEMA ACTUATED CONTROLLER SIGNAL TIMING DATA OK ?
```

Figure A-22. NEMA actuated controller signal timing data.

```
NEMA ACTUATED CONTROLLER VOLUME DENSITY DATA:
    F(1) - USE VOLUME DENSITY OPTIONS FOR THIS PHASE ? <"YES" OR "NO">
    F(2) - ADDED INITIAL INTERVAL PER ACTUATION. <0.000 TO 3.000> [0.125]
    F(3) - MAXIMUM INITIAL INTERVAL. <1 TO 60> [30]
    F(4) - MINIMUM VEHICLE INTERVAL. <0.000 TO 7.750> [2.000]
    F(5) - TIME BEFORE STARTING TO REDUCE VEHICLE INTERVAL. <1 TO 60> [5]
    F(6) - TIME PERIOD FOR REDUCING VEHICLE INTERVAL. <1 TO 60> [5]
    P(1): NO 0.100 30 3.000 5
     (2): NO 0.100 30 3.000 5 5
     (3): NO 0.100 30 3.000 5 5
     (4): YES 0.100 30 3.000 5 5
     (5): NO 0.100 30 3.000 5 5
     (6): NO 0.100 30 3.000 5 5
     (7): NO 0.100 30 3.000 5 5
     (8): YES 0.100 30 3.000 5
FLD: \1/\.2./\3\.4./\5\6
    IS NEMA ACTUATED CONTROLLER VOLUME DENSITY DATA OK ?
```

Figure A-23. NEMA actuated controller volume density data.

# DIAMOND CONTROLLER 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-12 through A-15 requires additional specifications for some the 12 special controller intervals. These are listed in Figure A-24a 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 options and possible responses are provided in Figure A-24b. The sequence pattern diagrams of Figures A-12 through A-15 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-25.

# 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.

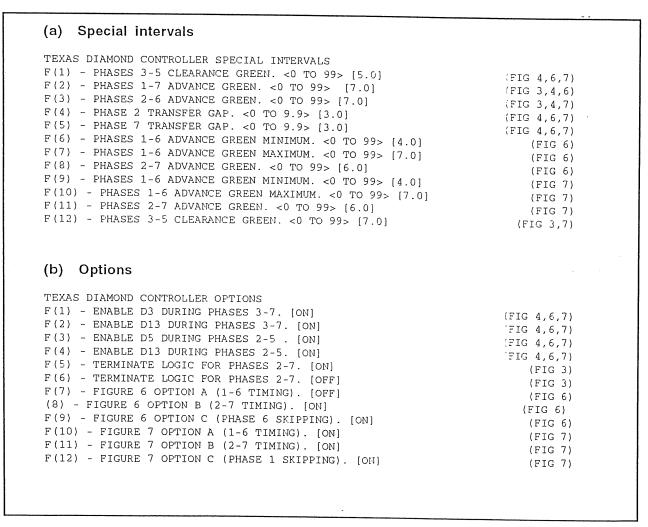


Figure A-24. Data fields for Texas Diamond Controller options

```
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 3 1 2 1 2 1 2 1 2 1 2 3
D(1):
        5 1 2
                -10
                     30 PR
                                                XX
 (2):
        6 1 2
                -10
                     30 PR
                                                    X X
(2A):
        6 1 2
                -50
                     10 PR
                                                     ХХ
 (3): IL 1 1
                     30 PR
                -10
                                                        Χ
(13): IL 2 2
                -10
                     30 PR
 (5): IR 1 1
                                                           XX
                -10
                     30 PR
                                 Х
(56): IR 2 2
                -10
                     30 PR
                                   X \quad X
 (6):
       2 1 2
                -10
                     30 PR
                                        х х
 (7):
       3 1 2
                -10
                     30 PR
                                            X X
(7A):
       3 1 2
                -50
                     10 PR
                                            х х
FLD: \1 2 8 \.4.7 \5/ \6
IS DATA FOR DETECTORS OK ?
```

Figure A-25. Screen display for detector data input.

# SEPARATE U-TURN LANES AT DIAMOND INTERCHANGES

# Free U-Turn Lane Geometry

A new set of screen prompts for creating free u-turn lanes has been added to GDVDATA (Figure A-26). The prompts are displayed only when modeling a diamond interchange. These prompts make it easy to add a new, or remove an existing, free u-turn lane. A free u-turn lane is added or removed based upon the value in Field 1: a value of 0 (zero) specifies that no free u-turn lane is to be created, or an existing free u-turn lane is to be removed; whereas, a value in the range of 8 to 15 (feet) specifies that a free u-turn lane of that width is to be created.

```
FREE U-TURN LANE DATA:

F(1) - WIDTH OF LANE (0 FOR NO FREE U TURN LANE). <0, 8 TO 15> [0]

F(2) - SPACE BETWEEN OUTER INTERNAL LANE AND FREE U-TURN LANE. <0 TO 25> [10]

F(3) - LENGTH OF ENTRANCE LANE. <20 TO 250> [100]

F(4) - RADIUS AT ENTRANCE. <5 TO 100> [20]

F(5) - LENGTH OF EXIT LANE. <20 TO 250> [100]

F(6) - RADIUS AT EXIT. <5 TO 100> [20]

F(7) - PERCENT OF U-TURNING TRAFFIC TO USE THE FREE U-TURN. <0 TO 100> [80]

*** L(1) IS FOR FREE U-TURN FROM LEG 3 TO LEG 4

*** L(2) IS FOR FREE U-TURN FROM LEG 6 TO LEG 1

L(1): 15 10 100 20 100 20 80

(2): 0 10 100 20 100 20 80

FLD: \1 \2/ \3/ \4/ \5/ \6/ \7/
```

Figure A-26 Free u-turn lane data for diamond interchange.

The free u-turn geometry comprises 5 segments: (1) a single, exclusive, inbound lane of specified length on the median (left) side of the external inbound ramp leg on one side of the diamond interchange, (2) an exclusive, circular-arc, intersection path tangent to the centerline of segment 1, tangent to the centerline of segment 3, and changing direction by approximately 90 degrees, (3) a single, exclusive, internal lane of calculated length with traffic control at the end of this internal lane, (4) an exclusive, circular-arc, intersection path tangent to the centerline of segment 3, tangent to the centerline of segment 5, and changing direction by approximately 90 degrees, and (5) a single, exclusive, outbound lane of specified length on the median (left) side of the external outbound ramp leg on the other side of the diamond interchange. The width of the free u-turn lane is specified with the same value for segments 1, 3, and 5.

If a free u-turn lane is requested, for example (see Fig A-26) from Leg 3 (right side of diamond interchange northbound) to Leg 4 (left side of diamond interchange southbound), it is created automatically as follows. The number of inbound lanes on Leg 3 is increased by 1. All the properties of

the inbound lanes are transferred to the next higher-numbered lane. The properties of the previously high-numbered lane (right-hand lane) are transferred to the newly-added lane and so-on until the properties of the previous Lane 1 (median lane) are transferred to Lane 2. Lane 1 is then available to be used as the entrance to the free u-turn lane. Its length and width are assigned from the values in data Fields 1 and 3. It is located geometrically to the left of the lane that was previously Lane 1. It is assigned a turn code of "U" to indicate that it is for u-turns only. A similar process is applied to Leg 4 to add the exit segment of the free u-turn lane. Next, a pseudo leg is created. This new leg has only one lane, with lane width as specified in Field 1 and is located parallel to the internal lanes of the diamond interchange. Field 2 specifies the distance between this lane and the right-hand edge of the internal lanes that are inbound to the right intersection. Finally, this new leg is connected to the entrance and exit lanes by circular segments. The radii of the left edge of these circular segments (curb returns) are specified in Fields 4 and 6, respectively, and their width is taken from Field 1.

To remove an existing free u-turn lane, simply change the value in Field 1 to 0 (zero) and the above process will automatically be reversed. Free u-turn lane data cannot be added to a file that was created by a previous version of GDVDATA. When revising such a file, an informative message will be issued in place of the free u-turn data prompts.

# Free U-Turn Processing in SIMDATA

The Simulation Data Processor SIMDATA is aware of the free u-turn data in the GDVDATA reference data file and will make adjustments, as needed, in lane-control data, signal-sequence data and detector data. This is illustrated in Figs A-27, A-28 and A-29. In each figure, the SIMDATA data shown in part (a) resulted from the use of a reference file that had no free u-turn lanes. The reference file was then revised to add a free u-turn lane from Leg 3 to Leg 4. The adjustments made by SIMDATA are shown in Part (b) of each figure.

```
LEG: /-IR\ /-2-\ /-3-\ /-5-\ /-6-\ /-IL\
LANE: 1 2 1 2 1 2 1 2 1 2 1 2 1 2

DATA: SI SI SI RT SI RT SI RT SI RT SI SI
FLD: \1 \2 \3 \4 \5 \6 \7 \8 \9 10 11 12

(a) - Without free u-turns

LEG: /-IR\ /-2-\ /---3--\ /-5-\ /-6-\ /-IL\
LANE: 1 2 1 2 1 2 3 1 2 1 2 1 2

DATA: SI SI SI RT YI SI RT SI RT SI SI
FLD: \1 \2 \3 \4 \5 \6 \7 \8 \9 10 11 12 13

(b) - With free u-turn from Leg 3 to Leg 4
```

Figure A-27 Lane control data.

Figure A-29(a) shows the free u-turn entrance lane (Lane 1) added to Leg 3 with the default lane control "YI" (yield sign control). It is important to note that the lane control for a free u-turn will be applied at the exit end of the free u-turn internal lane (pseudo leg). Only "YI" or "ST" (stop sign control) are appropriate for a free u-turn lane.

The addition of the free u-turn lane (the column of data in Field 5) is also seen in Fig A-28. The data "UN" (unsignalized) is appropriate for a sign-controlled lane.

```
LEG: /-IR\ /-2-\ /-3-\ /-5-\ /-6-\ /-IL\
LANE: 1 2 1 2 1 2 1 2 1 2 1 2
 MC: LS S S SR LS SR S SR LS SR LS S
 LC: SI SI SI RT SI RT SI RT SI RT SI SI
      C C
P(1):
                             LC C
(2):
                             LC C
 (3): LC C
                        C C
(4): LC C C C
     ----- OVERLAPS -----
 (A):
(B):
(C):
(D):
FLD: \1 \2 \3 \4 \5 \6 \7 \8 \9 10 11 12
(a) - Without free u-turns
LEG: /-IR\ /-2-\ /---3--\ /-5-\ /-6-\ /-IL\
LANE: 1 2 1 2 1 2 3 1 2 1 2 1 2
 MC: LS S S SR U LS SR S SR LS SR LS S
 LC: SI SI SI RT YI SI RT SI RT SI RT SI SI
         UN C C
                                LC C
(2): C C UN
                                LC C
(3): LC C UN C C (4): LC C UN C C
    ----- OVERLAPS -----
(A):
            UN
(B):
             UN
(C):
              ИN
(D):
              UN
FLD: \1 \2 \3 \4 \5 \6 \7 \8 \9 10 11 12 13
(b) - With free u-turn from Leg 3 to Leg 4
```

Figure A-28 Signal sequence data.

Detector data are also revised to conform to the new geometry. The data in Field 2 indicates the first lane to be covered by a detector. Detector number 1 is located on Leg 3, and it can be seen by

comparing Fig A-29(a) with A-29(b) that the data in Field 2 has been revised to exclude the new free u-turn entrance lane but to still cover the other two lanes.

When entering detector lane coverage data, the user should always consider the absence or presence of free u-turn lanes in the reference data file that is being used at that time. It is inappropriate to place a detector to cover Lane 1 if that lane is indeed a free u-turn lane. SIMDATA will not specifically prohibit this. However, if at a later time the reference file were revised to remove the free u-turn lane that is covered by a detector, the results will be invalid detector data.

```
LEG: /IR /2\ /3\ /5\ /6\ /IL
                        LANE: 1 2 1 2 1 2 1 2 1 2 1 2 1 2
D(1): 3 1 2
               0 60 PR
                              ХХ
 (2): 2 1 2
               0 60 PR
                                 ХХ
 (3): 6 1 2
               0 60 PR
                                            X X
 (4): 5 1 2
               0 60 PR
                                        X \quad X
FLD: \1 2 3 \.4./ \5/ \6
(a) - Without free u-turns
                         LEG: /IR /2\ /-3-\ /5\ /6\ /IL
                        LANE: 1 2 1 2 1 2 3 1 2 1 2 1 2
D(1): 3 2 2
               0 60 PR
                                      ХХ
(2): 2 1 2
               0 60 PR
                                ХХ
               0 60 PR
(3): 6 1 2
                                              X X
             0 60 PR
(4): 5 1 2
                                          ХХ
FLD: \1 2 3 \.4./ \5/ \6
(b) - With free u-turn from Leg 3 to Leg 4
```

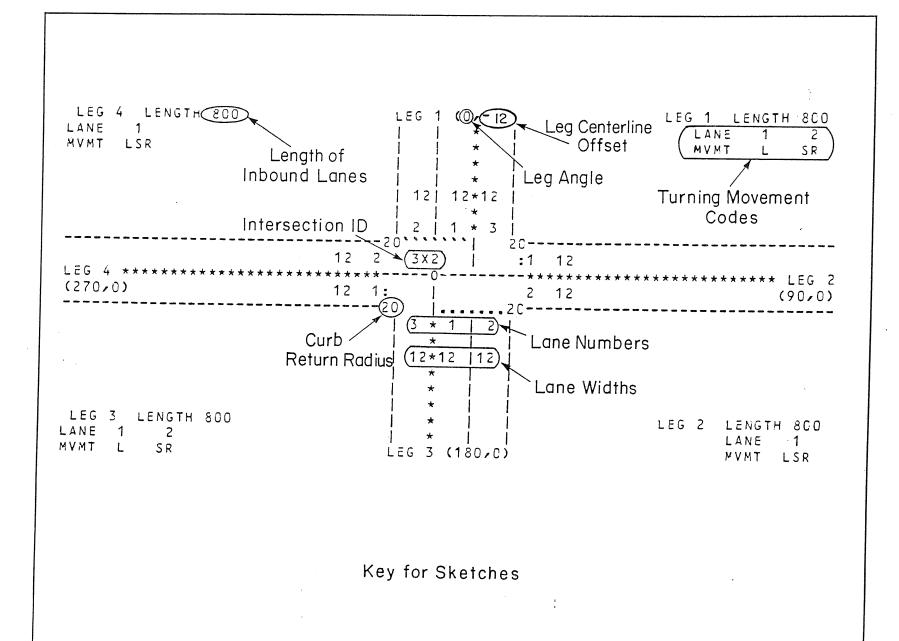
Figure A-29 Detector data.

# APPENDIX A.1 FILES IN THE PERMANENT LIBRARY

# Table of Contents

<u>File ID</u>	Description	<u>Page</u>
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4 T 3	Standard 4 T 3	A.1-48
4 T 4	Standard 4 T 4	
EX1	Example 1*	A.1-51
EX2	Example 2**	A.1-54
EX3	Example 3***	A.1-58
	Example 0	A. <b>1</b> -65

<sup>\*</sup> Six-Points Intersection (6 legs with 4 lanes each)
\*\* 35th and Jefferson, Austin, Texas
\*\*\* Skewed Diamond Interchange



STANDARD 3 X 2	LEG 4 LENGTH 200 Lane 1 Myht LSR	LEG 1 (0,-12)	LEG 1 LENGTH 8CO LANE 1 2 MYMT L SR
	(2/0/0)	12 2 3x2   :1 12 ********* 12 1:   2 12 20  2C	************ LEG
	LEG 3 LENGTH 800 Lane 1 2 MVMT L SR	*       *       *       *       Leg 3 (180,0)	LEG 2 LENGTH 8CO LANE 1 PVMT LSR
	NUMBER OF LEGS	S TRAFFIC SIMULATION PACKAGE  TES	
	TC ENTER IN MEDIAN LAN PERCENT OF RIGHT TURNING TO ENTER IN CURB LANE. CURB RETURN RACII: CURB RETURN RACIUS NUMBER - CURB RETURN RACIUS		

# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

### STANDARD 3 X 2

# TEXAS TRAFFIC SIMULATION PACKAGE CRIVER-VEHICLE INPUT DATA

### STANDARD 3 X 2

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INSCUND TRAFFIC	
HEACHAY FREQUENCY DISTRIBUTION	SAEGEXP
TOTAL MOURLY VOLUME ON LEG	400
PARAMETER FOR CISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, MPH	26.0 21.0
BS-PERCENTILE SPEEC, PPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO.

OUTEOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER				1	2	7	4
PERCENT OF	LEG	1 INBOUND		•	-	-	7
VEHICLES W	ITH	DESTINATION	ON LEG	a	3.3	7.7	3.4

# TEXAS TRAFFIC SIMULATION PACKAGE

### STANDARD 3 X 2

LEG 2 GEOMETRY DATA:

LEG ANGLE	800 250
NUMBER OF INBOUND LANES	1
SPEED LIMIT ON INBOUND LANES IN MPH SPEED LIMIT ON DUTBOUND LANES IN MPH	3 Ċ 3 O
MECIAN WICH	30
LIMITING ANGLE FOR STRAIGHT MCVEMENT	2 Ó 1 G

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

LANE NUMBER	. 1
WICTH OF LANE	
FROM LANE TERMINAL	Č
DFFSET OF LANE TERMINAL PERCENT OF INBOUND TRAFFIC TC ENTER IN THIS LANE	

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

LANE NUMBER	1,
MOVEMENT CCDE	LŚŔ
FROM LANE TERMINAL	ç
OFFSET OF LANE TERMINAL	Ŏ

## TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA

### STANDARD 3 X 2

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR	NBOUND TRAFFIC	
HEADWAY	REQUENCY DISTRIBUTION SNE	GFYP
TOTAL HO		
PARAMETE	FCR DISTRIBUTION	200
MEAN SPE	OF ENTERING VEHICLES, MPH	28.0
85-PERCE	ILE SPEED, MPH	31.8
TRAFFIC I	X DATA TO ECLIDE 7	

### OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER PERCENT OF		2 71 00				 1	2	3	4
VEHICLES	ITH.	DESTIN	ATION	CN	LEG	 33	. с	33	34

```
TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                                                                    TEXAS TRAFFIC SIMULATION PACKAGE
    STANDARD 3 X Z
                                                                                                                                    STANDARD 3 X 2
       LEG 3 GECHETRY CATA:
                                                                                                                                       LEG 4 GEOMETRY DATA:
 LEG ANGLE
LENGTH OF INBOUND LANES
LENGTH OF CUTSOUND LANES
NUMSER OF INSCUND LANES
NUMSER OF CUTSOUND LANES
SPEED LIMIT ON INBOUND LANES IN MPH
SPEED LIMIT ON OUTBOUND LANES IN MPH
LEG CENTERLINE OFFSET
MECIAN WIDTH
LEG LANG ANGLE FOR STRAIGHT MCVERENT
                                                                                                                                  LIMITING ANGLE FOR STRAIGHT MCVEMENT ---
LIMITING ANGLE FOR U-TURN ----
       LANE DATA FOR INSCUND LEG 3:
                                                                                                                                      LANE DATA FOR INBOUND LEG 4:
 LANE NUMBER
(INBOUND LANE NUMBER)

MICTH CF LANE
MOVAMENT CODE

LENGTH OF UNBLOCKED LANE
FROM LANE TERMINAL

OFFSET OF LANE TERMINAL

OFFSET OF LANE TERMINAL

TC ENTER IN THIS LANE

HER
                                                                                                                                LANE NUMBER - 1
(INBCUND LANE NUMBER) - 1
MICH OF LANE - 1
MOVEMENT CODE - LSR
LENGTH OF UNGLOCKEC LANE
FROM LANE TERMINAL - 0
FFOM CUTER END - 0
OFFSET OF LANE TERMINAL - 0
DERSET OF LANE TERMINAL - 0
DERSET OF LANE TERMINAL - 1
TC ENTER IN THIS LANE - 100
                                                     12
                                                    48
                                            MEDIĂŘ CLŘĚ
                                                                                                                                     CONVERTED APPROACH 8)
      LANE DATA FOR OUTECUND LEG 3:
LENGTH OF UNBLOCKED LANE
FROM LANE TERMINAL
FROM OUTER END
                                                                                                                                 OFFSET OF LANE TERPINAL -----
                                  TEXAS TRAFFIC SIMULATION PACKAGE CRIVER-VEHICLE INPUT CATA
                                                                                                                                                                 TEXAS TERFFIC SIMULATION DATAKAGE
  STANDARD 3 X 2
                                                                                                                                 STANDARD 3 X Z
     INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:
                                                                                                                                    INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:
NAME FOR IMBOUND TRAFFIC
HEACLAY FREGUENCY DISTRIBUTION SNEGEXP
TOTAL HOURLY VOLUME ON LEG 200
PARAMETER FOR DISTRIBUTION 200
HEAN SPEEC OF ENTERING VEHICLES, PPH 28.0
BS-PERCENTILE SPEED, MPH 21.0
TRAFFIC MIX DATA TO FOLLOW 7 NO
    OUTBOURG TRAFFIC DESTINATION DATA FOR LEG 3:
                                                                                                                                   OUTBOUNG TRAFFIC DESTINATION DATA FOR LEG 4:
PERCENT OF LES 4 INSOUND ON LEG --- 33 33 34 C
```

TEXAS TRAFFIC SIMULATION, PACKAGE  STANDARD 3 X 3  NUMBER CF LEGS SIMULATION TIME IN VINUTES SIMULATIO	STANDARD 3 X 3	LEG 4 LENGTH 800 LEG 1 (0,-12) LEG 1 LENGTH 800 LANE 1 2     *   LANE 1 2 MYMT L SR     *   MYMT L SR   12  12*12   *
LEG 3 LENGTH 800 LANE 1 2 MVHT L SR  TEXAS TRAFFIC SIMULATION PACKAGE  STANDARD 3 X 3		12 3 3 X 3   :2 12
III STANDARO 3 X 3		LEG 3 LENGTH 800
$\Pi$		STANDARD 3 X 3

# TEXAS TRAFFIC SIMULATION PACKAGE GECHETRY INPUT DATA

LANE DATA FOR INSOUND LEG 1:

STANDARD 3 X 3

LANE DATA FOR CUTBCUND LEG 1:

ANE NUMBER CUTEGUND LANE NUMBER) ICTH OF LANE NUMBER) OVEMENT CODE	12
ENGTH OF UNBLOCKED LANE FROM LANE TERMINAL FROM CUTER END FFSET OF LANE TERMINAL	ç

TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA

STANDARD 3 X 3

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

 TEXAS TRAFFIC SIMULATION PACKAGE
GECMETRY INPUT DATA

STANDARD 3 X 3

LANE DATA FOR OUTBOUND LEG 2:

LANE NUMBER  (OLTBCUND LANE NUMBER)  12  MCVETENT OF LANE

# TEXAS TRAFFIC SIMULATION PACKAGE

MEDIĂŇ CUŔB

STANDARD 3 X 3

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC	
HEACHAY FRECUENCY DISTRIBUTION	SKEGEVD
101AL MOUYET VOLUME CN ( FG	/ 00
PAKAMELEK FOR DISTRIBUTION	7 . 6 6
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0 31.0
S-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	L۸

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

PERCENT OF LEG 2 INBOUND ON LEG --- 33 C 33 34

```
TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                                                                                                                                                                                                                                                                                      TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA
               STANDARD 3 X 3
                                                                                                                                                                                                                                                                                                              STANDARD 3 X 3
                     LEG 3 GEOMETRY CATA:
       LEG ANGLE
LENGTH OF INSCUND LANES - 255C
LENGTH OF CUTSCUND LANES - 255C
NUMBER OF INSCUND LANES - 255C
NUMBER OF INSCUND LANES - 255C
SPEED LIMIT ON INSCUND LANES IN MPH 35C
SPEED LIMIT ON OUTSOUNC LANES IN MPH 35C
LEGET OF THE STRAIGHT MOVEMENT 2C
LIMITING ANGLE FOR STRAIGHT MOVEMENT 2C
LIMITING ANGLE FOR UTTURN 1C
                                                                                                                                                                                                                                                                                                                    LEG 4 GEOMETRY CATA:
                                                                                                                                                                                                                                                                                                       LEG ANGLE
LEAGTH OF INBOUND LANES
LEAGTH OF UTBOUND LANES
LEAGTH OF UTBOUND LANES
AVMBER OF INBOUND LANES
NUMBER OF INBOUND LANES
SPEED LIMIT ON INBOUND LANES IN MPH
SPEED LIMIT ON OUTBOUND LANES IN MPH
3C
LEG CENTERLINE OFFICE
MECIAN WIDTH
LIMITING ANGLE FOR STRAIGHT MCVEMENT
2C
LIMITING ANGLE FOR UTRAIN MCVEMENT
2C
LIMITING ANGLE FOR UTRAIN MCVEMENT
2C
                    LANE DATA FOR INBOUND LEG 3:
                                                                                                                                                                                                                                                                                                                 LANE DATA FOR INBOUND LEG 4:
      LANE NUMBER
(INBOUND LANE NUMBER)
WIOTH OF LANE
MIOTH OF LANE
MOVEMENT CODE
LENGTH OF UNBLOCKEC LANE
FROM LANE TERMINAL
FROM OUTER END
OFFSET OF LANE TERMINAL
TC ENTER IN THIS LAKE
                                                                                                                                                 12
SR
                                                                                                         MEDIAN CURB
                                                                                                                                                                                                                                                                                                                                                                                                        MEDIAN CURR
                 LANE DATA FOR OUTPOUND LEG 3:
                                                                                                                                                                                                                                                                                                              LANE DATA FOR CUTBOUND LEG 4:
    LANE NUMBER

GOUTBOUND LANE NUMBER)

MICTH OF LANE

LENGTH OF LYBLOCKED LANE

FROM LANE TERMINAL

OFFSET OF LANE

COFFSET OF LANE

COFFSET OF LANE

COFFSET OF LANE

COFFSET OF LANE

COTTONIAN CONTRACTOR CONTRA
                                                                                TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                                                                                                                                                                                                                                                                            TEXAS TRAFFIC SIMULATION PACKAGE CRIVER-VEHICLE INPUT CATA
       STANDARD 3 X 3
             INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:
                                                                                                                                                                                                                                                                                                    STANDARD 3 X 3
INCOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:
                                                                                                                                                                                                                                                                                             OUTBOUNC TRAFFIC DESTINATION DATA FOR LEG 3:
PERCENT OF LEG 3 INBOUND ON LEG --- 33 33 C 34
                                                                                                                                                                                                                                                                                                        OUTBOUNG TRAFFIC DESTINATION DATA FOR LEG 4:
                                                                                                                                                                                                                                                                                            PERCENT OF LEG 4 INBCUND N LEG --- 33 33 34 (
```

STANDARD 4 X 2	LEG 4 LENGTH 800   LEG 1 (0,C).    LANE 1   *      MVMT LSR     *	LEG 1 LENGTH 8CC LANE 1 2 MVMT LS \$R
	12   12*12   12	***** LEG
	LEG 3 LENGTH 800	LEG 2 LENGTH 8CO LANE 1 MYMT LSR
	TEXAS TRAFFIC SIMULATION PACKAGE  STANDARD 4 X 2  NUMBER OF LEGS	
	CURB RETURN RADIUS NUMBER 1 20 30 40 20 20 20	

```
TEXAS TRAFFIC SIMULATION PACKAGE
    STANDARD 4 X 2
      LEG 1 GEOMETRY CATA:
  LEGG ANGLE FOR STRAIGHT MCVEMENT CC
      LANE DATA FOR INBOUND LEG 1:
 LAKE NUMBER - NUMBER) - 1
(IABOUND LANE NUMBER) - 1
MICH OF LANE - 1
MCYMENT CODE - 1
LEAGTH OF UNFLOCKED LANE FROM LANE TERMINAL - C
FROM OUTER END - C
TO ENTER IN THIS LANE - C
MEDIAL
                                 MEDIAN CURR
     LANE DATA FOR OUTBOUND LEG 1:
 MEDIAN CURB
                         TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA
 STANDARD 4 X 2
    INSCUNC TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:
OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:
```

# TEXAS TRAFFIC SIMULATION PACKAGE STANCARC 4 x 2 LEG 2 GECMETRY DATA: LEG ANGLE LEGATH OF INBCUNC LANES LEGATH OF UTBOUND LANES NUMBER OF INBCUND LANES NUMBER OF INBCUND LANES 1 SPEED LIMIT ON INBCUND LANES LEGATH OF UTBOUND LANES 1 SPEED LIMIT ON INBCUND LANES IN MPH 3C LEGATH OF UTBOUND LANES IN MPH 3C LIMITING ANGLE FOR STRAIGHT MCVEMENT 2C LIMITING ANGLE FOR UTURN 10 LANE DATA FOR INSCUND LEG 2: LANE NUMBER - LINBER MOVEMENT CCGC LSR LENGTH OF UNBLOCKED LANE FROM LANE TERMINAL ---- O FROM CUTER END ----- O OFFSET OF LANE TERMINAL ---- O OFFSET OF LANE TERMINAL ---- O PEPCENT OF INBOUND TRAFFIC TC ENTER IN THIS LANE --- 1CC LANE DATA FOR OUTBOUND LEG 2: (CONVERTED APPROACH 6) TEXAS TRAFFIC SIMULATION PACKAGE STANDARD 4 X 2 INEGUNG TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2: OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

STANDARD 4 X 3	LEG 4 LENGTH 800  LANE 1 2  MVMT L SR    12   12+12   12
	2   1 * 3   4     20
	LEG 3 LENGTH 800   12   12   12   12   12   12   12
	TEXAS TRAFFIC SIMULATION PACKAGE GECHETRY INPUT DATA
	NUMBER CF LEGS
	CURB RETURN RABIUS NUMBER 1c 2c 3c 2c

### STANDARD 4 x 3

LEG 1 GEOMETRY DATA: LEG ANGLE
LENGTH OF INBCUND LANES
LENGTH OF INBCUND LANES
LENGTH OF INBCUND LANES
NUMBER OF INBCUND LANES
NUMBER OF INBCUND LANES
SPEED LIMIT ON OUTBOUND LANES IN MPH 3C
LEG CENTERLINE OFFSET
LEG LEG ANGLE FOR STRIIGHT MCVEMENT 2C
LIMITING ANGLE FOR U-TURN 1C LANE DATA FOR INSCUND LEG 1: MEDIAN CLRB LANE DATA FOR OUTBOUND LEG 1: 

# TEXAS TRAFFIC SIMULATION PACKAGE

### STANDARD 4 X 3

INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

MEDIAÑ CLRĚ

HEADWAY FREQUENCY DISTRIBUTION	51 = C = v D
PARAMETER FOR CISTRIBUTION	400
MEAN SPEED OF ENTERING VEHICLES, MPH	2.00
TRAFFIC MIX DATA TO FOLLOW ?	31.0

CUTBOUNG TRAFFIC CESTINATION DATA FOR LEG 1:

LEG NUMBER -			_	_	
PERCENT OF I	G 1 INSCUND	1	2	د	4
VEHTCIES UT	O ALTOSOUND				
I CHITCES MI	H DESTINATION ON LEG	C	7.7	77	7/

STANDARD 4 X 3

LEG 2 GEOMETRY DATA:

LEG ANGLE LENGTH OF INBCUND LANES LENGTH OF INBCUND LANES LENGTH OF CUTECUND LANES NUMBER OF CUTECUND LANES NUMBER OF CUTBOUNG LANES SPEED LIMIT ON INBCUNC LANES IN MPH SPEED LIMIT ON OUTBOUNG LANES IN MPH LEG CENTERLINE OFFSET MECIAN MICHAEL LIMITING ANGLE FOR STRAIGHT MCVEMENT LIMITING ANGLE FOR UTURN LIMITING ANGLE ANGLE ANGLE FOR UTURN LIMITING ANGLE AN
--

LANE DATA FOR INBOUND LEG 2:

LANE NUMBER - 1 (IROUND LANE NUMBER) - 1 MIDTH OF LANE	2 12 5 R 0 0
MEDIAN	CL:RB
, , ,	CCKD

LANE DATA FOR OUTBOUND LEG 2:

TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA

### STANDARD 4 x 3

INECUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC	
HEADWAY FRECUENCY DISTOTRUTTOL	SNEGEXP
TOTAL BOUKLY VOLUME ON LEG	400
PARAMETER FOR DISTRIBUTION	3 . 0 0
C) - F C K C C N   1 L F   N F F F R   M P H	28.C
TRAFFIC MIX GATA TO FOLLOW ?	21.0

OUTECUNG TRAFFIC DESTINATION DATA FOR LEG 2:

PERCEN! UF	LEG	Z INBCUND			•	-	-	4
AEHICLE? P	ITH	DESTINATION	ON	LEG -	 <b>₹</b> ₹	r	7.7	7.

# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

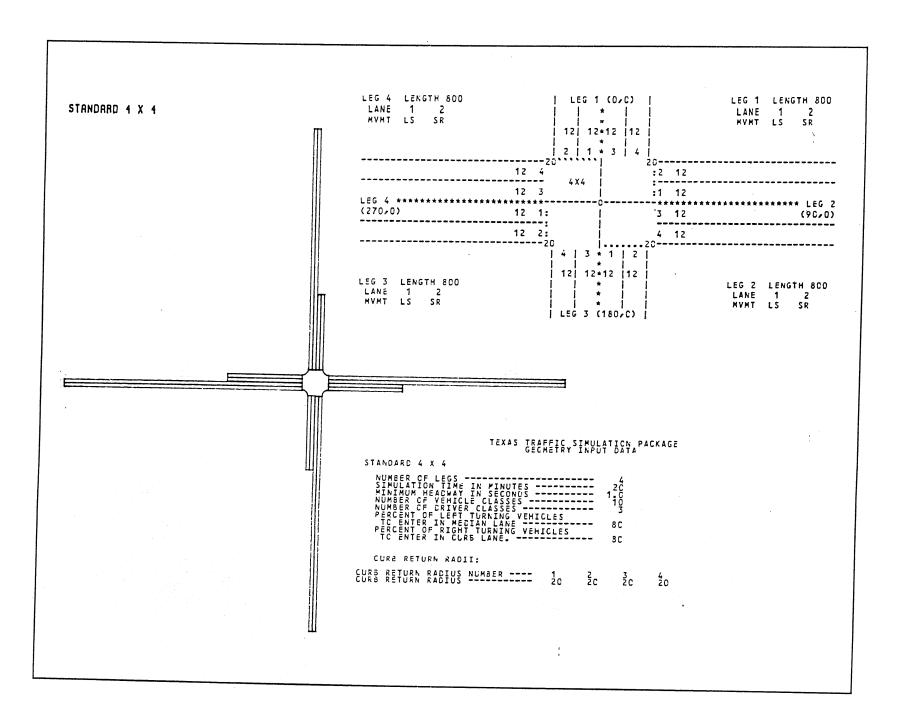
CUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

PECCENT OF LEG 3 INJOUND ON LEG --- 33 33 0 34
VEHICLES WITH DESTINATION ON LEG --- 33 33 0 34

## TEXAS TRAFFIC SIMULATION PACKAGE GECMETRY INPUT DATA STANDARD 4 X 3 STANCARD 4 X 3 LEG 3 GEOMETRY DATA: LEG 4 GECMETRY DATA: LEG ANGLE LENGTH OF INBCUND LANES LENGTH OF INBCUND LANES LENGTH OF INBCUND LANES LENGTH OF INBOUND LANES NUPBER OF INBOUND LANES RUPBER OF CUTBOUND LANES REED LIMIT ON INACUND LANES IN MPH 30 CLED LIMIT ON UNACUND LANES IN MPH 30 CLED LIMIT ON UNACUND LANES IN MPH 30 CLED LIMIT OFFSET REDIAN WIOTH OFFSET LANE DATA FOR INBOUND LEG 3: (CONVERTED APPROACH 3) LANE DATA FOR INECUND LEG 4: (CONVERTED APPROACH 4) LANE NUMBER - 1 (INBOUND LANE - 1 WICTH CF LANE - 1 MOVEMENT CCOE - 12 LANE NUMBER -----12 58 LENGTH OF UNSLOCKEC LANE FROM LANE TERMINAL ---FROP GUITER END OFFSET OF LANE TERMINAL ---PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE 12 LENGTH OF UNBLOCKEC LANE FROM LANE TERMINAL FROM OUTER END OFFSET OF LANE TERMINAL PERCENT OF INACUND TRAFFIC TO ENTER IN THIS LAKE 000 MEDIAN CURE 48 MEDIAN CURB LANE DATA FOR OUTBOUND LEG 3: LANE DATA FOR OUTBOUND LEG 4: LANE NUMBER -----COUTEOUND LANE NUMBER) ---- 12 WICTH OF LANE ----- 12 MCVEMENT CCDE ----- LSR LENGTH OF UNBLOCKED LANE FROM LANE TERMINAL ---FROM CUTER END ----OFFSET OF LANE TERMINAL ----MEDIAN CURŠ TEXAS TRAFFIC SIMULATION PACKAGE TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA STANDARD 4 X 3 STANDARD 4 X 3 INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3: INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

OUTSOUND TRAFFIC DESTINATION DATA FOR LEG 4:

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



# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

### STANDARD 4 X 4

LEG 2 GECMETRY	DATA	٠.
----------------	------	----

LEG ANGLE LENGTH OF INEOUND LANES LENGTH OF CUTBOUND LANES NUMBER OF INBOUND LANES NUMBER OF CUTBOUND LANES SPEEC LIMIT ON INBOUND LANES IN MPH SPEED LIMIT ON OUTBOUND LANES IN MPH LEG CENTERLINE OFFSET MECIAN WIGHTH LIMITAL ANGLE FOR STRAIGHT MOVEMENT LIMITING ANGLE FOR UTURN	9 CC 22 20 CC 20 C
LANE DATA FOR INBOUND LEG 2: (CONVERTED APPROACH 2)	
LANE NUMBER - 1 (INBCUND LANE NUMBER) - 1 MICH CF LANE - 1 MOVEMENT CODE - 1 LENGTH OF UNBLOCKED LANE FROM LANE TERMINAL - C FROM CUTER EN	2215 DOO 28
LANE DATA FOR OUTBOUND LEG 2:	
LANE NUMBER	4

TOURIER AFFRUACH O)		
LANE NUMBER	7	2
HOVEMENT CODE	LS	1 2 5 R
FROM LANE TERMINAL FROM OUTER END OFFSET OF LANE TERMINAL	0	000
MED	IAN	CURS

# TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA

### STANDARD 4 x 4

INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBLTION DATA FOR LEG 1:

MEDIAN CURB

PEDIAK CLRS

MAPE FOR INBOUND TRAFFIC MEADWAY FRECUENCY DISTRIBUTION TOTAL HOURLY VCLUME ON LEG PARAMETER FOR DISTRIBUTION	2-00
REAM SPEED OF ENTERING VEHICLES, MPH TRAFFIC MIX DATA TO FCLLOW 7	

LANE DATA FOR OUTBOUND LEG 1:

LANE NUMBER OF THE NUMBER OF T

OUTEOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER			•	_	
PERCENT OF	LEG 1 INECUND		2	3	4
AEHICTER !	LEG 1 INECUND ITH DESTINATION ON LEG	С	33	37	3.4

# TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT CATA

### STANDARD 4 X 4

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION CATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC	
MEADWAY FRECUENCY DISTOTRUTTON	SKEGEYE
	4 C C
PARAMETER FOR CISTRIBUTION	2.00
0) - F C K L C N	28.0 31.0
TRAFFIC MIX CATA TO FOLLOW 2	31.0

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

PERCENT OF LE							
VEHICLES WIT	H DESTINATION	0 N	LEG	 33	0	33	34

```
TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA
                                                                                                                                        TEXAS TRAFFIC SIMULATION PACKAGE
    STANDARD 4 X 4
                                                                                                            STANDARC 4 x 4
      LEG 3 GEOMETRY CATA:
                                                                                                               LEG 4 GECMETRY DATA:
  LEG ANGLE
LENGTH OF INSCUNC LANES
LENGTH OF CUTBCULC LANES
NUMBER OF INSCULC LANES
NUMBER OF INSCULC LANES
NUMBER OF CUTBCULC LANES
SPEED LIMIT ON INSCULC LANES IN MPH
3C
SPEED LIMIT ON OUTBOUNC LANES IN MPH
3C
LEG CENTERLINE OFFSET
LEGIAN WIDTH
CC
LIMITING ANGLE FOR STRAIGHT MOVEMENT
1C
      LANE DATA FOR INBOUND LEG 3:
                                                                                                              LANE DATA FOR INBOUND LEG 4:
(CONVERTED APPROACH 4)
  LANE NUMBER - NUMBER) - 1
(INBOUND LANE NUMBER) - 1
MIOTH OF LANE - 1
MOVEMENT CODE - 1
LENGTH OF UNGLOCKED LANE FROM LANE TERMINAL - C
PFOM LANE TERMINAL - C
OFFSET OF LANE TERMINAL - C
DEFSET OF LANE TERMINAL - C
TC ENTER IN THIS LANE - 1

HEDTAN
  C
                                                                                                                                                               Ο
                                       -- 48 52
MEDIAN CURA
                                                                                                                                             MEDIAK CURR
     LANE DATA FOR OUTBOUND LEG 3: (CONVERTED APPROACH 7)
                                                                                                             LANE DATA FOR CUTBOUND LEG 4: (CONVERTED APPROACH 8)
 12
S R
 LENGTH OF UNBLOCKED LANE
FROM LANE TERMINAL -----
FROM OUTER ENC
OFFSET OF LANE TERMINAL ----
                                                                                                                                                             12
SR
                                                                                                                                              MEDIAN CURB
                             TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT SATA
                                                                                                                                     TEXAS TRAFFIC SIMULATION PACKAGE
  STANDARD 4 X 4
                                                                                                          STANDARD 4 X 4
    INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:
INSCUNC TRAFFIC HEADWAY FREQUENCY CISTRIBUTION DATA FOR LEG 4:
                                                                                                       MEAN SPEED OF ENTERING VEHICLES, MPH ---
B5-PERCENTILE SPEED, MPH ---
TRAFFIC MIX CATA TC FCLLOW ? -----
    OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:
                                                                                                            CUTBOUNC TRAFFIC DESTINATION DATA FOR LEG 4:
PERCENT OF LEG 4 INSCUNC
VEHICLES WITH DESTINATION ON LEG --- 33 33 34 C
```

STRNDARD 5 X 4	LEG 4 LENGTH 80C   LEG 1 (Cr-12)   LEG 1 LENGTH 6CO   LANE 1 2 3
	12 4
	(270,C) 12 1:   3 12 (90,0)  12 2:   4 12
	12   12*12   12   12   12   12   12
	TEXAS TRAFFIC SIMULATION PACKAGE STANDARD 5 X 4
	NUMBER CF LEGS
	CURB RETURN RADIUS NUMBER 10 20 20 20 20
A .	

# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

### STANDARD 5 X 4

LEG 1 GEOMETRY CATA: LEG ANGLE - SOUND LANES - SOUND - SOUN LANE DATA FOR INSCUND LEG 1: (CONVERTED APPROACH 1) 12 35 CLRE LANE DATA FOR OUTBOUND LEG 1: (CONVERTED APPROACH 5) ANE NUMBER -----

# TEXAS TRAFFIC SIPULATION PACKAGE

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION TOTAL HOURLY VOLUME ON LEG PARAMETER FOR DISTRIBUTION HEAN SPEED OF ENTERING VEHICLES, MPH ES-PEPCENTILE SPEED, MPH  ES-PEPCENTILE SPEED, MPH	2.00 28.0 31.0
TRAFFIC MIX DATA TO FOLLOW ?	N C

OUTBOUNG TRAFFIC CESTINATION DATA FOR LEG 1:

PERCENT OF LEG 1 INSCUND VEHICLES WITH DESTINATION ON LEG --- 0 33 33 34

# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

### STANDARC 5 X 4

LEG 2 GEOMETRY DATA:	
LEG ANGLE INZOUND LANES	90 250 250 250 250 20 30 30 30 30 30 30
LANE DATA FOR INBOUND LEG 2: (CONVERTED APPROACH 2)	
LANE NUMBER 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 12 5 R 0 C C C C C C C C C C C C C C C C C C C
LANE DATA FOR CUTBOUND LEG 2: (CONVERTED APPROACH 6)	
LANE NUMBER AT THE NUMBER AT T	4 2 2 2 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9

# TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA

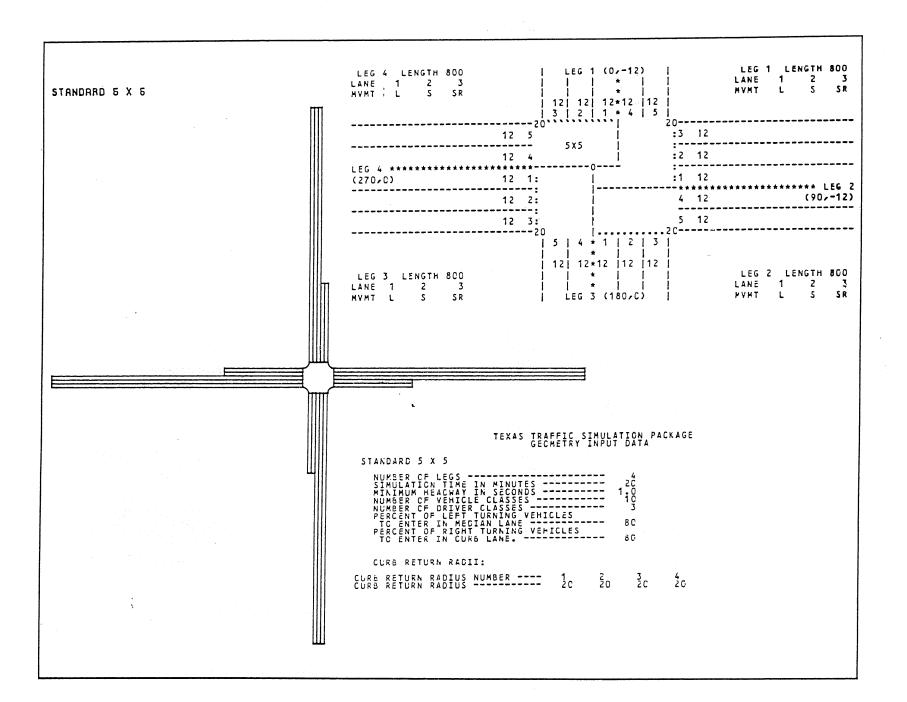
### STANDARD 5 X 4

INCOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VCLUME ON LEG	4CC 2.00
REAL SPEED, MPH	31.C

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

```
TEXAS TRAFFIC SIMULATION PACKAGE
                                                       TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                                                                                                                   STANCARC 5 X 4
   STANDARD 5 X 4
                                                                                                                                                                                                                        LEG 4 GEOMETRY DATA:
         LEG 3 GEGMETRY DATA:
                                                                                                                                                                                                                LANE DATA FOR INSCUND LEG 4:
(CONVERTED APPROACH 4)
         LANE DATA FOR INSCUND LEG 3: (CONVERTED APPROACH 3)
                                                                                                                                                                                                                12
5 R
                                                                                                                   12
5 k
                                                                                                    12
                                                                                                                                                                                                                                                                                         -- 48 52
MEDIAN CURB
                                                                                    32
                                                                                                                                                                                                                    TO ENTER IN THIS LANE -----
                                                                                                    35
                                                                        MEDIAN
                                                                                                                                                                                                                        LANE DATA FOR OUTBOUND LEG 4: (CONVERTED APPROACH 8)
         LANE DATA FOR OUTSOUND LEG 3:
LANE NUMBER AND NUMBER OF LANE NUMBER OF LANE 
                                                                                                                                                                                                                íz
                                                                                   ĹŠ
                                                                                                   ŚŔ
                                                                                                                                                                                                                  FROM LANE TERMINAL ------
                                                                                                                                                                                                                 OFFSET OF LANE TERMINAL -----
                                                                         MEDIAN CURB
                                                                                                                                                                                                                                                                      TEXAS TRAFFIC SIMULATION PACKAGE CRIVER-VEHICLE INPUT DATA
                                                        TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                                                                                                                 STANDARD 5 X 4
   STANDARC 5 X 4
         INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:
                                                                                                                                                                                                                       INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION CATA FOR LEG 4:
OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:
         OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:
```



# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

#### STANDARD 5 X 5 STANDARD 5 X 5 LEG 2 GEOMETRY DATA: LEG 1 GEOMETRY CATA: LANE DATA FOR INSOUND LEG 1: LANE DATA FOR INBOUND LEG 2: (CONVERTED APPROACH 2) LANE NUMBER (INSOUND LANE NUMBER) MICHN OF LANE MOVEMENT COB LENGTH OF LUBLOCKED LANE FROM LANE TERMINAL FROM OUTER END OFFSET OF LANE TERMINAL TC ENTER IN THIS LANE TC ENTER IN THIS LANE LANE NUMBER -----LANE NUMBER (INSOUDD LANE NUMBER) MICTH OF LANE MICTH OF LANE HOVEMENT OF UNBLOCKED LANE FROM LANE TERMINAL FROM LANE FROM COUTER END PROPER OF LANE TERMINAL TO ENTER IN THIS LANE ME 12 12 12 12 5 R 0000 č 3.2 3.2 35 35 MEDIĂÑ CLKE LANE DATA FOR OUTBOUND LEG 1: LANE DATA FOR OUTBOUND LEG 2: (CONVERTED APPROACH 6) LANE NUMBER ATE NUMBER) 4 VIDTH CF LANE 12 MOVEMENT CEDE 15 LENGTH OF UNBLOCKED LANE FROM LANE TERMINAL 15 FROM LANE TERMINAL 15 OFFSET OF LANE TERMINAL 15 MEDIAN MEGIAN CURS MEDIAN CURB

### TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT CATA

### TEXAS TRAFFIC SIMULATION PACKAGE CRIVER-VEHICLE INPUT DATA

	-						
INBCUNC TRA	FFIC HEADWAY	FREQUENCY	DISTRIBUTION	CATA	FCR	LEG	1:

MAME FOR INAGUND TRAFFIL HEADNAY FREGUENCY DISTRIBUTION TOTAL HOURLY VCLUME ON LEG PARAMETER FOR DISTRIBUTION MEAN SPEED OF ENTERING VEHICLES, MPH B5-PERCENTILE SPEED, MPH	SNEGEXP 6000 2.00 21.00 31.00
INAPPIC MIX DATA IC PULLUM : DOLLEGE	NU

STANDARD 5 X 5

OUTBOUND	.TRAFFIC	CESTINATION	DATA	FCR	LEG	1:	
				. 1	,	7	

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

#### STANDARD 5 X 5

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION	
PARAMETER FOR DISTRIBUTION	2.ČŎ
MEAN SPRED OF ENTERING VEHICLES, PPH 85-PERCENTILE SPEED, MPH	31.6
TRAFFIC MIX DATA TO FCLLOW ?	ÑÔ

# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

GECAEIRI INFOI DA	OCCUENT THEO
STANDARD 5 X 5	STANDARD 5 X 5
LEG 3 GEOMETRY CATA:	LEG 4 GEOMETRY CATA:
LEG ANGLE INSCUND LANES	LEG ANGLE LENGTH OF INSCUNC LANES LENGTH OF CUTBCUND LANES NUMBER OF INEOUND LANES SPEED LIMIT ON INBOUNC LANES IN MPH SPEED LIMIT ON OUTBOUNC LANES IN MPH LEG CENTERLINE OFFSET MEDIAN WIGHT LIFITING ANGLE FOR STRAIGHT MOVEMENT LIMITING ANGLE FOR UTURN
LAME DATA FOR INBOUND LEG 3: (CONVERTED APPROACH 3)	LANE DATA FOR INBOUND LEG 4: (CONVERTED APPROACH 4)
VANE NUMBER	NUMBER OF INEQUIND LANES  NUMBER OF OUTBOUND LANES IN MPH SPEED LIMIT ON INBOUNC LANES IN MPH LEG CENTERLINE OFFSET
LAME DATA FOR OUTBOUND LEG 3: (CONVERTED APPROACH 7)	LANE DATA FOR OUTBOUND LEG 4: (CONVERTED APPROACH 8)
LANE NUMBER	LANE DATA FCR OUTBOUND LEG 4:  (CONVERTED APPROACH B)  LANE NUMBER

# TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA

### STANDARD 5 X 5

INCOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INBOUND TRAFFIC	
HEADWAY FREQUENCY DISTRIBUTION	SWEGEXP
TOTAL HOURLY VCLUME CN LEG	_600
PARAMETER FOR DISTRIBUTION	3.00
MEAN SPEED OF ENTERING VEHICLES, MPH	28.0 31.0
BS-PERCENTILE SPEEC, MPH	
TRAFFIC MIX DATA TO FOLLOW ?	٧C

OLTBOUNC TRAFFIC CESTINATION DATA FOR LEG 3: PERCENT OF LEG 3 INEOUND 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 FREGUENCY DISTRIBUTION	GEXP 500 2.00 28.00 31.00
---	---------------------------------------

CUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

PERCENT OF LEG 4 INBOUND VEHICLES WITH DESTINATION ON LEG --- 33 33 34 C

STANDARD 6 X 4	LEG 4 LENGTH SCC     LEG 1 (0,C)     LEG 1 LENGTH SCC LANE 1 2       *       LANE 1 2 3 HYMT LS SR       *       YVMT LS S SR   12   12   12 * 12   12   12   12
	3   2   1 * 4   5   6
	12 3   :1 12 LEG 4 ***********************************
	12 2: 4 12
	LEG 3 LENGTH 80C
	TEXAS TRAFFIC SIMULATION PACKAGE GECHETRY INPUT DATA STANDARD 6 X 4
ш	NUMBER CF LEGS
	NUMBER OF DRIVER CLASSES
	CURS RETURN RADII:
	CURB RETURN RADIUS NUMBER 1 20 20 20 20
<b>V</b>	

### TEXAS TRAFFIC SIMULATION PACKAGE GECMETRY INPUT DATA

### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

### STANDARD 6 X 4

| CLARE NUMBER | CLARE | CLARE

### TEXAS TRAFFIC SIMULATION PACKAGE GRIVER-VEHICLE INPUT CATA

#### STANDARD 6 X 4

INSCUND TRAFFIC HEADWAY PRECUENCY DISTRIBUTION DATA FOR LEG 1:

NAME FOR INSCOND TRAFFIC	_
HEAGNAY FREQUENCY DISTRIBUTION	SNEGEXP
TOTAL HOURLY VOLUME ON LEG	.600
PARAPETER FOR DISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, PPH	2.00
85-PERCENTILE SPEEC, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	N.C.
IMPERIO PIA DESA IN INCOMENTA	

#### STANCARD 6 x 4

LEG 2 GEGMETRY CATA:

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

ANE NUMBER INBOUND LANE NUMBER) ILIGHH OF LANE GOVERENT CCCE ENGTH OF LUBLOCKEC LANE FROM LANE TERMINAL	12 25 0	2 1 2 1 2 8 8
FROM CUTER END	. 48 11AN	0 0 52 CURB

### LANE DATA FOR CUTSOUND LEG 2:

LANE NUMBER	} 12 LS	4 2 1 2 5 R
LENGTH OF UNBLOCKED LANE FROM LANE TERMINAL FROM OUTER END CFFSET OF LANE TERMINAL	CCC	CURB

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

### STANDARD 6 X 4

INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INSOUND TRAFFIC	
HEACHAY FREQUENCY DISTRIBUTION	SMECEYD
TOTAL HOURLY VOLUME ON LEG	30.0 E
PARAMETER FOR GISTRIBUTION	2.00
MEAN SPEED OF ENTERING VEHICLES, PPH	
SE-DECCENTILE SHEET NO VERTICES, PPR	26.0
35-PERCENTILE SPEED, MPH	31.0
TRAFFIC MIX DATA TO FOLLOW ?	NO.

GUTBOUNG TRAFFIC DESTINATION DATA FOR LEG 2:

LEG NUMBER ---- 1 2 3 4
PERCENT OF LEG 2 INSCUND
VEHICLES WITH DESTINATION ON LEG --- 33 C 33 34

# TEXAS TRAFFIC SIMULATION PACKAGE GECHETRY INPUT CATA

LEG 3 GEOMETRY DATA:

STANDARD 6 X 4

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

COUNTERIES ATTROACT. 17		
LANE NUMBER 4	5	ģ
WICTH OF LANE	12	1 2 S R
FROM LANE TERMINAL C	CO	C
OFFSET OF LANE TERMINAL C	0	0 8 A U O

### TEXAS TRAFFIC SIMULATION PACKAGE CRIVER-VEHICLE INPUT GATA

STANDARD & X 4

INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

 TEXAS TRAFFIC SIMULATION PACKAGE

STANDARD 6 X 4

LEG 4 GEOMETRY DATA:

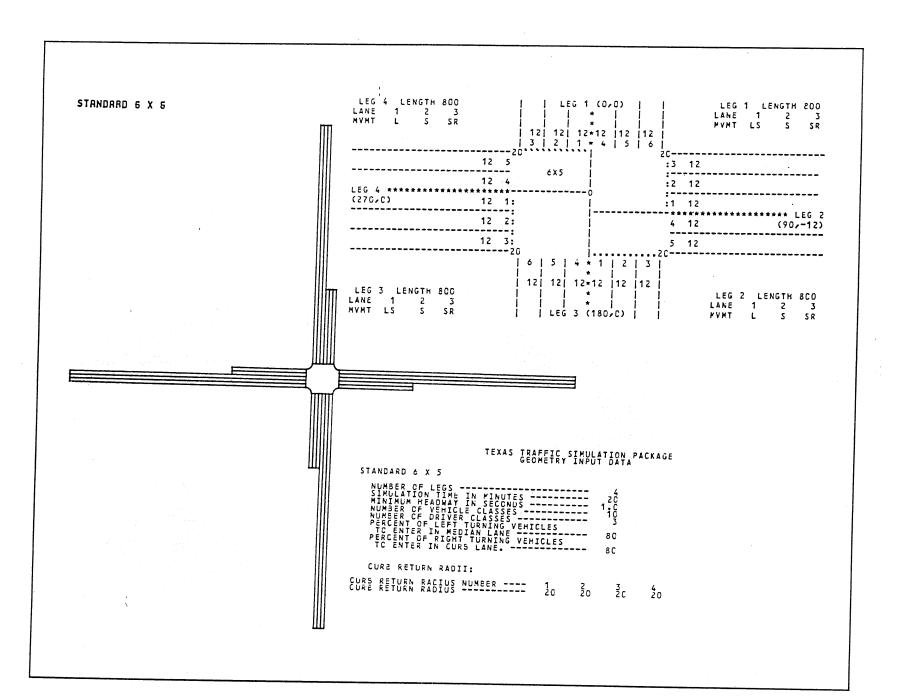
ELG 4 GEOMETRI DATA:	
LEG ANGLE INSCUND LANES - 27 LENGTH OF INSCUND LANES - 25 LENGTH OF CUTSCUND LANES - 25 NUMBER OF INSCUND LANES - 25 SPEED LIMIT OR OUTSCUND LANES IN MPH - 3 SPEED LIMIT OR OUTSCUND LANES IN MPH - 3 LEG LENTER LIME OFFISET - 22 MECIAN WIDTH LIMIT OF STRIGHT MCYEMENT - 2 LIMITING ANGLE FOR UTILEN TO STREET MCYEMENT - 2 LIMITING ANGLE FOR UTILEN T	COCININGCOCO
LANE DATA FOR INBOUND LEG 4: (CONVERTES APPROACH 4)	
LANE NUMBER	
LANE DATA FOR CUTSCUND LEG 4: (CONVERTED APPROACH 8)	
LANE NUMBER	

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

STANDARD 6 X 4

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

GUTBOUNG TRAFFIC DESTINATION DATA FOR LEG 4:



```
TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                        TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA
   STANDARD 6 X 5
                                                                                                STANDARD 6 x 5
     LEG 1 GEOMETRY CATA:
                                                                                                  LEG 2 GEOMETRY DATA:
 LEG ANGLE
LESCATH OF INBOUNC LANES
LENGTH OF CUTACUNG LANES
NUMBER OF INBOUNC LANES
NUMBER OF INBOUNC LANES
SPEED LIMIT ON INBOUND LANES
SPEED LIMIT ON OUTBOUNG LANES
IN MPH 30
LEG CENTERING OFFSET
LEGIC CENTERING OFFSET
     LANE DATA FOR INBOUND LEG 1:
                                                                                                  CONVERTED APPROACH 2)
                                                                                             ARE NUMBER ------
 LANE NUMBER
(INSCOMD LANE NUMSER)
HIGHTH CF LANE
HIGHTH CF LANE
HOVEMENT CCE
LENGTH OF UNBLOCKEC LANE
FROM LANE TERMINAL
FROM OUTER FINC
CFFSET OF LANE TERMINAL
TC ENTER IN THIS LANE
                                             12
                                                    12
5 R
                                                                                                                                          ĨZ
S
                                                                                                                                                 12
5 k
                                      COC
                                                     Ç
                                MEDIAN
                                                                                                                                          3.5
                                                                                                                              MEDIĂÑ
    LANE DATA FOR OUTBOUND LEG 1: (CONVERTED APPROACH 5)
                                                                                                 LANE DATA FOR OUTBOUND LEG 2: (CONVERTED APPROACH 6)
12
                                                 CLRE
                                                                                                                             KEDIAK CURK
                         TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA
                                                                                                                      TEXAS TRAFFIC SIMULATION PACKAGE
 STANDARD & X 5
                                                                                             STANDARD 6 X 5
    INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:
                                                                                                INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:
OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:
                                                                                               OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:
LEG NUMBER ---- 1 2 3 4
PERCENT OF LEG 1 INSCUNS
VEHICLES WITH DESTINATION ON LEG --- C 33 33 34
```

### TEXAS TRAFFIC SIMULATION PACKAGE SEGMETRY INPUT DATA TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA STANDARD & X 5 STANDARD 6 X 5 LEG 3 GEOMETRY DATA: LEG 4 GEOMETRY DATA: LEG ANGLE 18CUND LANES 26CU LENGTH OF INEGUND LANES 26CU LENGTH OF CUTACUND LANES 37 NUMBER OF INEGUND LANES 37 NUMBER OF OUTECUND LANES 37 NUMBER OUTECUND LANES 37 NUMBER OF OUTECUND NUMBER OUTECUND NUMBER OF OUTECUND NUMBER O NUPSEK OF CUIDDUND LANES IN MPH --SPEED LIMIT ON INBOUNC LANES IN MPH --LEG CENTERLINE OFFSET --HECIAN WIDTH --HECIAN WIDTH --LIMITING ANGLE FOR STRAIGHT MCYEMENT --LIMITING ANGLE FOR U-TURN ---LAME DATA FOR INSOUND LEG 3: (CONVERTED APPROACH 3) LANE DATA FOR INCOUND LEG 4: (CONVERTED APPROACH 4) LANE NUMBER - 1 (INBOUND LANE NUMBER) - 1 WIDTH CF LANE 12 MOVEMENT COSE LANE | 15 LENGTH OF UNALOCKEC LANE | 15 FROM LANE TERMINAL - 1 OFFSET OF LANE TERMINAL - 1 OFFSET OF LANE TERMINAL - 1 TO ENTER IN THIS LANE - 1 FEGIAN 12 12 5R 12 MOVEMENT CCDE LENGTH OF UNBLOCKED LANE FROM LANE TERMINAL FROM CUTER END CFFSST OF LANE TERMINAL PEPCENT OF INBOUND TRAFFIC TC ENTER IN THIS LANE 000 CLÉŠ MEDIĂÑ LANE DATA FOR CUTBOUND LEG 3: LANE DATA FOR OUTBOUND LEG 4: (CONVERTED APPROACH 8) Ĩ۷ FROM CUTER END OFFSET OF LANE TERPINAL -----MEDIAN CURE MEDIAN CURB TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT CATA TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT CATA STANDARD 6 X 5

INECUND TRAFFIC HEADWAY FREQUENCY DISTRIBLTION DATA FOR LEG 3:

OUTSOUND TRAFFIC DESTINATION DATA FOR LEG 3:

STANDARD 6 X 5

INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

STRNDARD 6 X 6	L'EG 4 LENGTH 8'00   LEG 1 (0, LANE 1 2 3   1	1     LANE 1 2 3
	12 6 6X6  12 5  12 4  LEG 4 ***********************************	:3 12 :
	12 2: 12 3: 	1 i i ·
	LEG 3 LENGTH BOG   12   12   12   12   12   12   12   1	III LANE 1 2 3
	TEXAS TRAFFIC SIMULATION GEOMETRY INPUT DO	ON PACKAGE
	NUMBER CF LEGS	
	CURB RETURN RADIUS NUMBER 1c 2c 2o	3c 40

### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

LEG NUMBER ----- 1 2 3 4

PERCENT OF LEG 1 INSCUND
VEHICLES WITH DESTINATION ON LEG --- 0 33 33 34

### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

CUTBOUNC TRAFFIC DESTINATION DATA FOR LEG 2:

STANDARD 6 X 6 STANDARD 6 X 6 LEG 1 GEOMETRY DATA: LEG 2 GEOMETRY DATA: LEG ANGLE
LENGTH OF INBOUND LANES
LENGTH OF CUTECUND LANES
LENGTH OF CUTECUND LANES
LENGTH OF CUTECUND LANES

NUMBER OF INBOUNC LANES

SPEEC LIMIT ON INBOUNC LANES IN MPH

SPEEC LIMIT ON OUTBOUNC LANES IN MPH

LEG CENTERLINE OFFSET

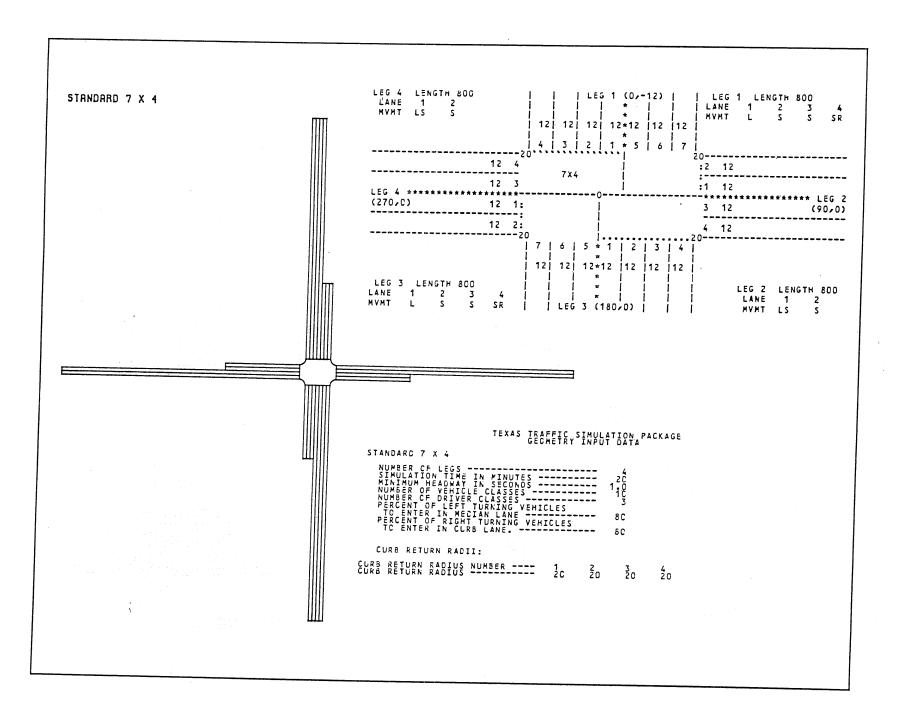
CMCCIAN WIDTH

CCLIMITING ANGLE FOR STRAIGHT MCVEMENT

1C LANE DATA FOR INBOUND LEG 1: (CONVERTED APPROACH 1) LANE DATA FOR INBOUND LEG 2: (CONVERTED APPROACH 2) LANE NUMBER
(INBOUND LANE NUMBER)
MICTH OF LANE
MOVEMENT CCDE
LENGTH OF UNBLOCKED LANE
FROM LANE TERMINAL
FROM OUTER ENG
FROM OUTER ENG
PROM TOTER ENG
PROM TOTER ENG
TOTER OF THE CUMP TRAFFIC
TOTERTER IN THIS LANE fz 12 CGO Ω 32 35 33 32 35 CLRE LANE DATA FOR OUTBOUND LEG 1: (CONVERTED APPROACH 5) LANE DATA FOR OUTBOUND LEG 2: (CONVERTED APPROACH 6) LANE NUMBER -----12 LENGTH OF LIBELOCKED LANE
FROM LANE TERMINAL ----FROM GUTER END -----OFFSET OF LANE TERMINAL ----MEDIAN TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT CATA STANDARD 6 X 6 STANDARD 6 X 6 INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1: INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2: 

```
TEXAS TRAFFIC SIMULATION PACKAGE
GECMETRY INPUT DATA
             STANDARD 6 X 6
                       LEG 3 GEOMETRY CATA:
      LEG ANGLE 180 LARES 250 LERGTH OF UTBOUNG LANES 250 LERGTH OF OUTBOUNG LANES 250 LERGTH OF OUTBOUNG LANES 250 LERGTH OF OUTBOUNG LANES 250 LERGTH ON INBOUNG LANES IN MPH 250 LIMIT ON OUTBOUNG LANES IN MPH 250 LIMIT OUTBOUNG LANES LANGS L
                     LANE DATA FOR INBOUND 1 LEG 3:
       12
                                                                                                                                                                                                                         12
      000
                                                                                                                                                                                            35
                                                                                                                                       MEDIĂÑ
                    LANE DATA FOR OUTBOUND LEG 3:
   12
                                                                                                                                                                                                                       12
                                                                                                                                       MEDIAN
                                                                                                                                                                                                              CURR
                                                                                                      TEXAS TRAFFIC SIMULATION PACKAGE
       STANDARD 6 X 6
                INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION CATA FOR LEG 3:
OUTBOUNG TRAFFIC DESTINATION DATA FOR LEG 3:
```

# TEXAS TRAFFIC SIMULATION PACKAGE STANDARD 6 X 6 LEG 4 GEOMETRY DATA: LEG ANGLE LEGGTH OF INECUNC LANES LEGGTH OF INECUNC LANES LEGGTH OF INECUNC LANES NUMBER OF INACUND LANES LIMIT ON INACUND LANES IN MPH 36 SPEED LIMIT ON OUTBOUND LANES IN MPH 36 LIMIT ON OFFSET LEGGERIAN HIDTH OFFSET LEGGERIAN HIDTH OFFSET LIMITING ANGLE FOR STRAIGHT MCVEMENT 20 LIMITING ANGLE FOR UTURN 10 LANE DATA FOR INBOUND LEG 4: (CONVERTED APPROACH 4) LANE NUMBER (INBCUND LANE NUMBER) WICH CF LANE MOVEMENT CODE fz 12 LENGTH OF UNBLOCKED LANE FROM LANE TERMINAL FROM GUTER END 000 OFFSET OF LANE TERMINAL ----PERCENT OF INSOUND TRAFFIC TO ENTER IN THIS LANE MEDIAN 35 CUŘĚ LAKE DATA FOR OUTBOUND LEG 4: CURE TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4: NAME FOR INCOUND TRAFFIC MEADLAY FREQUENCY DISTRIBUTION SNEGEXP TOTAL HOURLY VOLUME ON LEG PARAMETER FOR CLISTRIBUTION 7.00 MEAN PRED OF ENTERING VEHICLES, MPH 20.00 BS-PERCENTILE SFEET, MPH 31.00 TRAFFIC MIX DATA TO FOLLOW 7.00 OUTEOUNE TRAFFIC DESTINATION DATA FOR LEG 4:



### TEXAS TRAFFIC SIMULATION PACKAGE

#### STANDARD 7 X 4

LEG 1 GEOMETRY DATA: LANE DATA FOR INBOUND LEG 1: LANE NUMBER
(INBOUND LANE NUMBER)

MOTH OF LANE

MOVEMENT CODE

LENGTH OF UNBLOCKED LANE

FROM LANE TERMINAL

FROM LOTER END

FROM LANE

FROM L 3 1 2 5 Ç 8 25 25 MEDIĂÑ LANE DATA FOR OUTBOUND LEG 1: Ĩ2

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

#### STANDARD 7 X 4

CFFSET OF LANE TERMINAL -----

INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

MEDIAN

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1: PERCENT OF LEGY1 INBOUND VEHICLES WITH DESTINATION ON LEG --- 0 33 33 34

### TEXAS TRAFFIC SIMULATION PACKAGE

#### STANDARD 7 x 4

LEG 2 GEOMETRY DATA:

LEG ANGLE LENGTH OF INBOUND LANES LENGTH OF CUTBOUND LANES NUMBER OF INBOUND LANES NUMBER OF OUTBOUND LANES SPEED LIMIT ON INBOUND LANES SPEED LIMIT ON GUTBOUND LANES IN MPH LEG CENTERLINE OFFSET HETIAN UTTH LITTING ANGLE FOR STRAIGHT MCVEMENT LIMITING ANGLE FOR UTTERN	905 33 71
LANE DATA FOR INSCUND LEG 2:	
LANE NUMBERS 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
LANE DATA FOR OUTBOUND LEG 2:	
CCONVERTED APPROACH 6)  LANE NUMBER	

### TEXAS TRAFFIC SIMULATION PACKAGE

#### STANCARD 7 X 4

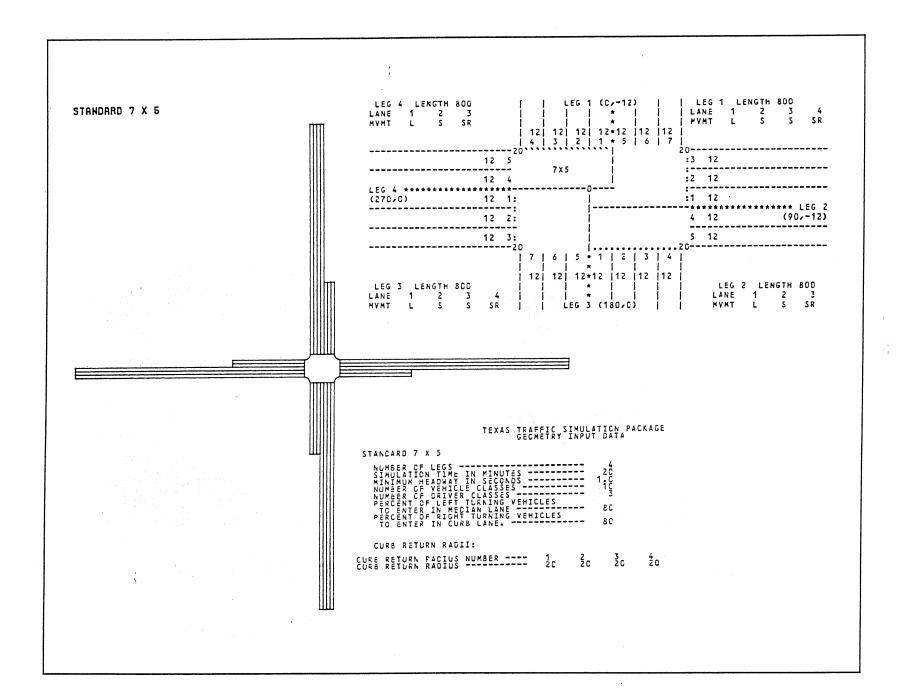
INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

HEADWAY FREGUENCY DISTRIBUTION TOTAL HOURLY VCLUME ON LEG PARAMETER FOR DISTRIBUTION MEAN SPEED OF ENIERING VEHICLES, MPH	2 <b>.</b> 68
TRAFFIC MIX DATA TO FOLLOW 7	

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

PERCENT OF LEG 2 INSCUND ON LEG --- 33 0 33 34

TEXAS TRAFFIC SIMULATION PACKAGE TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA STANCARD 7 X 4 STANDARD 7 X 4 LEG 4 GEOMETRY DATA: LEG 3 GEOMETRY CATA: LANE DATA FOR INBOUND LEG 4: LANE DATA FOR INBOUND LEG 3: (CONVERTED APPROACH 3) LANE NUMBER - NUMBER) - 12
VINE COME LANE - 12
MICTH OF LANE - 12
MOVERENT CODE - LS
LENGTH OF UNALOCKED LANE FROM LANE TERMINAL - C
PFOM OUTER ENC - C
OFFSET OF LANE TERMINAL - C
PERCENT OF INSCUMD TRAFFIC
TO ENTER IN THIS LANE - HEDIAN 12 Ç č 25 25 MEDIAN CURB LANE DATA FOR OUTBOUND LEG 4: (CONVERTED APPROACH 8) LANE DATA FOR CUTBOUND LEG 3: Ťz 12 LENGTH OF UNBLOCKED LANE
FROM LANE TERMINAL ----PROM GUTER END -----OFFSET OF LANE TERMINAL ----MEDIAN CURB CLRE TEXAS TRAFFIC SIMULATION PACKAGE TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA STANDARD 7 X 4 STANDARD 7 X 4 INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4: INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3: NAME FOR INSCUDO TRAFFIC HEADWAY REGULATION TRAFFIC HEADWAY REGULATION TO SALEGE X POTAL HOUSELY VELLURE ON LEG TO THE PROPERTY OF THE PROPERT NAME CFOR INAGUNDO TRAFFIC SAEGE SON LEG SAEGE OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4: OUTBOUNG TRAFFIC DESTINATION DATA FOR LEG 3: LEG NUMBER III 4 INSOUND 1 2 3 4 PERCENT OF III 2 3 4 VSHICLES WITH DESTINATION ON LEG --- 33 33 34 C LEG NUMBER LEG 3 INBOUND 1 2 3 4
PERCENT OF LEG 3 INBOUND ON LEG --- 33 33 C 34



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TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA
                                                  TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA
                                                                                                                                                                                                                                 STANDARD 7 X 5
   STANCARD 7 X 5
                                                                                                                                                                                                                                       LEG 2 GECMETRY CATA:
        LEG 1 GECMETRY CATA:
                                                                                                                                                                                                                              LANE DATA FOR INBOUND LEG 2:
(CONVERTED APPROACH 2)
         LANE DATA FOR INBOUND LEG 1:
                                                                                                                                                                                                                              3
1 2
5
                                                                                                                                                                                                                                                                                                                                                         12
S R
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                                                                                                                                             12
5 R
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                                                                                      2.5
                                                                                                                                                                                                                                  TO ENTER IN THIS LANE -----
                                                                                                                                                                                                                                                                                                                       32
                                                                                                                                                                                                                                                                                                                                         35
                                                                                                                                                                                                                                                                                                                                                   CLRB
                                                                                                           25
                                                                                                                          25
                                                                                                                                      CLRB
                                                                                                                                                                                                                                      LANE DATA FOR OUTEGUND LEG 2: (CCNVERTED APPROACH 6)
         LANE DATA FOR OUTBOUND LEG 1: (CONVERTED APPROACH 5)
                                                                                                                                                                                                                             LANE NUMBER

(OUTBOUND LANE NUMBER)

WICTH CF LANE

MCYEMENT CCCE

FROM LANE TERMINAL

FROM LANE TERMINAL

OFFSET OF LANE

FROM LANE TERMINAL
5
1 2
5
                                                                                                                            12
 OFFSET OF LANE TERMINAL -----
                                                                                                                                                                                                                                                                                       TEXAS TRAFFIC SIMULATION PACKAGE
DRIVER-VEHICLE INPUT DATA
                                                      TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                                                                                                                                STANDARD 7 X 5
   STANDARD 7 X 5
         INECUNC TRAFFIC HEADWAY FREQUENCY DISTRIBUTION CATA FOR LEG 1:
                                                                                                                                                                                                                                      INDOUND TRAFFIC MEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:
                                                                                                                                                                                                                            NAME FOR INBOUND TRAFFIC HEADAN SNEGEXP SNEGEXP STANDARD SNEGEXP SNEGE
OUTEOUND TRAFFIC DESTINATION DATA FOR LEG 2:
         OLTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:
                                                                                                                                                                                                                             LEG NUMBER - 1 2 3 4
PERCENT OF LEG 2 INSOUND ON LEG --- 33 C 33 34
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STANDARD 7 X 5
                                                         LEG 3 GEOMETRY DATA:
             LEG ANGLE 1800ND LANES - 1800 C 1800 
                     LIMITING ANGLE FOR STRAIGHT MOVEMENT ---
LIMITING ANGLE FOR U-TURN --------
                                                       LANE DATA FOR INBOUND LEG 3: (CONVERTED APPROACH 3)
                          LANE NUMBER -----
             12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       000
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                                                                                                                                                                                                                                                                                                                                                                                                               MEDIĂÑ
                                                    LANE DATA FOR OUTBOUND LEG 3:
     CANE NUMBER AT A MUMBER A MUMBER AT A MUMBER AT A MUMB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     İż
                                                                                                                                                                                                                                                                                                                   TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA
                     STANDARD 7 X 5
                                               INECUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:
NAME FOR INSOUND TRAFFIC HEADAY FROM TO THE STAFF TO THE
```

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

TEXAS TRAFFIC SIMULATION PACKAGE STANCARD 7 X 5 LEG 4 GEOMETRY DATA: LANE DATA FOR INDOUND LEG 4: LANE NUMBER

(INSCUND LANE NUMBER)

MICHN OF LANE

MOVEMENT GCDE

LENGTH OF UMBLOCKED LANE

FROM LANE TERRINAL

FROM CUTSR END

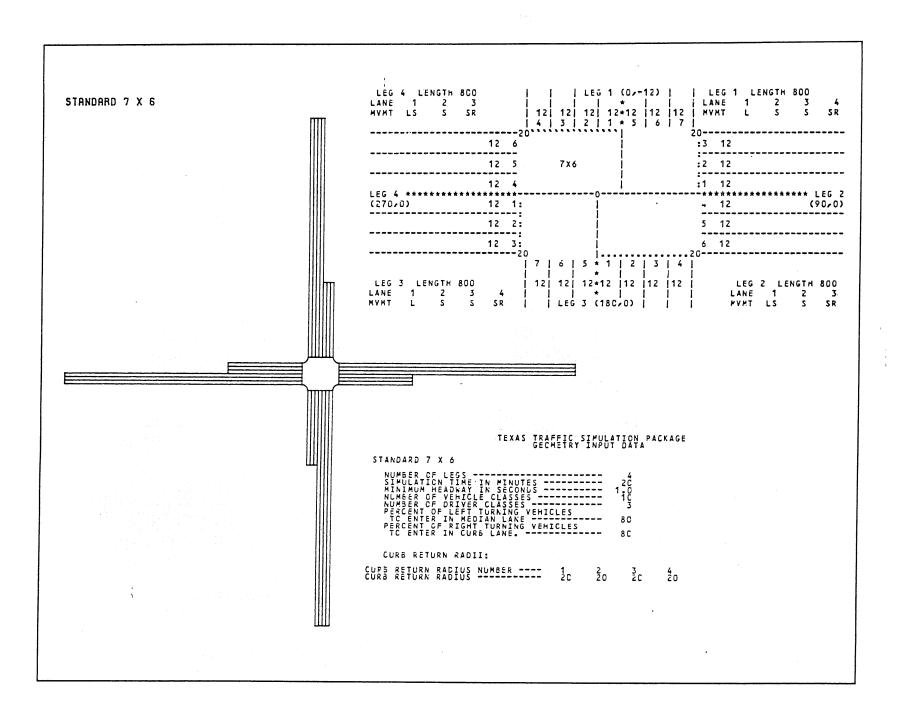
PROM CUTSR END

PROM CUTSR END

PROM CUTSR END

TO ENTER IN THIS LANE

TO ENTER IN THIS LANE 12 CURA LANE DATA FOR OUTBOUND LEG 4: (CONVERTED APPROACH 8) MEDIAN CURB TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA STANDARD 7 X 5 INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4: OUTEOUNE TRAFFIC DESTINATION DATA FOR LEG 4: PERCENT OF LEG 4 INBOUND ON LEG --- 33 33 34



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TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA
                                                                                                                                                                                                                                                                                                                                                                                                                    TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA
      STANDARD 7 X 6
                                                                                                                                                                                                                                                                                                                                   STANDARD 7 X 6
              LEG 1 GEOMETRY DATA:
                                                                                                                                                                                                                                                                                                                                            LEG 2 GEOMETRY DATA:
                                                                                                                                                                                                                                                                                                                             LANE DATA FOR INSOUND LEG 1:
                                                                                                                                                                                                                                                                                                                                         LANE DATA FOR INSOUND ; EG 2:
  12
                                                                                                                                                            12
                                                                                                                                                           25
                                                                                                                                                                                  25
                                                                                                                                                                                                  CLŘÉ
                                                                                                                   MEDIĀŃ
             LANE DATA FOR OUTBOUND LEG 1: (CONVERTED APPROACH 5)
                                                                                                                                                                                                                                                                                                                                       LANE DATA FOR OUTSCUND LEG 2: (CONVERTED APPROACH 6)
LANE NUMBER - 4
COUTBOUND LANE NUMBER) - 1
MITH OF LANE - 1
MOVEMENT CODE - 1
LONGTH OF UNALOCKEC LANE
FROM LANE TERMINAL - C
FROM OUTER SEC. C
OFFSET OF LANE TERMINAL - KEDIAN
                                                                                                                                                          12
                                                                                                                                                                                                                                                                                                                                                                                                                                            MEDIAN
                                                                                       TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT CATA
     STANCARD 7 X 6
                                                                                                                                                                                                                                                                                                                              STANDARD 7 X 6
             INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:
NAVE FOR INECUND TRAFFIC AND T
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OUTBOUNG TRAFFIC CESTINATION DATA FOR LEG 1:

12

12

CURB

CLEB

INSCUNC TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

MAPE FOR INSOUND TRAFFIC HEADWAY FRECUENCY DISTRIBUTION SKEG TOTAL HOURLY VCLUME ON LEG	EXP 60000 1.00
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OUTEOUND TRAFFIC DESTINATION DATA FOR LEG 2:

### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA TEXAS TRAFFIC SIMULATION PACKAGE STANCARD 7 X 6 STAMBARD 7 X 6 LEG 3 GEOMETRY CATA: LEG 4 GECMETRY CATA: LEG ANGLE 18C LEAGTH OF INECUND LANES 25C LEAGTH OF CUTEOUNG LANES 25C NUMBER OF INECUNG LANES 35C NUMBER OF GUTAOUNG LANES 35C SPEED LIMIT ON NIAOUNG LANES IN MPH 35C SPEED LIMIT ON OUTBOUND LANES IN MPH 35C LEGIAN MIDTH 2FF ST MEGIAN MIDTH 2FF ST LIMITING ANGLE FOR STRAIGHT MCYEMENT 25C LIMITING ANGLE FOR U-TURN 35C LANE DATA FOR INBOUND LEG 3: (CONVERTED APPROACH 3) LANE DATA FOR INBOUND LEG 4: (CONVERTED APPROACH 4) ANE NUMBER INDESTRUCTION INDESTRUCTION INDESTRUCTION INDESTRUCT INDESTRUC 12 LANE NUMBER -----ŤΖ ŤŽ COO Ç ŏ 25 25 35 CURE LANE DATA FOR OUTBOUND LEG 3: (CONVERTED APPROACH 7) LANE DATA FOR CUTEOUND LEG 4: 12 12 LENGTH OF UNBLOCKED LANE FROM LANE TERMINAL ----FROM CUTER END ------OFFSET OF LANE TERMINAL -----OFFSET OF LANE TERMINAL -----CLRĂ MEDIAN TEXAS TRAFFIC SIMULATION PACKAGE TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT CATA STANDARD 7 X 6 STANDARD 7 X 6 INSCUND TRAFFIC HEADNAY FREQUENCY DISTRIBUTION DATA FOR LEG 3: A STATE OF THE STA NAME FOR INSCUENCY TRAFFIR TO THE CONTROL OF THE CO CUTEOUND TRAFFIC CESTINATION DATA FOR LEG 3: OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 4:

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

TANDARD 7 X 7	LEG 4 LENGTH 800     LEG 1 (2,-12)     LEG 1 LENGTH 80C 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 
	12 6 7X7 :3 12  12 5 :2 12  (270,C) 12 1: :1 12  12 2: :5 12 (90,-12  12 3: :6 12
	12 4: 7 12
	TEXAS TRAFFIC SIMULATION PACKAGE STANDARD 7 X 7
	NUMBER CF LEGS
	CURB RETURN RADIUS NUMBER 1 2 3 4 CURB RETURN RADIUS 2C 2C 2C 2C

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TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                                                                                                                                                                                                                                                                          TEXAS TRAFFIC SIMULATION PACKAGE
        STANCARD 7 X 7
                                                                                                                                                                                                                                                                                           STANGARD 7 x 7
                  LEG 1 GECMETRY DATA:
     LEG ANGLE
LENGTH OF INSCUND LANES
LENGTH OF CUTSOUND LANES
NUMBER OF INSCUND LANES
NUMBER OF CUTSOUND LANES
SPEED LIMIT ON INSCUND LANES IN MPH 30
SPEED LIMIT ON UNSCUND LANES IN MPH 30
SPEED LIMIT ON UNSCUND LANES IN MPH 30
LEG CENTERLINE OFFSET LANES IN MPH 30
LEG CENTERLINE OFFSET LANES IN MPH 30
LIPITING ANGLE FOR STRAIGHT MCVEMENT 2
LIMITING ANGLE FOR UTURN 30
LIMITING ANGLE FOR UTURN 30
LIMITING ANGLE FOR UTURN 30
                                                                                                                                                                                                                                                                                                      LEG 2 GEOMETRY DATA:
                                                                                                                                                                                                                                                                                       LANE DATA FOR INBOUND LEG 1: (CONVERTED APPROACH 1)
                                                                                                                                                                                                                                                                                                  LANE DATA FOR INBOUND LEG 2: (CONVERTED APPROACH 2)
     LANE NUMBER
(INBOUND LANE NUMBER)
MICTH OF LANE
MOVEMENT CODE
LENGTH OF UNBLOCKED LANE
FROM LANE TERMINAL
FROM OUTER ENG
OFFSET OF LANE TERMINAL
TO ENTER IN THIS LANE
TO ENTER IN THIS LANE
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               LANE DATA FOR OUTBOUND LEG 1:
                                                                                                                                                                                                                                                                                                  LANE DATA FOR OUTBOUND LEG Z:
   LANE NUMBER

(OUTBOUND LANE NUMBER)

WICTH OF LANE

MOVEMENT CODE

LENGTH OF UNBLOCKED LANE

FROM LANE TERMINAL

FROM OUTER END

OFFSET OF LANE TERFINAL
                                                                                                                                                                                                                                                                                     12.
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                                                                                                           MEDIAN
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                                                                                 TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA
                                                                                                                                                                                                                                                                                                                                                                    TEXAS TRAFFIC SIMULATION PACKAGE
  STANDARD 7 x 7
             INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:
                                                                                                                                                                                                                                                                                               INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:
NAME FOR INBOUND TRAFFIC
HEADMAY FREQUENCY DISTRIBUTION SNEGEXP
TOTAL HOURLY VOLUME ON LEG
PARAMETER FOR CISTRIBUTION 2.00
MEAN SPEED OF ENTERING VEHICLES, MPH --- 28.00
MEAN SPEED OF ENTERING VEHICLES, MPH --- 28.00
TRAFFIC MIX DATA TO FOLLOW 7 --- 31.00
                                                                                                                                                                                                                                                                                  NAME FOR INBOUND TRAFFIC
HEADWAY FRECUENCY DISTRIBUTION SNEGEXP
TOTAL HOURLY VOLUME ON LEG STATEMENT STATE
           OUTBOUND TRAFFIC DISTRIBUTION DATA FOR LEG 1:
                                                                                                                                                                                                                                                                                              DUTBOUND TRAFFIC DISTRIBUTION DATA FOR LEG 2:
LEG NUMBER TO BE OUTSCUNC ON LEG -- 10 33 33 34 44
                                                                                                                                                                                                                                                                                  TECHNUMBER THEORY VEHICLES TO BE CUTBOUND ON LEG -- 33 20 33 34
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TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TEXAS TRAFFIC SIMULATION PACKAGE
            STANDARD 7 X 7
                                                                                                                                                                                                                                                                                                                                                                                                        STANDARD 7 X 7
                           LEG 3 GEOMETRY DATA:
                                                                                                                                                                                                                                                                                                                                                                                                                       LEG 4 GECMETRY DATA:
         LEG ANGLE
LEAGTH OF INBCUND LANES
LEAGTH OF INBCUND LANES
LEAGTH OF INBCUND LANES
LUBBER OF INBCUND LA
                                                                                                                                                                                                                                                                                                                                                                                                    LEG ANGLE

LENGTH OF LUTSCUND LANES

LENGTH OF CUTSCUND LANES

NUMBER OF INSCUND LANES

NUMBER OF CUTSCUND LANES

SPEEC LIMIT ON INSCUND LANES

SPEEC LIMIT ON INSCUND LANES IN MPH

LEG CENTERLINE OFFSET

MECLAN MICHAELE FOR STRAIGHT HCVEMENT

LIMITING ANGLE FOR UTURN
                          LANE DATA FOR INBOUND LEG 3:
                                                                                                                                                                                                                                                                                                                                                                                                                     LANE DATA FOR INBOUND LEG 4: (CONVERTED APPROACH 4)
                                                                                                                                                                                                                                                                                                                                                                                                 LANE NUMBER

(INBOUND LANE NUMBER)

MICTH OF LANE

MOVEMENT COSE

LENGTH OF UNELOCKED LANE

FROM LANE TERMINAL

FROM COUTER ENC

CEFSET OF LANE TERMINAL

PERCENT OF INCOLNE TRAFFIC

TO ENTER IN THIS LANE

TO ENTER IN THIS LANE
                                                                                                                                                                                                                                         3 2
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                                                                                                                                                                                                                                                            CLRE
                       LAKE DATA FOR OUTEDUNG LES 3:
                                                                                                                                                                                                                                                                                                                                                                                                                  LANE DATA FOR OUTBOUND LES 4:
     LANE NUMBER CONTROLLANE NUMBERS CONTROLLANE NU
                                                                                                                                                                                                                                                                                                                                                                                                fş
                                                                                                                                                                                                                                       12
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                                                                                                                TEXAS TRAFFIC SIMULATION PACKAGE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TEXAS TERFFIC SIMULATION DACKAGE
                  INEGUNE TRAFFIC HEADWAY FREQUENCY DISTRIBLTION DATA FOR LEG 3:
                                                                                                                                                                                                                                                                                                                                                                                                            INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 4:
OLTEDUNG TRAFFIC DISTRIBLTION DATA FOR LEG 3:
                                                                                                                                                                                                                                                                                                                                                                                                       OUTSOUND TRAFFIC DISTRIBUTION DATA FOR LEG 4:
TER LEG 3 INSCURE VENICLES TO BE CUTBOURD ON LEG -- 13 33 33 30 44
                                                                                                                                                                                                                                                                                                                                                                                        TER PLES 4 INSCUND VEHICLES TO SE CUTSOUND ON LEG -- 33 33 34 40
```

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA STANDARD 4 T 2 3 C CURB RETURN RACII: CURB RETURN RADIUS NUMBER ---- 1 CURB RETURN RADIUS ----- 32 STANDARD 4 T 2 LEG 3 LENGTH 800 LANE 1 2 MVMT 5 SR 12 4 | :2 12 12 3 :1 12 (270,0) 24 Pighaute12 1: 3 12 4 12 12 \* 1 | . 1 12\*12 i LEG 2 LENGTH 8GO 1 \* 1 LEG 1 LENGTH 800 LANE 1 MYMT LR LANE 1 2 HVMT LS S LEG 2 (180,C)

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TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA
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#### STANDARD 4 T 2

LEG 1 GEOMETRY DATA:

LEG ANGLE
LENGTH OF INBCUNC LANES
SPEED LIMIT ON INBCUNC LANES
SPEED LIMIT ON OUTBOUNC LANES IN MPH
3C
LEG CENTERLIKE OFFSET
LEG LAN MIDTH
LEG CENTERLIKE OFFSET
LIMITING ANGLE FOR STRAIGHT MCVEMENT
LIMITING ANGLE FOR UTLAN
LIMITING ANGLE FOR UTLAN

LANE DATA FOR INECUND LEG 1:

LANE DATA FOR OUTBOUND LES 1:

LANE NUMBER	3	4 2
MOVEMENT COCELINE	ŠŘ	12 SR
FROM OUTER ENC	۶	Š
OFFSET OF LANE TERMINAL	ĬAN.	CLRB

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

#### STANCARD 4 T 2

INECUNE TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:

 TEXAS TRAFFIC SIMULATION PACKAGE

#### STANCARC 4 T 2

LEG 2 GEOMETRY CATA:

LEG ANGLE		
LENGTH OF	INBCUND LANES	180
LENGIA OF	CUITACHNO LANGE	250
	INBCUNC LANES	- 1
		, 1
	T ON OUTBOUND LANES IN MPH	30
		Č
CIPILING A	ASIF FOR STRATCHT MODELES	30 30 20 10
AITNO AI	NGLE FOR U-TURN	1ă

LANE DATA FOR INBOUND LEG 2:

LANS NUMBER (INBOUND LANE NUMBER) HOVEMENT CCGE LANG LANG LANE FROM LANE FROM LANE	1
PERCENT OF LANE TERFINAL	100

CONVERTED APPROACH 5)

THE WILL ST	
LANE NUMBER	3
MOVEMENT CODE	12
FROM LANE TERMINAL FROM OUTER END	٤

# TEXAS TRAFFIC SIMULATION PACKAGE CRIVER-VEHICLE INPUT DATA

#### STANCARD 4 T 2

INECUND TRAFFIC HEADWAY FRECUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INDOUND TRAFFIC	
	SKEGEXI
PARAMETER FOR DESTRUCTION	2.00
	28.00
SS-PERCENTILE SPEED, APH	31.0
COLLUW ?	Ä, Č

OLTBOUND TRAFFIC DESTINATION DATA FOR LEG 2:

	Z INBGUND			3
AEHICLE2 FILH	DESTINATION ON LEG	 5.0	-	ε.

TEXAS TRAFFIC SIMULATION PACKAGE

### STANDARD 4 T 2

### LEG 3 GEOMETRY CATA:

LEG ANGLE LENGTH OF INEOUNG LARES LENGTH OF CUTBOUNG LARES NUMBER OF CUTBOUNG LARES NUMBER OF CUTBOUNG LARES SPEED LIMIT ON INBOUNC LARES IN MPH SPEED LIMIT ON INBOUNC LARES IN MPH LEG CENTERLINE CFTSET MECIAN MICTH LIMITING ANGLE FOR STRAIGHT MOVEMENT LIMITING ANGLE FOR UTLEN	270002 300000000000000000000000000000000
LANE DATA FOR INBOUND LEG 3:	
LANE NUMBER (INBOUND LANE NUMBER)	
LANE DATA FOR OUTBOUND, LEG 3:	
LANE NUMBER  (OLTECUNE LANE NUMBER)	

# TEXAS TRAFFIC SIMULATION PACKAGE

### STARDARD 4 T 2

INSGUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION CATA FOR LEG 3:

THE THE HEADHAT	PRECUENCY DISTRIBUTION DATA FOR L
HEADWAY FREQUENCY DISTRIBUTED TO THE HOURLY VOLUME ON LEG	TICK Skegexp
MEAN SPEED OF ENTERTION	
TRAFFIC MIX DATA TO FOLLOW	?
OUTBOUNG TRAFFIC DESTINA	TICH DATA FOR LEG 3:
Leg Numara	
PERCENT OF LEG 3 TRADILLO	د ۽ ا
VEHICLES WITH DESTINATION	ON LEG 50 to 0

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TEXAS TRAFFIC SIMULATION PACKAGE
                                   STANDARD 4 T 3
                                    CURB RETURN RADII:
                                  CURB RETURN RADIUS NUMBER ----
                                                            20
STANDARD 4 T 3
                                  LEG 3
                                       LENGTH 8CC
                                  LANE
                                       1 2
                                  MVMT
                                                    12 4
                                                                  :2 12
                                                    12 3
                                                                 :1 12
                                 LEG 3 ***************
                                                                 (270,0)
                                                    12 1:
                                                                  3 12
                                                                                    (90,0)
                                              12 2:
                                                                  4 12
                                 -----20
                                                        13 * 1 | 2 |
                                                        1 12*12 112 1
                                 LEG 2 LENGTH 8CO
                                                          *
                                                                           LEG 1 LENGTH 800
                                 LANE
                                      1 2
                                 HVHT
                                                                            LANE 1
                                      L
                                                                                     2
                                                                            MVMT LS
                                                        LEG 2 (180,C)
```

TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT GATA TEXAS TRAFFIC SIMULATION PACKAGE STANDARD 4 T 3 STANDARD 4 T 3 LEG 1 GEOMETRY DATA: LEG 2 GEOMETRY CATA: LEG ANGLE ANGUE ANGUE ANGUE ANGUE ANGUE ANGUE ANGUE ANGUE ANGUE ANGUND LANGS ANGUE A LEG ANGLE 130UNC LANES 255
LENGTH OF ILTSOUNC LANES 255
LENGTH OF CUTSOUNC LANES 255
NUMBER OF INECONC LANES 37
NUMBER OF CUTSOUNC LANES 37
SPEED LIMIT ON INSOUNC LANES IN MPH 36
SPEED LIMIT ON OUTEOUNC LANES IN MPH 36
LEG CENTERLINE OFFSET 36
HECKEN MIOTH OFFSET 36
HECKEN ANGLE FOR STRAIGHT MOVEMENT 36
LIMITING ANGLE FOR UTLINE 36
LIMITING ANGLE 56
LIMITING ANGLE LANE DATA FOR INSOUND LEG 1: (CONVERTED APPROACH 1) LANE DATA FOR INBOUND LEG 2: ĩş MEDIAN CURB LANE DATA FOR CUTBOUND LEG 1: (CONVERTED APPROACH 4) LANE DATA FOR OUTBOUND LEG 2: LAME NUMBER
COUTEOUND LAME NUMBER)
HIGH OF LAME
HOVEMENT CODE
LENGTH OF UNBLOCKEC LAME
FROM LAME TERMINAL
PROM CUTER END
OFFSET OF LAME TERMINAL PEDIAR CLRB TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT CATA TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA STANDARD 4 T 3 STANDARD 4 T 3 INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2: INBOUND TRAFFIC HEADWAY FRECUENCY DISTRIBUTION CATA FOR LEG 1: NAME FCR INBOUND TRAFFIC TO SECUENCY TO SE OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2: OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1: 

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TEXAS TRAFFIC SIMULATION PACKAGE
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### STANCARC 4 T 3

LEG 3 GECMETRY CATA:

LEG ANGLE LENGTH OF INBOUND LANES LENGTH OF CUTBOUND LANES NUMBER OF INBOUND LANES NUMBER OF CUTBOUND LANES	27C
NUMBER OF CUTBCUND LANES SPEED LIMIT ON INBOUND LANES IN MPH SPEED LIMIT ON OUTBOUND LANES IN MPH LEG CENTERINE OFFSET MEDIAN WICTH	300
LIMITING ANGLE FOR STRAIGHT MOVEMENT LIMITING ANGLE FOR U-TURN	2 C 1 C

CONVERTED APPROACH 3)

LANC NUMBER	4	•
(INBOUND LANE NUMBER)	1	•
WICTH OF LANE	! -	4
MOVEMENT CCDE	72	12
LENGTH OF UNBLOCKED LANE	2	SR
TEROLII, OL UNBLUCKEL LANE		
FROM LANE TERMINAL	C	Λ
FROM GUTER END	ň	ž
OFFSET OF LANE TERMINAL	>	Ý
PERCENT OF INSCHAG TRAFFIC	L	L
TO ENTER IN THIS LANE		
THE THE PERSON AND TH	48	5.2
MER	1 T A A	C

LANE DATA FOR OUTBOUND, LEG 3:

COMPERTED APPROACH 6)	
LAKE NUMBER	75 LS CO2
MEDIÁ	N CURR

### TEXAS TRAFFIC SIMULATION PACKAGE

### STANDARD 4 T 3

INBOUND TRAFFIC HEADWAY FRECUENCY DISTRIBUTION CATA FOR LEG 3:

HEADLAY FRECUENCY DISTRIBUTION	SKEGERP
PARAMETER FOR DISTRIBUTION MEAN SPEEC OF ENTERING VEHICLES, MPH B5-PERCENTILE SPEEC, MPH TRAFFIC MIX DATA TC FCLLOW ?	4.00 2.6.00 31.00

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

PERCENT OF LES						3
VEHICLES WITH	DESTINATION	010	LES	5 C	5 C	С

TEXAS TRAFFIC SIMULATION PACKAGE STANDARD 4 T 4 CURB RETURN RADII: CURB RETURN RACIUS NUMBER ----STANDARD 4 T 4 LEG 3 LENGTH 8GC LANE 1 2 MVMT S SR 12 4 :2 12 ----------12 3 LEG 3 \*\*\*\*\*\*\*\*\*\*\*\*\*\* :1 12 (270,0) 12 1: 3 12 (90,0) -------12 2: 4 12 1413 \* 1 | 2 | i 12 | 12 \* 12 | 12 | LEG 2 LENGTH 8CC \* | | LANE 1 2 MVMT L R LEG 1 LENGTH SCC \* | | LANE 1 Z WVPT LS 1 LES 2 (180/C) |

```
TEXAS TRAFFIC SIMULATION PACKAGE '
     STANDARC 4 T 4
        LEG 1 GECMETRY DATA:
  LEG ANGLE
LENGTH OF INSCUNC LANES
LENGTH OF CUTACUNC LANES
SPEEC LIMIT ON INBCUNC LANES IN MPH
SPEEC LIMIT ON OUTBOUNC LANES IN MPH
SPEEC LIMIT ON OUTBOUNC LANES IN MPH
CEG CENTER INE OFFSET
LEG CENTER IN COFFSET
LEG CENTER INC OFFSET
LIMITING ANGLE FOR STRAIGHT MCVEMENT
CCLIMITING ANGLE FOR UTURN
10
       LANE DATA FOR INBOUND LEG 1:
    .ARE NUMBER -----
 Ĩ۷
                                             MEDIAN CURE
      LANE DATA FOR OUTSOUND LEG 1:
(CONVERTED APPROACH 4)
 ŚŔ
  CFFSET OF LANE TERMINAL -----
                                              MEDIAN CURB
                                   TEXAS TRAFFIC SIMULATION PACKAGE CRIVER-VEHICLE INPUT DATA
  STANCARE 4 T 4
     INECUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 1:
```

OUTBOUND TRAFFIC DESTINATION DATA FOR LEG 1:

TEXAS TRAFFIC SIMULATION PACKAGE STANDARD 4 T 4 LEG 2 GEOMETRY CATA: LEG ANGLE - 150C
LEGGTH OF INBCUND LANES - 25C
LEAGTH OF INBCUND LANES - 25C
NUMBER OF INFOUND LANES - 25C
SPEED LIMIT ON INBCUND LANES IN #PH - 3C
SPEED LIMIT ON OUTBCUND LANES IN #PH - 3C
LEG CENTERIN OFFSET - 25C
MELIANT ON OUTBCUND LANES IN #PH - 3C
LEG CENTERIN OFFSET - 25C
MELIANT ON OFF LANE DATA FOR INSCUND LEG 2: LAKE NUMBER

(IRBOUND LANE NUMBER)

HIGH OF LANE

HIGH OF LANE

FROM LANE TERMINAL

FROM OUTER END

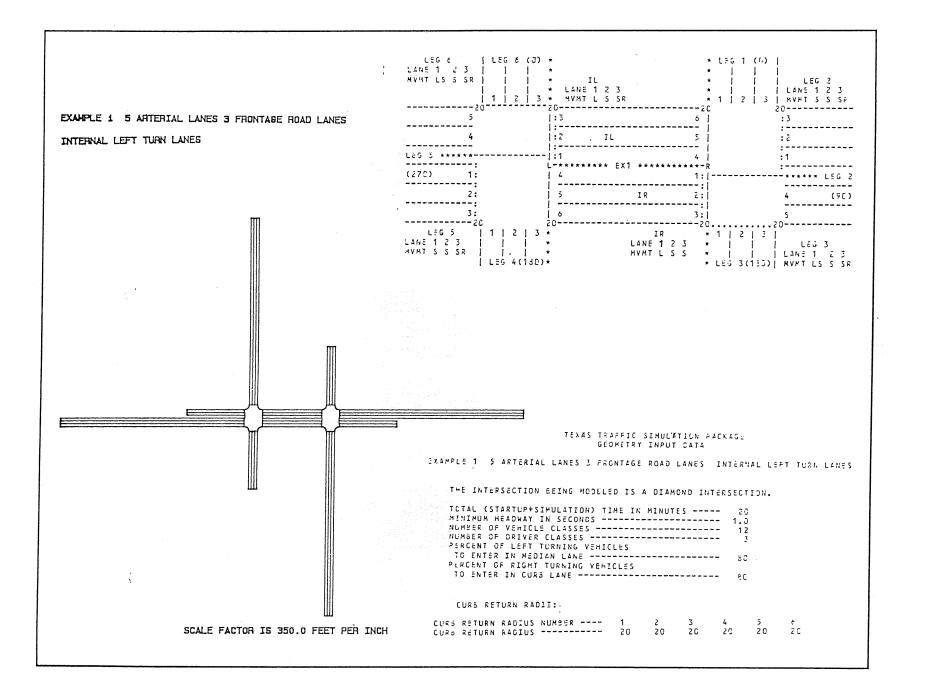
OFFSET OF LANE TERMINAL

PERCENT OF INSCUND TRAFFIC

TC ENTER IN THIS LANE

MEDIA 12 12 L 4.8 MEDIĂŇ CUŔĂ LANE DATA FOR OUTEOUND LEG 2: (CONVERTED APPROACH 5) 12 LR MECIAŇ CLRĚ TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT CATA STANDARD 4 T 4 INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2: OUTBOUNG TRAFFIC DESTINATION DATA FOR LEG 2: 

TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA STANDARD 4 T 4 LEG 3 GECHETRY DATA: LEG ANGLE
LESGTH OF INSCUND LANES
LESGTH OF CONTROL LANES
SPEED LIMIT ON INJOUND LANES IN MPH
SPEED LIMIT ON OUTBOUND LANES IN MPH
30 CONTROL LANES
LEGITARY OF STRAIGHT MCVENENT
LIMITING ANGLE FOR STRAIGHT MCVENENT
10 LANE CATA FOR INBOUND LEG 3: LANE DATA FOR OUTSCUND LEG 3: LANE NUMBER -- NUMBER) -- VOUTBOUND LANE NUMBER) -- VOUTBOUND LANE NUMBER) -- VOUTBOUND LANE FROM LANE TERMINAL -- VOUTBE END --MEDIAK CURŠ TEXAS TRAFFIC SIMULATION FACKAGE CRIVER-VEHICLE INPUT DATA STANCARD 4 T 4 INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3: 



### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

EXAMPLE 1 5 ARTERIAL LANES 3 FRONTAGE ROAD LANES INTERNAL LEFT TURN LANES

### INTERNAL LANES GEOMETRY DATA:

DISTANCE BETWEEN INTERSECTION CENTER R AND CENTER L	30
NUMBER OF LAKES THROUND TO CENTER R	
NUMBER OF LANES INBOUND TO CENTER L	3
COSED LIMIT ON LANES INSOUND TO CENTER L (MPH)	3
MEDIAN WIDTH	(

## LANE DATA FOR LANES INDOUND TO CENTER R: (CONVERTED APPROACH 4)

LANE NUMBER	1	2	. 3
(INBOUND LANE NUMBER)	1 .	4.7	12
WIDTH OF LANE	12	12	12
MOVEMENT CODE AT END NEAR CENTER R:	L,	S	S
MOVEMENT CODE AT END NEAR CENTER L	L S	S	S
LENGTH OF USABLE LANE FROM CENTER R	C	O	0
LENGTH OF USABLE LANE FROM CENTER L	ō	ñ	ō
	0	n	Ö
OFFSET OF LN. TERM. NEAR CENTER R	U	_	•
OFFSET OF LN. TERM. NEAR CENTER L	0	0	Ũ
ME	DIAN		CURB

#### LANE DATA FOR LANES INBOUND TO CENTER L: (CONVERTED APPROACH 5)

LANE NUMBER	4 1 12 .LS	5 2 12 3	6 3 1 2 S
MOVEMENT CODE AT END NEAR CENTER L	L	S	S
LENGTH OF USABLE LANE FROM CENTER R	. 0	0	C
LENGTH OF USABLE LANE FROM CENTER L	0	0	. 0
OFFSET OF LN. TERM. NEAR CENTER R	0	0	ប
OFFSET OF LN. TERM. NEAR CENTER L	O	0	0
	DIAN		CURB

### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

EXAMPLE-1 5 ARTERIAL LANES 3 FRONTAGE ROAD LANES INTERNAL LEFT TURN LANES

#### LEG 1 SEOMETRY DATA:

LEG ANGLE		0
	ANES	800
LENGTH OF OUTBOUND	LANES	250
	ANES	0
CHUORTUO OF REEMUN	LANES	3
SPEED LIMIT ON INSO	UND LANES (HPH)	30
SPEEC LIMIT ON OUTB	CUND LANES (MPH)	30
	cT	0
MEDIAN WIDTH		ົ່ງ

THERE ARE NO INBOUND LANES FOR LEG:1

#### LANE CATA FOR OUTEOUND LEG 1: (CONVERTED APPROACH 9)

LANE NUMBER	1	2	3
(OUTSCUND. LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	L S	S	3.2
LENGTH OF USABLE LANE FROM LANE TERMINAL	Ú	0	С
LENGTH OF USABLE LANE FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	C	0	C
MEI	MAIC		CURE

#### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

EXAMPLE 1 5 ARTERIAL LANES 3 FRONTAGE ROAD LANES INTERNAL LEFT TURN LANES

### LEG 2 GEOMETRY DATA:

LEG ANGLE		90
LENGTH OF	CHOOLING CONDOGNI	800
LENGTH OF	OUTBOUND LANES	250
NUMBER OF I	[NºOUND LANES	3
NUMBER OF C	OUTBOUND LANES	2
SPEED LIMIT	CN INBOUND LANES (MPH)	30
SPEED LIMIT	ON CUTBOUND LANES (MPH)	3 C
LEG CENTERL	.INE OFFSET	-6
MEDIAN WIDT	, b	12

#### LANE DATA FOR INBOUND LEG 2: (CONYERTED APPROACH 2)

LANE NUMBER	1	2	3
(INBCUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	S	S	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL	0	0	٥
LENGTH OF USABLE LANE FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	C	o
PERCENT OF INBOUND TRAFFIC			
TO ENTER IN THIS LANE	32	35	33
ME	TAN		CHES

#### LANE DATA FOR OUTEOUND LEG 2: (CONVERTED APPROACH 10)

LANE NUMBER	4	5 2
WIDTH OF LANE	12	12
MOVEMENT CODE	S	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL	O	0
LENGTH OF USABLE LANE FROM OUTER END	0	0
OFFSET OF LANE TERMINAL	0	0
. Mai	NAIC	CURB

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

EXAMPLE 1 5 ARTERIAL LANES 3 FRONTAGE ROAD LANES INTERNAL LEFT TURN LANES

INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2:

NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION SN	ESEXP
TOTAL HOURLY VOLUME ON LEG, VPH	٥٥٥
PARAMETER FOR DISTRIBUTION	2.00
MEAN, 85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH 29.0,	31.0
TRAFFIC MIX DATA TO FOLLOH ?	NO
SEED FOR RANDOM NUMBERS	13747

#### OUTEGUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG	NUMB	ēΡ							1	· 2	3	4	5	ć
PERC	ENT	0 F	LEG	2	INBOUND			-					_	-
٧â٢	ICLE	SH	HTI	0.5	STINATION	014	LEG		3.3	0	Ω	3.3	7 4	۲

# TEXAS IPAFFIC SIMULATION PACKAGE ... GEOMETRY INPUT DATA

EXAMPLE 1 5 ARTERIAL LANES 3 FRONTAGE ROAD LANES INTERNAL LEFT TURN LANES

TEXAS TRAFFIC SIMULATION FACKAGE

GEOMETRY INPUT CATA

5.AMPLE 1 5 ARTERIAL LANES 3 FRONTAGE RUAD LANES INTERNAL LEFT TURN LANES

#### LEG 4 GECMETRY DATA:

		130
LENGTH OF	INBOUND LANES	800
LENGTH OF	OUTBOUND LANES	250
NUMBER OF	INBOUND LANES	3
NUMBER OF	OUTSOUND LANES	0
SPEED LIMI	T ON INBOUND LANES (MPH)	30
SPEED LIMI	T ON OUTSOUND LANES (MPH)	30
LEG CENTER	LINE OFFSET	0
MEDIAN WID	TH	0

LEG ANGLE		18C
LENGTH OF	INBOUND LANES	80C
LENGTH OF	OUTBOUND LANES	250
NUMBER OF	INBOUND LANES	0
NUMBER OF	OUTBOUND LANES	3
SPEED LIMI	(HPM) ZBNAJ CNUDENI NO T	30
SPEEC LIMI	T ON CUTBOUND LANES (HPH)	3 C
LEG CENTER	LINE OFFSET	0
MEDIAN WID	TH	0

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

LEG 3 GEOMETRY DATA:

THERE ARE NO INBOUND LANES FOR LEG 4

LANE NUMBER	1	2	3 3
WIDTH OF LANE	12	12	12
MOVEMENT CODE	L S	S	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL	0	0	0
LENGTH OF USABLE LANE FROM OUTER END	0	O	.0
CFFSET OF LANE TERMINAL	0	0	o
PERCENT OF INBOUND TRAFFIC			
TO ENTER IN THIS LANE	32	3.5	3.3
MEC	DIAN		CURB

LANE	DATA	FOR	OUTEOUR	iD L	. E G	4:
(00)	VVERT	ED A.	PPROACH	14)		

THERE ARE NO OUTSDUND LANES FOR LEG 3

LANE NUMBER	1	2	3
(OUTBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	-12
MOVEMENT CODE	L S	S	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL	0	U	٤
LENGTH OF USABLE LANE FROM OUTER END	ø	0	O
OFFSET OF LANE TERMINAL	0	٠0	С
ME!	DIAN		CURB

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

EXÁMPLE 1 5 ARTERIAL LANES 3 FRONTAGE ROAD LANES INTERNAL LEFT TURN LANES

INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

NAME FOR INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION SME	GEXP
TOTAL HOURLY VOLUME ON LEG, VPH	000
PARAMETER FOR DISTRIBUTION	2.00
MEAN, 85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH 29.6,	71.0
SEED FOR RANDOM NUMBERS	271

CUTBOUND TRAFFIC DESTINATION DATA FOR LEG 3:

# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

EXAMPLE 1. 5 ARTERIAL LANES 3 FRONTAGE ROAD LANES INTERNAL LEFT TURN LANES

#### LEG 5 GEOMETRY DATA:

LEG ANGLE		270
	LANES	500
LENGTH OF OUTBOUND	LANES	250
	LANES	3
NUMBER OF OUTSOUND	LANES	2
	OUND LANES (MPH)	30
SPEED LIMIT ON OUT	BOUND LANES (MPH)	30
LEG CENTERLINE OFF	SET	<b>~</b> 6
MEDIAN WIDTH		12

#### LANE DATA! FOR INBOUND LEG 5: (CONVERTED APPROACH 7)

LANE NUMBER	1	2	3
(INSCUND LANE NUMBER)	1	2	3
WIDTH OF LANE 3NAJ TO HTGIW	12	12	12
MOVEMENT CODE	5	S	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL	0	0	٠0
LENGTH OF USABLE LANE FROM OUTER END	0	0	0
OFFSET OF LANE TERMINAL	0	0	0
PERCENT OF INSOUND TRAFFIC			
TO ENTER IN THIS LANS	32	35	33
ME	TAN		CURB

#### LANE DATA FOR OUTBOUND LEG 5: (CONVERTED APPROACH 15)

LANE NUMBER	4	. 5
(OUTSOUND LANE NUMBER)	1	2
WIDTH OF LANS	12	12
MOVEMENT CODE	S	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL	О	0
LENGTH OF USABLE LANE FROM OUTER END	c	0
OFFSET OF LANE TERMINAL	0	C
MEC	DIAN	CURS

#### TEXAS TPAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA

EXAMPLE 1 5 ARTERIAL LANES 3 FRONTAGE ROAD LANES. INTERNAL LEFT TUPN LANES

#### INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 5:

NAME FOR INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION S	NEGEXP
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	50123

#### OUTSOUND TRAFFIC DESTINATION DATA FOR LEG 5:

## TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

EXAMPLE 1 5 ARTERIAL LANES 3 FRONTAGE ROAD LANES INTERNAL LEFT TURN LANES

#### LEG & GEOMETRY DATA:

LEG ANGLE	0
LENGTH OF INSOUND 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)	3 G
LEG CENTERLINE OFFSET	О
MECIAN WIDTH	0

#### LANE DATA FOR INBOUND LEG o: (CONVERTED APPROACH 8)

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

THERE ARE NO OUTBOUND LANES FOR LEG 6

# TEXAS TRAFFIC SIMULATION PACKAGE ORIVER-VEHICLE INPUT DATA

# EXAMPLE 1 5 ARTERIAL LANES 3 FRONTAGE ROAD. LANES INTERNAL LEFT TURN LANES

### INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG.6:

NAME FOR INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION SP	EGEXP
TOTAL HOURLY VOLUME ON LEG, VPH	2.00
WEAR OF BLOCKHITTE SPEED OF ENTERING VEHICLES, MPH 24.0/	31.0
	NO 33145
SEED FOR RANDOM NUMBERS	23143

OUTSOUND TRAFFIC DESTINATION DATA FOR LEG 6:

EXAMPLE 2 6 LANES ON ARTERIAL 3 LANES ON FRONTABE ROADS	LEG 5   LEG 6 (0) *
	3:   6   3:   6   20   20   20   20   20   20   20
	TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA  EXAMPLE 2 6 LANES ON ARTERIAL. 3 LANES ON FRONTAGE ROADS  THE INTERSECTION BEING MODELED IS A DIAMOND INTERSECTION.  TOTAL (STARTUP+SIMULATION) TIME IN MINUTES 20 MINIMUM HEADHAY IN SECONDS
SCALE FACTOR IS 350.0 FEET PER INCH	CURB RETURN RADII:  CURB RETURN RADIUS NUMBER 1 2 3 4 5 5  CURB RETURN RADIUS 20 20 20 20 20 20

## TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

TEXAS TRAFFIC SIMULATION PACKAGE
GEOMETRY INPUT DATA

EXAMPLE 2 6 LANES ON ARTERIAL 3 LANES ON FRONTAGE ROADS

#### INTERNAL LANES GEOMETRY DATA:

#### LEG 1 GEOMETRY DATA:

DISTANCE BETWEEN INTERSECTION CENTER R AND CENTER L	300
NUMBER OF LANES INBOUND TO CENTER R	3
NUMBER OF LANES INBOUND TO CENTER L	3
SPEED LIMIT ON LANES INBOUND TO CENTER R (MPH)	30
SPEED LIHIT ON LANES INBOUND TO CENTER L (MPH)	30
MECIAN WIDTH	С

LEG ANGLE -		0
LENGTH OF 1	MACUND LANES	800
LENGTH OF	CANES	250
NUMBER OF I	NEOUND LANES	- 0
NUMBER OF C	CANAL CHUOSTUC	3
SPEED LIMIT	ON INSOUND LANES (MPH)	3.0
SPEED LIMIT	ON GUTBOUND LANES (MPH)	30
	INE OFFSET	.0
MEDIAN WIDT	H	Ω

LANE DATA FOR LANES INBOUND TO CENTER R: (CONVERTED APPROACH 4)

THERE ARE NO INBOUND LANES FOR LEG 1

LANE NUMBER	1	2	3
(INSOUND LANE NUMBER)	1	2	3
WIGTH OF LANE	12	12	12
MOVEMENT CODE AT END NEAR CENTER R	LS	S	S
MOVEMENT CODE AT END NEAR CENTER L	LS	S	S
LENGTH OF USABLE LANE: FROM CENTER R	0	0	0
LENGTH OF USABLE LANE FROM CENTER L'	0	0	0
OFFSET OF LN. TERM. NEAR CENTER R	0	0	0
OFFSST OF LN. TERM. NEAR CENTER L	. 0	0	0
ME	NAIG		CURB

LANE	DATA	FOR	ОИГОВТИО	LEG 1	:
(00)	VERT	ED AP	PROACH 9	)	

LANE	ATAC	FOR	LANES	INBOUND	. T 0	CENTER	L:
(00)	NVERT	ED AI	PROACH	1.5)			

LANE NUMSER	1	2.	. 3
(CUTSOUND LANE NUMBER)	i	2	3
IDTH OF LANE	12	12	12
HOVEMENT CODE	LS	\$	SR
ENGTH OF USABLE LANE FROM LANE TERPINAL	0	0	0
LENGTH OF USABLE LANE FROMEOUTER END	0	Ü	0
OFFSET OF LANE TERMINAL	0	0	C
Me	DIAN		CURB

LANE NUMBER	4	5	6
(OUTBOUND LANE NUMBER)	1	2	3
WIDTH OF LANE	12	12	12
MOVEMENT CODE.AT END NEAR CENTER R	LS	5	S
MOVEMENT CODE AT END NEAR CENTER L	L S	S	S
LENGTH OF USABLE LANE FROM CENTER R'	0	0	0
LENGTH OF USABLE LANE FROM CENTER L	0	0	C
OFFSET OF LN. TERM. NEAR CENTER R	0	0	0
OFFSET OF LN. TERM. NEAR CENTER L	0	0	0
ME	DIAN		CURB

## TEXAS TRAFFIC SIMULATION FACKAGE

#### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA DRIVER-VEHICLE INPUT DATA EXAMPLE 2 6 LANES ON ARTERIAL 3 LANES ON FRONTAGE ROADS EXAMPLE 2 6 LANES ON ARTERIAL 3 LANES ON FRONTAGE ROADS INSOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG 2: LEG 2 GEOMETRY DATA: NAME FOR INBOUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION --- Shegexp LEG ANGLE -----TCTAL HOURLY VOLUME ON LEG, VPH -----PARAMETER FOR DISTRIBUTION -----LENGTH OF INBOUND LANES ----- 800 LENGTH OF OUTBOUND LANES ------ 250 MEAN, 85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH --- 29.0, 31.0 NUMBER OF . INSOUND LANES ----- 3 TRAFFIC MIX DATA TO FOLLOW ? -----0 14 NUMBER OF OUTSOUND LANES -----SEED FOR RANDOM NUMBERS ----- 13747 SPEED LIMIT ON INBOUND LANES (MPH) ---- 30 SPEEC LIMIT ON OUTBOUND LANES (MPH) --- 30 LEG CENTERLINE OFFSET ----- O MECIAN WIDTH ------ O CUTBOUND TRAFFIC DESTINATION DATA FOR LEG 2: LEG NUMBER ----- 1 2 3 4 5 6 LANE DATA FOR INSOUND LEG 2: PERCENT OF LEG 2 INBOUND (CONVERTED APPROACH 2) VEHICLES WITH DESTINATION ON LEG --- 33 C O 33 34 C LANE NUMBER -----1 (INSOUND LANE NUMBER) ----- 1 WIDTH OF LANE ----- 12 .12 12 TEXAS TRAFFIC SIMULATION PACKAGE MOVEMENT CODE -----5 SR GEOMETRY INPUT CATA LENGTH OF USABLE: LANE FROM LANE TERMINAL -- 0. Ω 0 EXAMPLE 2 6 LANES ON ARTERIAL 3 LANES ON FRONTAGE ROADS PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE ----- 32 3.3 MEDIAN CURB LEG 3 GEOMETRY DATA: LEG ANGLE ----- 180 LANE DATA FOR OUTBOUND LEG 2: LENGTH OF INBOUND LANES ----- 800 (CONVERTED APPROACH 10) LENGTH OF OUTBOUND LANES ----- 250 NUMBER OF INBOUND LANES -----LAKE NUMBER ------ 4 NUMBER OF OUTBOUND LANES -----(OUTSOUND LANE NUMBER) ----- 1 SPEED LIMIT ON INSOUND LANES (MPH) ---- 30 12 12 SPEED LIMIT ON OUTSOUND LANES (MPH) --- 30 S SR LEG CENTERLINE OFFSET ------LENGTH OF USABLE LANE FROM LANE TERMINAL -- 0 MEDIAN WIDTH -----LENGTH OF USABLE LANE FROM OUTER END ----- O OFFSET OF LANE TERMINAL ----- O 0 MEDIAN CURS LANE DATA FOR INBOUND LEG. 3: (CONVERTED APPROACH 3) LANE NUMBER -----(INSOUND LANS NUMBER) ----- 1 HICTH OF LANE ------ 12 12 MOVEMENT, CODE ----- LS S SR

THERE ARE NO OUTBOUND LANES FOR LEG 3

PERCENT OF INBOUND TRAFFIC

LENGTH OF USABLE LANE FROM LANE TERMINAL -- O LENGTH OF USABLE LANE FROM OUTER END ----- O

DEFSET OF LANE TERMINAL. ----- 0

TO ENTER IN THIS LANE ----- 32

0

0

MEDIAN

(1 0

0

CURS

#### TEXAS TRAFFIC SIMULATION PACKAGE TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA GEOMETRY INPUT CATA EXAMPLE 2 6 LANES ON ARTERIAL 3 LANES ON FRONTAGE ROADS EXAMPLE 2 6 LANES ON ARTERIAL 3 LANES ON FRONTAGE ROADS INBOUND TRAFFIC HEADHAY FREQUENCY DISTRIBUTION DATA FOR LEG 3: LEG 5 GEOMETRY DATA: NAME FOR INECUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION --- SNEGEXP LEG ANGLE ----- 270 LENGTH OF INBOUND LANES ----- 800 MEAN, 85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH --- 27.0, 1.1 LENGTH OF OUTBOUND LANES ----- 250 TRAFFIC MIX DATA TO FCLLCH ? -----NUMBER OF INSOUND LANES ------ 3 SEED FOR RANDOM NUMBERS ------NUMBER OF OUTSOUND LANES -----SPEED LIMIT ON INBOUND LANES (MPH) ---- 30 SPEED LIMIT ON OUTBOUND LANES (MPH) ---LEG CENTERLINE OFFSET -----Ω CUTEOUND TRAFFIC DISTENATION DATA FOR LEG 3: MEDIAN WIDTH ----- HTGIW NAIGEM LEG NUMBER ------ 1 2 3 4 5 6 PERCENT OF LEG 3 INBOUND LANE GATA FOR INSOUND LEG 5: VEHICLES WITH DESTINATION ON LEG --- 25 25 8 25 25 3 (CONVERTED APPROACH 7) LANE NUMBER ----- 1 - 3 (INBOUND LANE NUMBER) ----- 1 MIDTH OF LANE ------ 12 MCVEMENT CODE ----- 5 12 12 S 5.8 TEXAS TRAFFIC SIMULATION PACKASE LENGTH OF USABLE LANE FROM LANE TERMINAL -- 0 LENGTH OF USABLE LANE FROM CUTER END ----- 0 0 OFFSET OF LANE TERMINAL ------ 0 GECMETRY INPUT DATA example 2 o Lanes on Arterial 3 Lanes on Frontage Roads PERCENT OF INBOUND TRAFFIC TO ENTER IN THIS LANE ----- 32 3.3 MEDIAN CURS LEG 4 SELMETRY DATA: LANE DATA FOR OUTBOUND LEG 5: 133 ANGL: ----- 133 (CONVERTED APPROACH 15) LENGTH OF INSCOUD LANES ----- 300 LEGITH OF OUTBOUND LANES ----- 250 LANE NUMBER ------ 4 NUMBER OF INSOUND LANES ----- 0 (OUTBOUND LANE NUMBER) ----- 1 WIDTH OF LANE ----- 12 MOVEMENT CODE ----- S NUMBER OF OUTBOUND LANES -----12 12 SPEED LIMIT ON INSOUND LANES (MPH) ---- 30 2.5 SPEEC LIMIT ON OUTBOUND LANES (MPH) --- 30 LENGTH OF USABLE LANE FROM LANE TERMINAL -- 0 LEG CENTERLINE OFFSET ------LENGTH OF USABLE LANE FROM OUTER BILD ----- O GOFFSET OF LANE TERMINAL ------- O D MEDIAN WIDTH ----ſ: MEDIAN CURB THERE ARE NO INBOUND LANES FOR LEG 4 LANE DATA FOR OUTZOUND LEG 4: (CONVERTED APPROACH 14) LANE NUMBER -----1 (OUTSOUND LANE NUMBER) ----- 1 2 WIDTH OF LANE ------ 12 12 MOVEMENT CODE ----- LS S SR LENGTH OF USABLE LANE FROM LANE TERMINAL -- . 0 0 С

LENGTH OF USABLE LANE FROM OUTER END -----

OFFSET OF LANE TERMINAL

0

MECIAN

0

0

CURB

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

TEXAS TRAFFIC SIMULATION PACKAGE Driver-vehicle input data

EXAMPLE 2	o LANES ON	ARTERIAL :	3 LANES ON	FRONTAGE ROADS

### EXAMPLE 2 6 LANES ON ARTERIAL 3 LANES ON FRONTAGE ROADS

INBOUND TRAFFIC	HEADWAY	FREQUENCY	CISTRIBUTION	DATA FOR	156 5.

INBOUND	TRAFFIC	HEACWAY	FREQUENCY	DISTRIBUTION	DATA	FOR LEG	6:

														SNEGEXP
														600
														2.00
MEAN,	85	PERC	ENT	ILE.	SPEE	D OF	ENT	ERI	٩G	VEHIC	LESA	MPH	 27.0	. 31.0
TRAFF	IC	XIP	CAT	A TO	FOL	LOH.	?						 	NO
SEED	FOR	RAN	MOGI	NUM	BERS								 	50123

NAME FOR INBOUND TRAFFIC HEADHAY FREQUENCY DISTRIBUTION ST	NEGEXP
TOTAL HOURLY VOLUME ON LEG, VPH	630 2.00
MEAN, 85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH 29.0, TRAFFIC MIX DATA TO FOLLOW?	31.0
SEED FOR RANDOM NUMBERS	NO 33145

#### CUTBOUND TRAFFIC DESTINATION DATA FOR LEG 5:

### CUTBOUND TRAFFIC DESTINATION DATA FOR LEG 6:

LEG NUMBER	1	2	3	4	5	6
PERCENT OF LEG 5 INBOUND						
VEHICLES WITH DESTINATION ON LEG	33	3.4	Ω	3.3	n	C

# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT DATA

EXAMPLE 2 6 LANES ON ARTERIAL 3 LANES ON FRONTAGE ROADS

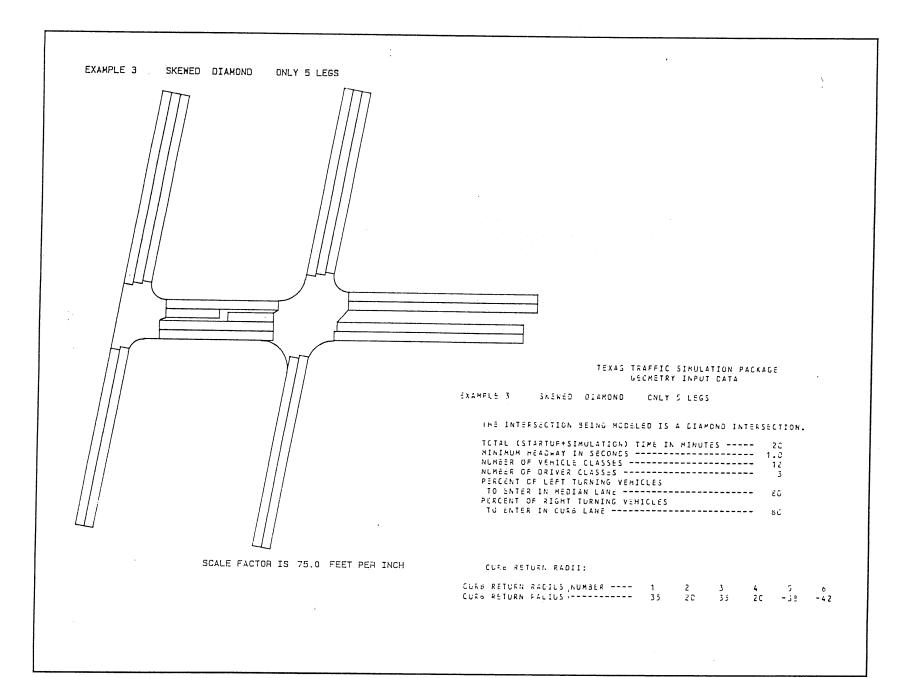
#### LEG 6 GEOMETRY DATA:

LEG ANGLE	n
LENGTH OF INBOUND LANES 80	-
LENGTH OF CUTBOUND LANES 25	
NUMBER OF THEOLOGICAL	3
NUMBER OF OUTSOUND LANES	0
SPEEC LIMIT ON INDUND LANES (MPH) 3	50
SPEED LIMIT ON OUTSOURS LANGE AND .	10
IFG CENTEDITAL OFFERS	0
MEDIAN UTOTH	0

# LANE DATA FOR INSCUND LEG o: (CONVERTED APPROACH 3)

LAME NUMBER	1 1 1 z L s 0 0	2 2 1 2 5 0 0	3 1 2 5 R 0 0
TO ENTER IN THIS LANE	32 NAIG	3 5	33 CURB

THERE ARE NO OUTSOUND LANES FOR LEG 6



#### TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT CATA

EXAMPLE 3 SKEWED DIAMONO CNLY 5 LEGS

#### INTERNAL LANES GECMETRY DATA:

DISTANCE BETWEEN INTERSECTION CENTER R AND CENTER L	200
NUMBER OF LANES INBOUND TO CENTER R	3
NUMBER OF LAKES INCOUND TO CENTER L	2
SPEEC LIPIT ON LANES INBOUND TO CENTER R (MPH)	3 C
SPEEC LIMIT ON LANES INSCUND TO CENTER L (MPH)	3 C
MIDIAN WILTH	- 3

#### LANE CATA FOR LAMES INSCUND TO CENTER R: (CONVERTED APPROACH 4)

LANE NUMBER	1	2	3
(INSCUND LANE NUMBER)	1	2	3
WISTH 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	С
LENGTH OF USABLE LANE FROM CENTER L	0	0	С
OFFSET OF LM. TERM. NEAR CENTER R	15	15	15
OFFSET OF LA. TERM. NEAR CENTER L	J	- 2 C	- 2:0
MEC	IAN		CLRS

#### LANE CATA FOR LANES INSOUND TO CENTER L: (CONVERTED APPROACH 5)

LANE NUMBER	4	5
(OUTSOUND LANE NUMBER)	1	2
WISTH OF LANE	12	12
MOVEMENT CODE AT END NEAR CEMTER R		LS
MOVEMENT COCE AT END NEAR CENTER L	L	L
LENJTH OF USABLE LANE FROM CENTER R	O	0
LENGTH OF USABLE LANE FROM CENTER L	7 Ü	0
OFFSET OF LN. TERM. NEAR CENTER R	C	ΰ
OFFSET OF LN. TERM. NEAR CENTER L	C	C
Méd	LAN	(にゅう

#### TEXAS TRAFFIC SIMULATION PACKAGE Geometry input data

EXAMPLE 3 SKEWED DIAMOND CNLY 5 LEGS

#### LEG 1 GEOMETRY DATA:

LEG ANGLE	10
LENGTH OF INBOUND LANES	
LENGTH OF OUTSCUNC LANES	25C
NUMBER OF INBOUND LAKES	_
NUMBER OF OUTSOUND LAKES	-
SPEED LIMIT ON INBOUND LANES (HPH)	
SPEED LIMIT ON OUTBOUND LANES (MPH)	
LEG CENTERLINE OFFSET	•
MEDIAN WIDTH	· <b>-</b> C

THERE ARE NO INSCUND LANES FOR LEG 1

#### LANE CATA FOR OUTBOUND LEG 1: (CONVERTED APPROACH 7)

LANE NUMBER	.1	ž	3.
(OUTECUNE LANE NUMBER)	1	2	3
WIGTH OF LANE	12	12	12
3COO TABMSVCM	LS	2	R
LENGTH OF USABLE LANE FROM LANE TERMINAL	0	Ð	L
LENGTH OF USABLE LANE FROM OUTER END	Ü	O	Ĺ
OFFSET OF LANE TERMINAL	8	4	С
4.5	CIAN		CURc

# TEXAS TRAFFIC SIMULATION PACKAGE GEOMETRY INPUT CATA

EXAMPLE 3 SKEWED DIAMOND CNLY 5 LEGS

#### LEG & GECMETRY DATA:

LEG ANGLE -		şζ
LENGTH OF	INPOUND LANES ******	50C
	DUTECUNE LANES	250
	INEOUND LANES	ċ
	OUTSOUND LANES	ĉ
	Ch INBOUND LANES (MPH)	3 C
	CN CUTBOUND LANES (MPH)	30
	INE CFFSeT	1
ACCING MIGI	n	1 ć

#### LANE CATA FOR INSCUND LEG 2: (CONVERTED APPROACH 2)

LANE NUMEER	1	2
(INSCUMB LANE MUMBER)	1	2
WIDTH OF LANE	12	13
40 V & V & S & CODE	5	Á
LENGTH OF USABLE LANS FROM LANG TERMINAL	С	C
LENGTH OF USABLE LANE FROM CUTER END	С	C
OFFSET OF LANE TERMINAL	C	U
PERCENT OF INBOUND TRAFFIC		
TO ENTER IN THIS LANE	40	5 2
MEC	IAN	CURB

# LANE DATA FOR OUTSOUND LEG 2: (CONVERTED APPROACH 10)

LANE NUMBER	3 1	4 2
WISTM OF LANE	12	12
MOVEMENT COCE	۵	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL	٥	Ū
LENGTH OF USABLE LANE FROM GUTER END	С	С
CFFSET OF LANE TERMINAL	- 4	ō
MECI	AN	CURB

#### TEXAS TRAFFIC SIMULATION PACKAGE Driver-Vehicle Inplt data

CXAMPLE 3 SKENED DIAPONE ONLY SLEGS

#### INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION DATA FOR LEG Z:

MAME FOR INECOND TRAFFIC HEACHAY FREQUENCY DISTRIBUTION SNEGE	χP
	0.0
	0.0
MEAN, 85 PERCENTILE SPEED OF ENTERING VEHICLES, MPH 29.L, 31	.0
TRAFFIC MIX DATA TO FOLLOW ?	NC
SEED FOR RANDOM NUMBERS 137	47

#### CUTECUND TRAFFIC DESTINATION DATA FOR LEG 2:

LEG	NUMBER					 1	2	3	4	5	6
				INBCUND			_	-	•	-	-
VEF	ITCLES .	alla	i) F	STIAATTON	ON LOG	 4.5	٥	C.	5.5		_

# TEXAS TRAFFIC SIMULATION FACKAGE GEOMETRY INPUT CATA

## EXAMPLE 3 SKENED DIAMOND CHLY 5 LEGS

#### LEG 3 GEOMETRY DATA:

LEG ANGLE		190
LENGTH CF	INCOUNC LANES	800
	OTTOCHNO LANES	250
	INSOLNO LANES	2.0
	CUTOCUND LANES	č
SPEEL LIMI	IT ON INBOUND LANES (MPH)	3.0
SPEEC LIMI	IT ON OUTBOUND LANES (MPH)	3.
LEG CENTER	LINE OFFSET	Č
MECIAN WID	)TH	ċ

#### LANE CATA FOR INBOUND LEG 3: (CONVERTED APPROACH 3)

L4% NUY25R	1	2
(INSCUND LANE NUMBER)	1	2
WIDTH OF LANE	12	12
MOVEMENT CODE	LS	SR
LENGTH OF USABLE LANE FROM LANE TERMINAL	C	G
LENGTH OF USABLE LANE FROM OUTER END	o	C
CFFSET OF LANE TERMINAL	4	ة
FERCENT OF INBOUND TRAFFIC		
TO ENTER IN THIS LAKE	48	52
Mac	IAN	CURB

THERE ARE NO CUTEOUND LANES FOR LEG 3

# TEXAS TRAFFIC SIMULATION PACKAGE DRIVER-VEHICLE INPUT DATA

#### EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS

#### INSCUND TRAFFIC HEAGHAY FREQUENCY DISTRIBUTION DATA FOR LEG 3:

HARE FOR INSCUND TRAFFIC HEADWAY FREQUENCY DISTRIBUTION SNO	EGEXP
TOTAL HOURLY VOLUME ON LEG, VPH	400
PAFAMETER FOR DISTRIBUTION	2.00
MEANING PERCENTILE SPEED OF ENTERING VEHICLES, MPH 29.0,	31.0
TRAFFIC MIX CATA TO FOLLOW ?	NS
JIED FCK RANCOM NUMBERS	291

#### CUTECUNG TRAFFIC DESTINATION DATA FOR LEG 3:

TEXAS TRAFFIC SIMULATION PACKAGE TEXAS TRAFFIC SIMULATION PACKAGE GECMETRY INPUT CATA GECHETRY INPUT CATA EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS EXAMPLE 3 SKEWED DIAMOND CNLY 5 LEGS LEG 4 GECMETRY GATA: LEG C GECHETRY DATA: LEG ANGLE ------ 196 LEG ANGLE -----LEAGTH OF INBOUND LANES ------ 800 LENGTH OF INECUNE LAKES ----- 800 LEAGTH OF CUTSOUND LANES ----- 250 LENGTH OF CUTEOUNG LANES ------ 250 NUMBER OF INBOUND LANES -----NUMBER OF INSCUND LANES -----"UMBER OF OUTBOUND LANES -----NUMBER OF CUTBOUND LANES -----SPEED LIMIT ON INBOUND LANES (MPH) ---- 30 SPEEC LIMIT ON INSCUND LANES (MPH) ----SPEED LIMIT ON OUTECUND LANES (MPH) --- 30 SPEEC LIMIT ON GUTBOUNG LANES (MPM) --- 30 LEG CENTERLINE CFFSET -----MEDIAN WIDTH -----Mediam alota ----- Hidla Naicom THERE ARE NO INECUND LANES FOR LEG 4 LANE DATA FOR INSCUND LEG O: (CChverted Approach e) LARE CATH FOR OUTSOURD LEG 4: LAND NUMBER -----(CCNVERTED APPROACH 14) (INFOUNC LANE NUMBER) ------3 Labt NUPBER -----12 LENGTH OF USABLE LANE FROM LANE TERMINAL --12 MINEMENT CODE ------LENGTH OF USABLE LANE FROM CUTER END -----L S CFFSET OF LANE TERMINAL -----LENGTH OF USABLE LANE FROM LANE TERMINAL -- ULINGTH OF USABLE LANE FROM OUTER INC ----- C PERCENT OF INSCUND TRAFFIC TO ENTER IN THIS LANS ----- 32 FFSET OF LANE TERMINAL ----- -10 -14 MEDILL CUKE MECIAN CLRE THERE ARE NO OUTBOUND LANES FOR LEG & TEXAS TRAFFIC SIMULATION PACKAGE TEXAS TRAFFIC SIMULATION PACKAGE GECMETRY INPUT CATA BRIVER-VEHICLE INPUT DATA EXAMPLE 3 SKEHED DIAMOND ONLY 5 LEGS EXAMPLE 3 SKEWED DIAMOND ONLY 5 LEGS INEQUAD TRAFFIC HEACHAY FREQUENCY DISTRIBUTION GATA FOR LEG 6: LEG 5 GEOMETRY DATA: NAME FOR INSCUND TRAFFIC HEACHAY FREQUENCY DISTRIBUTION --- SNEGEXP LEG ANGLE ----- 270 TOTAL MOURLY VOLUME ON LEG, VPH -----LENGTH OF INCOUND LANES ----- 300 FARAMETER FOR DISTRIBUTION -----LENGTH OF DUTACUND LANES ----- 250 2.00 MEALINGS PERCENTILE SPEED OF ENTERING VEHICLES, MAH --- 27.0, 31.0 NUMBER OF INSOUND LANES ------ C TRAFFIC MIX CATA TO FOLLOW ? -----NUMBER OF OUTBOUND LANES ----- 0 1.5 SEED FOR RANCOM NUMBERS SPEED LIMIT ON INBOUND LANES (MPH) ---- 30 MESIAN WIDTH -----CUTEOUNE TRAFFIC DESTINATION DATA FOR LEG 6: LES NUMBER ------ 1 2 3 4 5 c PERCENT OF LEG & INSCUNC THERE ARE NO LANES FOR LEG 5

VEHICLES WITH DESTINATION ON LEG --- 10 30 0 60 0 0



# APPENDIX A.2 EXAMPLES OF HOW TO USE THE DATA-ENTRY PROGRAM

## Table of Contents

<u>Figure</u>	<u>Case</u> *	Action*	<u>Page</u>
A.2-0	1	1b	A.2-2
A.2-1	1	1c	A.2-4
A.2-2	2	2a	A.2-6
A.2-3	2	2b	A.2-7
A.2-4	<b>3</b> ,	За	A.2-8
A.2-5	3	3b	A.2-9

<sup>\*</sup>See pages A-21 and A-22 for descriptions of Cases and Actions.

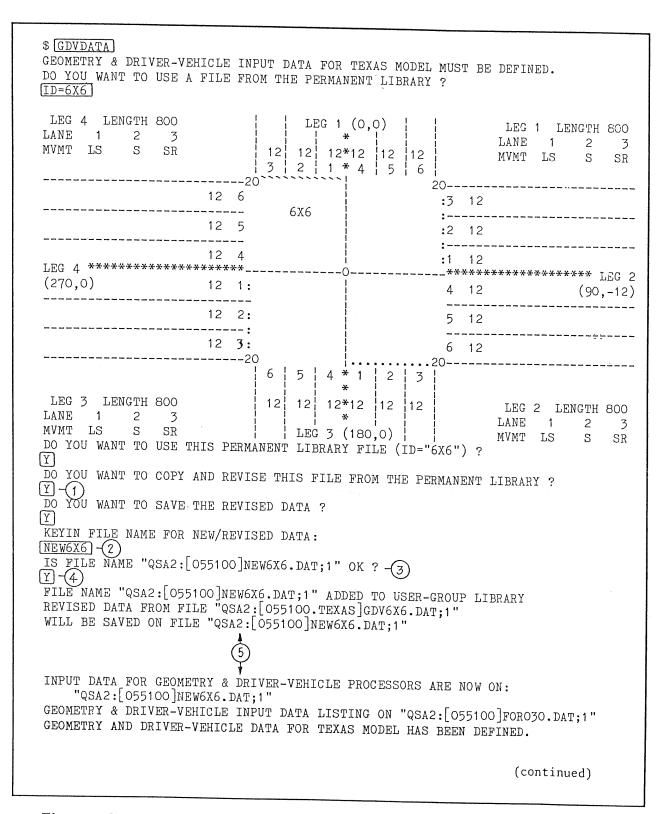


Figure A.2-0. Example of CASE 1, Action 1b - Choosing a permanent library file, automatically copying it, making revisions and saving the revised data on a new file for future use.

- 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.

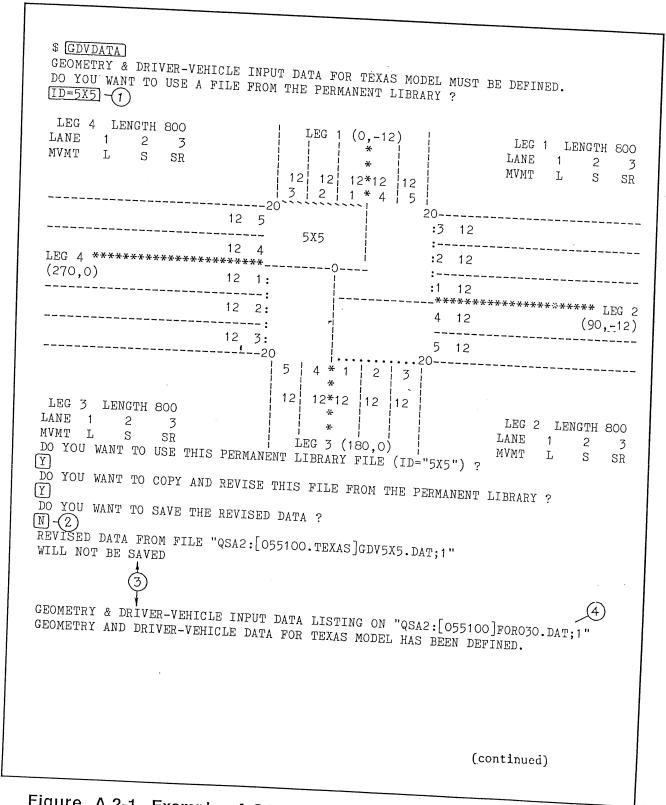


Figure A.2-1. Example of CASE 1, Action 1c - Choosing a permanent library file, automatically copying it, making revisions and discarding the revised data after a single use.

- 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.
- 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.

Figure A.2-1. Continued.

```
$ 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 ?

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)

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.

- 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).
- 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.

Figure A.2-3. Example of CASE 2, Action 2b - Choosing an existing file and making revisions on the existing file.

# \$ GDVDATA GEOMETRY & DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED. DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY ? 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" 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. NOTE: Key in data in response to prompts.

Figure A.2-4. Example of CASE 3, Action 3a - Keyed in data saved on a new file for future use.

#### \$ [GDVDATA]

GEOMETRY & DRIVER-VEHICLE INPUT DATA FOR TEXAS MODEL MUST BE DEFINED. DO YOU WANT TO USE A FILE FROM THE PERMANENT LIBRARY ?

<u>KEY</u> -(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.

- $\widehat{\mathbb{1}}$  This is a "shortcut" to indicate that data is to be entered by keyin.
- (2) Keyin data in response to prompts.

Figure A.2-5. Example of CASE 3, Action 3b - Keying in data and discarding the data after a single use.



# APPENDIX A.3 HARD COPIES OF SCREEN DISPLAYS FOR SIMDATA

# Table of Contents

Description of Data Fields Displayed in Prompts by SIMDATA	A.3-2
Data-Edit Requests for Use in SIMDATA	A.3-5

# 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 5.0> [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) - VEHICLE POSITION (POLLUTION/DISPLAY) DATA ? <"YES" OR "NO"> ["YES"]
F(9) - VEHICLE POSITION DATA ENDING TIME IN MINUTES. <0.0 TO 70.0> [5.0]
F(10) - PRINTED OUTPUT USES 132 COLUMNS ("NO" USES 80) ? <"YES" OR "NO"> ["NO"]
F(11) - LEFT TURNING VEHICLES PULL INTO INTERSECTION ? ("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 1.600 (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> [0.80]
F(7) - TIME FOR LAG ZONE USED IN CONFLICT CHECKING. <0.50 TO 3.00> [0.80]
LANE CONTROL DATA:
EACH FIELD - TYPE OF CONTROL FOR THE INDICATED INBOUND LANE:
 "BL" - BLOCKED LANE. LANE ENDS BEFORE THE INTERSECTION.
  "UN" - UNCONTROLLED. KONLY IF INTER. CONTROL = "NONE", "YIELD" OR "STOP">
  "YI" - YIELD SIGN. (NOT IF INTERSECTION CONTROL = "NONE")
  "ST" - STOP SIGN. KONLY 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> [0.5]
 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> [1]

# Description of Data Fields Displayed in Prompts by SIMDATA (continued)

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) [0.5]

```
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 FED-CLEARANCE INTERVAL. <0.0 TO 9.0> [0.5]
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> [0.5]
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 (continued)

DETECTOR CONNECTION DATA:

2

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 "O" TO INDICATE

THAT NO DETECTOR IS CONNECTED) <+/- NUMBER OF DETECTORS (1)>

CONTROLLER PHASE "CLEAR TO" DATA:

EACH FIELD - A CONTROLLER PHASE THAT CAN BE "CLEARED TO" DIRECTLY FROM THE
INDICATED CONTROLLER PHASE.

<PHASE LETTER, "A" THRU "Z", IN "CLEAR TO" PRIORITY ORDER>

### Data-Edit Requests for Use in SIMDATA

PHASE DATA EDIT REQUEST: P((((,)))=(n\*)(()(,...))

ITEMS BETWEEN BRACKETS ("(...)") ARE OPTIONAL AND MAY BE OMITTED.

i - THE NUMBER OF THE CONTROLLER PHASE FOR WHICH DATA IS TO BE EDITED. [1]

i - THE NUMBER OF THE FIRST FIELD TO BE EDITED. (INTEGER, 1 TO NO. OF FIELDS)[1]

1 ii - DATA TO REPLACE DATA THAT IS CURRENTLY IN THE FIRST FIELD TO BE EDITED.

ADDITIONAL REPLACEMENT DATA FIELDS MAY FOLLOW fil, SEPARATED BY COMMAS. USE MULTIPLE COMMAS TO SKIP FIELDS.

n - DUPLICATION FACTOR. USE FOR n SEQUENTIAL IDENTICAL FIELDS, FOR EXAMPLE: "P(3,6)=2\*ON" SETS FIELDS 6 AND 7 OF INTERVAL C TO "ON".

DETECTOR DATA EDIT REQUEST: D{(if,i})}={n\*}fiif,...}

ITEMS BETWEEN BRACKETS ("[...]") ARE OPTIONAL AND MAY BE OMITTED.

i - THE NUMBER OF THE DETECTOR FOR WHICH DATA IS TO BE EDITED. [1]

i - THE NUMBER OF THE FIRST FIELD TO BE EDITED. (INTEGER, 1 TO NO. OF FLELDS)[1]

fii - 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

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#### 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 Figure 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 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.

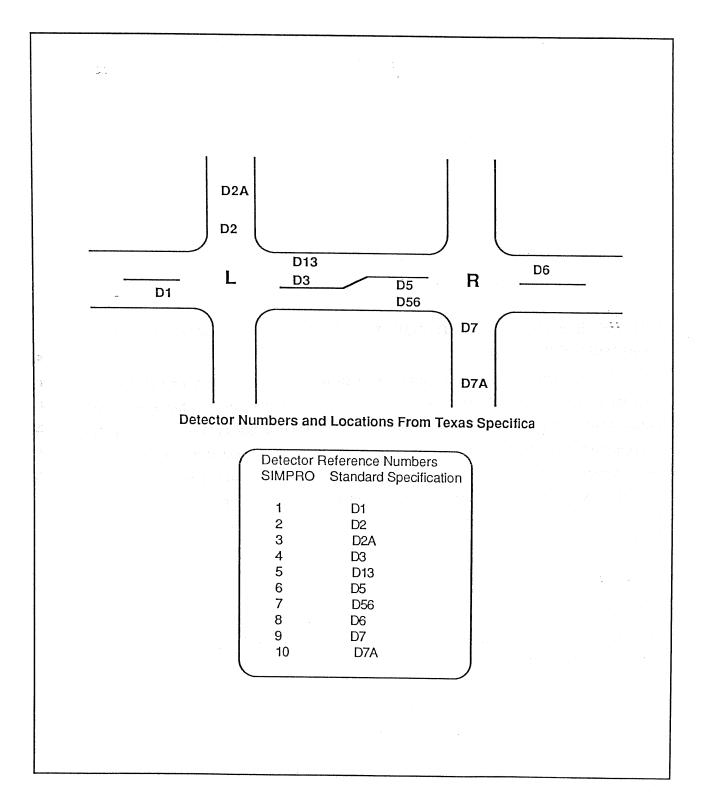


Figure B-1. Standard Detector Specification and SIMPRO Equivalents

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.

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.

TABLE B-1. DESCRIPTIONS OF TEXAS DIAMOND CONTROLLER SPECIAL INTERVALS

	INT	VAL	FUNCTION OF OPTION	Pl	AAS	SE	S	COLUMNS
	1	YES	Enable detector 3 during phase 3-7		4 (	s.	7	01-03
	1	NO	Disable detector 3 during phase 3-7			6		01-03
	2	YES	Enable detector 13 during phase 3-7			6		04-06
	2	NO	Disable detector 13 during phase 3-7				, 7	04-06
	3	YES	Enable detector 5 during phase 2-5			3		07-09
	3	NO	Disable detector 5 during phase 2-5				, 7	07-09
	4	YES	Enable detector 56 during phase 2-5			6	-	10-12
	4	NO	Disable detector 56 during phase 2-5			3		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	•	f	3		19-21
ā-			1-6, and 3-6 clears to 1-6 (figure 6 option A)					10 21
	7	NO	Simgap enforced on 3-6, rest not allowed on		6	3		19-21
			1-6, and 3-6 clears to 1-5(figure 6 option A)					10 21
	8	YES	Detector 2A is not cross-switched to 5		E	3		22-24
			during 2-5 and 2-7 is actuated(figure 6 option B)					!:
	8	NO	Detector 2A is cross-switched to 5		6	3		22-24
			during 2-5 and 2-7 not actuated (figure 6 option B)		,	-		
	9	YES	3-7 clears through 1-7 when going to 1-5			3		25-27
			(figure 6 option C)					
	9	NO	3-7 clears through 3-5 when going to 1-5		6	3		25-27
			(figure 6 option C)					,20 2,7
	10	YES	Simgap is inhibited on 1-5, rest is allowed				7	28-30
			on 1-6, and 1-5 clears to 1-6 (figure 7 option A)					20 00
	10	NO	Simgap is enforced on 1-5, rest is not allowed				7	28-30
			on 1-6, and 1-5 clears to 3-6 (figure 7 option A)					20 00
	11	YES	Detector 7A is not cross-switched to 3				7	31-33
			during 3-7 and 2-7 is actuated (figure 7 option B)				•	01 00
	11	NO	Detector 7A is cross-switched to 3 during				7	31-33
			3-7 and 2-7 is not actuated (figure 7 option B)					01 00
	12	YES	2-5 clears through 2-6 when going to 3-6				7	34-36
			(figure 7 option C)			•	•	0+ 00
	12	NO	2-5 clears through 3-5 when going to 3-6			-	7	34-36
		· .	(figure 7 option C)				•	0+ 00

TABLE B-2. TEXAS DIAMOND CONTROLLER OPTION 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	······································	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		31-34	
10	0.0-99.0	phase 1-6 advance green maximum timer	7 	35-38	
11	0.0-99.0	phase 2-7 advance green timer	in version <b>7</b> Literatur Alande <b>7</b>	39-42	
12	0.0-99.0	phase 3-5 clearance green timer	3	43-46	

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", Table B-3 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", Table B-4 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.

For "Figure 7", Table B-5 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.

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

TABLE B-4. "FIGURE 6" DETECTOR CONNECTIONS

D56	D5	D13	D3	PHASE
yes	yes	no	yes	1-5
r i var frii no	yes	no	yes	1-6
no	yes	no	yes	1-7
opt	opt	ph1	yes	2-5
no	yes	no	yes	2-6
no	yes	no	yes	2-7
yes	yes	yes	yes	3-5
no	yes	yes	yes	3-6
ph6	yes	opt	opt	3-7

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	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	

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 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 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 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 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, (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 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, 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).

Table B-6 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	<b>no</b>	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).

Table B-7 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, 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

TABLE B-7. DETECTOR CONNECTIONS AND PHASE COMBINATIONS
UNDER "FIGURE 6" OPERATION

D56	D5	D13	D3	PHASE
yes	yes	no	yes	1-5
no	yes	no	yes	1-6
no	yes	no	yes	1-7
opt	opt	ph1	yes	2-5
no	yes	no	yes	2-6
no	yes	no	yes	2-7
	yes	yes	yes	3-5
no	yes	yes	yes	3-6
ph6	yes	opt	opt	3-7

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).

Table B-8 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 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.

TABLE B-8. DETECTOR CONNECTIONS AND PHASE COMBINATIONS UNDER "FIGURE 7" OPERATION

PHASE	D3	D13	D5	D56	
1-5	yes	no	yes	VOC	
1-6	yes	no	yes	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	



#### APPENDIX C

TEXAS Model For Intersection Traffic Version 3.12 [Diamond Interchanges]

## INSTALLATION INSTRUCTIONS

AND

#### PRIMER

Note: Some information contained herein does not appear in the user's <u>Guide</u>\*. File this pamphlet with the <u>Guide</u>\* 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.

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#### INTRODUCTION

This appendix 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 microcomputers. 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.

#### Section 1

# TEXAS MODEL FIXED DISK INSTALLATION INSTRUCTIONS

NOTE: Successful utilization of the TEXAS Model will require the following hardware:

- IBM-PC or compatible computer, equipped with disk, 640K or memory and running under DOS 3.1 or greater.
- 2. Math co-processor.
- Graphics adaptor for your monitor, either IBM 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 4 if you are using 5 1/4 disks or diskette 2 if using 3 1/2 disks and then diskette 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 or greater. 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 or greater, 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:\ if DOS is located in your root directory. If DOS is not located in your root directory but it is in a subdirectory, type PATH C:\BATCH;C:\ with the name of the subdirectory following the last backslash and no spaces. 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 rebooted you may enter the TEXAS Modeling System by typing TEXAS to see the command menu.

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. Four 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 the diskette labeled TEXAS\_MDL\_DISPLAY into a suitable floppy disk drive. Then use a DOS command to make this drive the default drive. If the diskette was inserted into drive A:, type A:, if inserted into drive B:, type B:, etc. This diskette contains four files named DISDAT.CG, DISDAT.EG, DISDAT.EGM, and DISDAT.VGA. Due to space limitations, the file DISDAT.VGA is not included on the 5 1/4 disk. If you are installing from 5 1/4 disks and have a VGA, the file DISDAT.EG or DISDAT.EGM may be used in place of 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 adapter with color monitor. The demonstration files can be expected to operate reliably only on one of these adapter-monitor combinations.
- 3. Having identified your hardware type in step 1, you are almost ready to view the demonstration. 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. Now type DISPRO DISDAT.CG if you have IBM or compatible color graphics adapter and monitor, or DISPRO 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.
- 5. While the animation is in progress, Function Keys may be used to alter the way that the animation is displayed.
  - F2 Pause. When paused, press any key to continue.
  - F3 When paused, continue for one more step then pause again.
  - F4 Toggle forward motion / reverse motion .
  - F5 Toggle fast motion / normal motion.
  - F6 Skip to end of data block (block is 120 steps, 1 or 2 minutes).
  - F8 Toggle motion smoothing. When starting motion smoothing, keyin a single digit 2 thru 9 to set the number of smoothing divisions per step.

F10 - Quit.

## 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. These preprocessor files are in the subdirectory \TEXAS\USER\_DAT, which is the default directory for user input data files. Output files for the six

examples produced by the pre-processors and the basic model processors themselves have also been installed on the fixed disk in the \TEXAS\EXAMPLES subdirectory

Please note that the TEXAS Model processors and preprocessors will, by default, use the same file names for output whenever they are run. These files will be placed in the \TEXAS subdirectory. Each time a TEXAS Model processor or preprocessor is run using these default file names, existing output files will be overwritten so that only the data from the most recent run will be in the output file. File names may be changed to be different from the defaults by using command line parameters. Command line parameters are described in Appendix D.

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 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  ${\bf N}$  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.

The files that are supplied with the TEXAS Model and their descriptions are listed below. You can examine these files on your monitor or print them using the usual DOS TYPE OR PRINT commands. It may be useful to compare the supplied files to the output files produced by your runs.

File Name	
GDV.S1	Converted geometry-driver-vehicle data file, Example 1 and 2
GDV.S3	Converted geometry-driver-vehicle data file, Example 1 and 2
GDV.S5	Converted geometry-driver-vehicle data file, Example 3 and 4
SIM.S1	Converted simulation data file, Example 5 and 6
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

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#### 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).

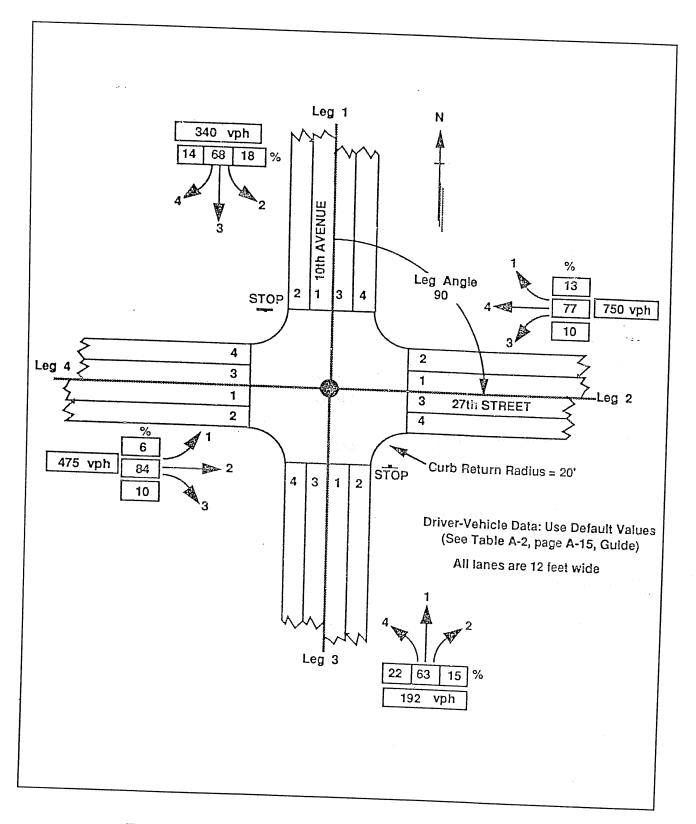


Figure C-1. Urban 2-way stop intersection,  $4 \times 4$ .

# STEP-BY-STEP INSTRUCTIONS CASE STUDY Example 1

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
- 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.

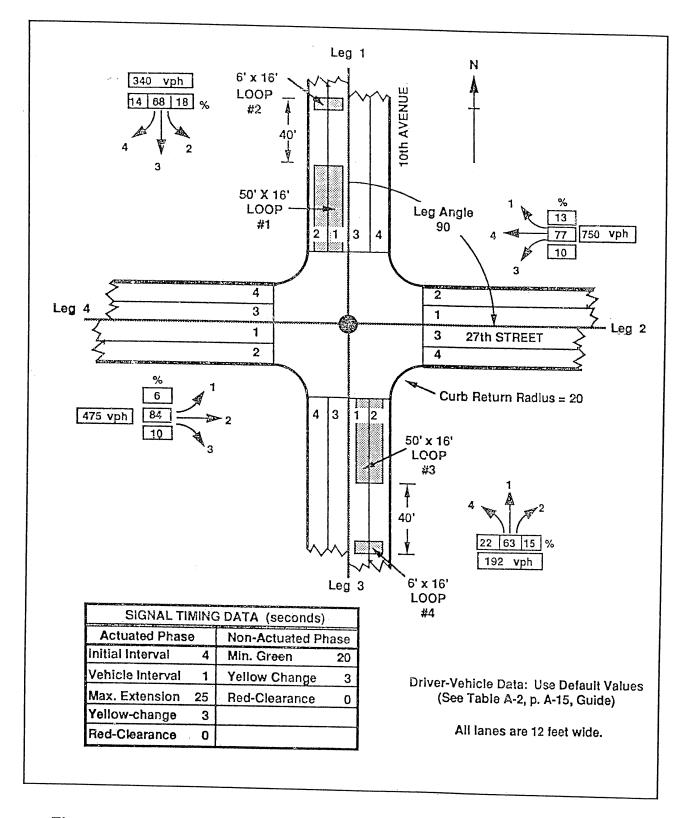


Figure C-2. Urban 4 x 4 intersection, 2-phase semi-actuated signal. STEP-BY-STEP INSTRUCTIONS

#### CASE STUDY Example 2

	1.	Key	in	"SIM	DA	T	٧"
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- 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 keyin **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 reference file name as *GDV4X4* 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. Keyin 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 KEYIN SIMULATION PARAMETER-OPTION DATA:
- 7. For this scenario, keyin simulation parameter-option data as follows: "1,N This will set Field 3 for a 1.0 second simulation time increment and Field 4 for NEMA signal control. Confirmation will be displayed. Edit if necessary, and keyin 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 detault values will be used; therefore, press the ENTER key in response to the command KEYIN SIMULATION PARAMETER-OPTION DATA 2; Confirmation will be displayed, and you can keyin 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 NEMA 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 *KEYIN 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. You must now KEYIN THE TRAFFIC PHASES TO BE IN CONTROLLER PHASE 1 For this scenario, include traffic phases 2 and 6 in controller phase 1 and traffic phases 4 and 8 in controller phase 2. Respond to the prompts as they occur.
- 14. NEMA CONTROLLER SIGNAL TIMING DATA FOR PHASE 1; for this scenario will utilize a MAXIMUM EXTENSION of 20 seconds, set the ENABLE MAXIMUM RECALL option to "YES" and use the default values for the other timing parameters. Therefore, simply keyin ,,,,20,,,Y Confirmation will be displayed.
- 15. NEMA CONTROLLER SIGNAL TIMING DATA FOR PHASE 2; 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 6-1). To enter these values in the proper fields, keyin 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 6-1). Keyin 4 in response to the prompt.
- 18. Data for each detector must be supplied. Refer to Fig 6-1 for the number and location of each detector. Keyin the following items in response to the series of screen prompts:

For Detector #	<u>Keyin</u>
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 2. Keyin 0 in response to the prompt for detectors connected to phase 1 and confirm by keying in Y. Keyin 1,2,3,4 in response to the prompt for detectors connected to phase 2 and confirm.

#### 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.

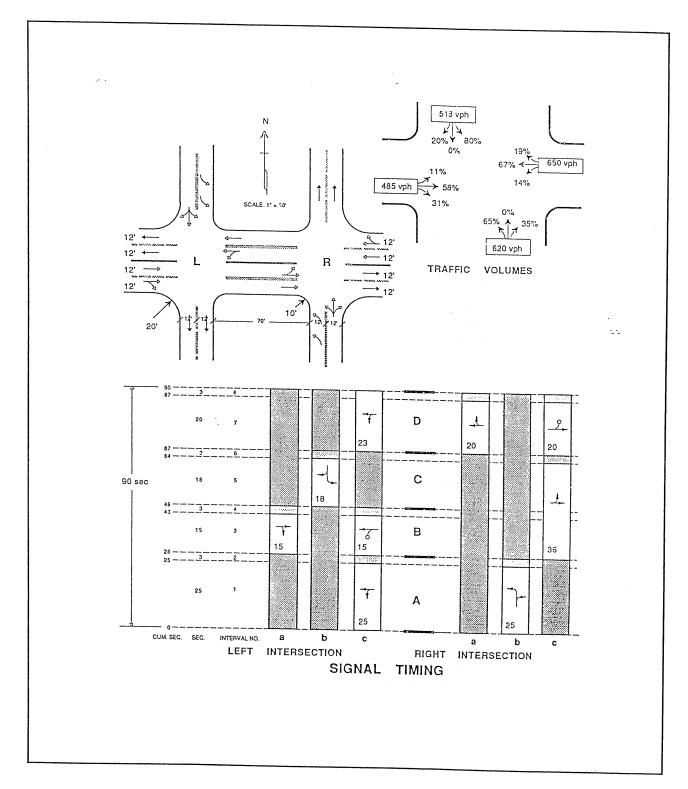


Figure C-3. Compact diamond, 4-phase pretimed signal control (Example 5).

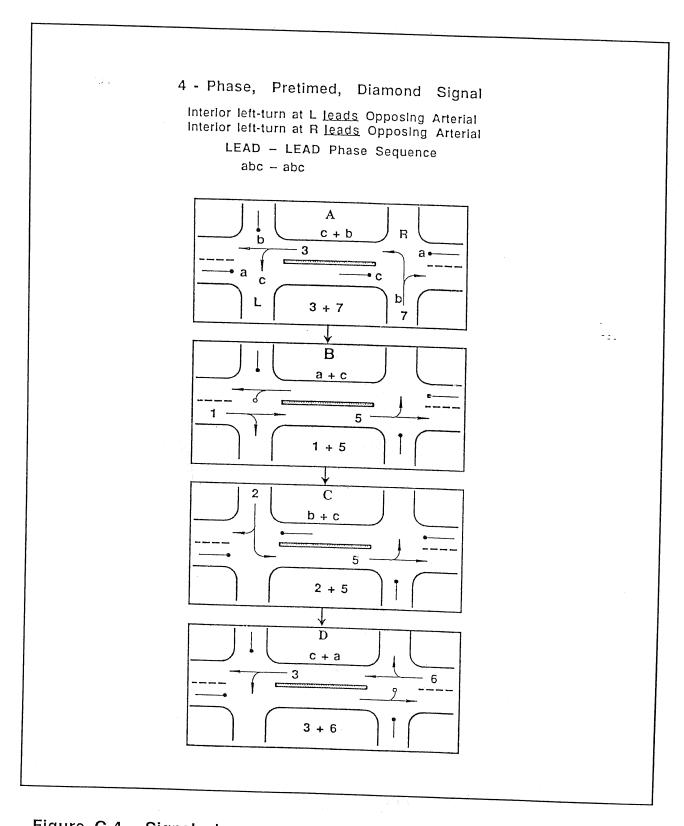


Figure C-4. Signal phase sequence for compact diamond (Example 5).

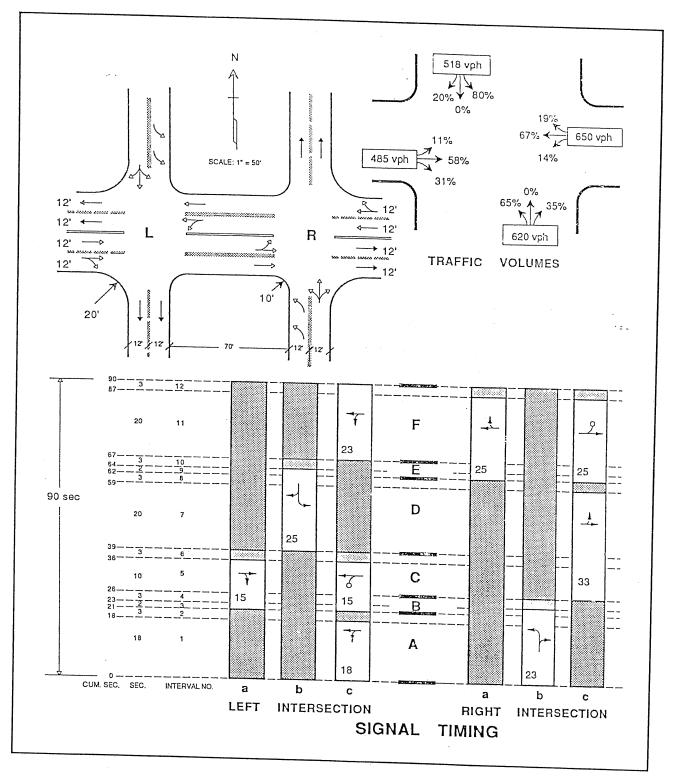


Figure C-5. Compact diamond, 4-phase with overlaps (6-phases in TEXAS 3.12), pretimed signal control (Example 6).

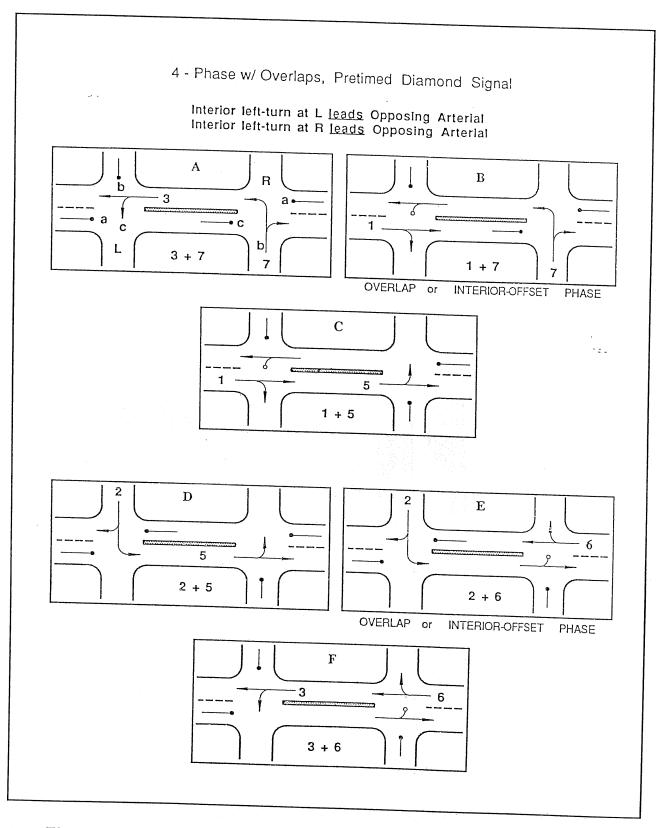


Figure C-6. Phase sequence for 4-phase with overlaps, pretimed diamond signal (Example 6).

# 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. 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. 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. Note, if only the second optional parameter is to be specified, it must be preceded by DIS+. For example, typing DISPRE DIS+TEST will cause the animation preprocessor to use the file POSDAT for reading input data and will write output data to the file named TEST.

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.

See Appendix D for instructions for using command line parameters to specify file names that are different than the defaults.

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.	<b>0</b>
21 - 30	Scale factor: intersection units/ inch on screen	50
31 - 35	Type of display:  0 - Program selects display  1 - EGA or VGA and monochrome moni  2 - CGA or EGA and color monitor  3 - EGA and enhanced color monitor  4 - VGA and color monitor	0 tor 
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**

<sup>\*\*</sup>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, there are two options. First, when running SIMDATA, he can change the appropriate data field from the default value of 5.0. Or 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. To edit this file, 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 decimal point

#### 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 A-15 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 before 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. The DISPRO input data file may be specified on the command line. If a file name is not specified on the command line, the default file name (DISDAT).will be used 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 animation is in progress, Function Keys may be used to alter the way that the animation is displayed.

- F2 Pause. When paused, press any key to continue.
- F3 When paused, continue for one more step then pause again.
- F4 Toggle forward motion / reverse motion .
- F5 Toggle fast motion / normal motion.
- F6 Skip to end of data block (block is 120 steps, 1 or 2 minutes).
- F8 Toggle motion smoothing. When starting motion smoothing, keyin a single digit 2 thru 9 to set the number of smoothing divisions per step.
- F10 Quit.

## 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 MAXO argument
1144 Incorrect MAXO 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 MINO argument
1160 Incorrect MINO argument
1162 Incorrect AMIN1 argument
1164 Incorrect DMIN1 argument
1166 Incorrect AMINO argument
```

```
1168 Incorrect AMINO 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



#### APPENDIX D

# TEXAS Model For Intersection Traffic Version 3.12

## COMMAND LINE PARAMETERS

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#### Section 1

#### USAGE

Command line parameters are for passing file names or instructions to the TEXAS Model processors. Each parameter may be presented to a processor as keyword parameter or as positional parameter.

Each keyword parameter requires a keyword, a separator and a file name. Keywords are listed below. The separator is an equal sign (=) on all but DOS implementations. The separator must be a plus sign (+) for the DOS implementation. Keyword parameters may appear in any order on the command line.

Positional parameters are distinguished by the order in which they appear on the command line. Keyword parameters are not considered when determining ordering on the command line. There is no provision for skipping positional parameters. If it is desired to skip one or more parameters and therefore use defaults for these, entry of any parameter(s) that follow must use the keyword form.

Parameters are listed below in positional parameter order for each processor. Defaults as shown below in square brackets ([]) will be used for all items that are not redefined from the command line.

The examples below assume that you wish to specify *file1* for the PVA parameter, *file2* for the DIS parameter and *file3* for the PAR parameter to the TEXAS Model processor DISPRE. If any of the parameters are not specified, it is assumed that the default is desired for that parameter.

valid

DISPRE PVA+file1 DIS+file2 PAR+file3

DISPRE file1 file2 file3

DISPRE file1 PAR+file3

(use default file for DIS)

DISPRE PAR+file3 DIS+file2 file1

(file1 is the first positional parameter)

not valid

DISPRE file1 file3
DISPRE PVA+file1 DIS+file2 file3
DISPRE file2

(file3 is second positional parameter, will be used for DIS) (file3 is first positional parameter, will be used for PVA) (file2 is first positional parameter, will be used for PVA)

#### Section 2

#### DEFINITIONS FOR EACH PREPROCESSOR AND PROCESSOR

GDVDATA - Geometry & Driver-Vehicle preprocessor data entry

L - Listing of input data. [GDVLIST]

GDVCONV - Convert Geometry & Driver-Vehicle preprocessor data

PRE - Input data in preprocessor format.

[GDVDATA]

C - Output data in converted format. For input to Simulation Processor. [GDV]

#### GDVPRO - Geometry & Driver-Vehicle Processors

I - Input data in converted format.

[GDV]

T8 - Geometry Processor output data, for input to SIMPRO.

[FORT8] (DOS)

[fort.8] (UNIX)

T9 - Driver-Vehicle Processor output data, for input to SIMPRO. [fort.8] (UNIX)

[FORT9] (DOS) [fort.9] (UNIX)

PLOT - Geometry Processor output data, for input to GEOPLOT. [fort.9] (UNIX)

[GEOPLOT]

PRE - Input data in preprocessor format. Will be converted and used by GEOPRO and written to file defined by C, below.

[GDDATA]

C - Output data in converted format. For input to DVPRO.

[GDV]

LGEO - Listing of Geometry Processor input data.

[GEOLIST]

LDV - Listing of Driver-Vehicle Processor input data. [DVLIST]

#### GEOPRO - Geometry Processor

I - Input data in converted format.

[GDV]

L - Listing of input data.

[GEOLIST]

T8 - Output data, for input to SIMPRO.

[FORT8] (DOS)

[fort.8] (UNIX)

PLOT - Output data, for input to GEOPLOT.

[GEOPLOT]

PRE - Input data in preprocessor format. Will be converted and used by GEOPRO and written to file defined by C, below.

[GDDATA]

C - Output data in converted format.

[GDV]

LGEO - Same as L, for compatibility with GDVPRO. [GEOLIST]

## GEOPLOT - Plot geometry and path data. (DOS)

PLOT - Plot file for input. This file is from GEOPRO. If this is the first parameter, the file name may be

GKS - The GKS interface will be used. This requires that a GKS Device Driver be available for the desired plotting device. For the PC, DISPLAY or PRINTER or PLOTTER may be chosen. When DISPLAY is used and the GEOPLOT program does not end normally (crash, CNTRL-BREAK, etc.), the DOS mode may not be set correctly. If this happens, use the DOS MODE command (MODE CO80 or MODE MONO) to set the proper DOS mode. Please see the manual for the specific GKS Device Driver for more information about its installation, setup and use.

HPGL - HPGL compatible plotter. This has been tested on Hewlett-Packard desktop plotters.

DXF - Standard AutoCad external file format. This file can be imported by many CAD packages.

DXF\_HDR - File that contains text to be included in DXF header section. The DXF header section contains settings of variables associated with the drawing. If this command line parameter is absent, or the specified file is not found, a search proceeds as follows. First, the current directory is searched. Next, the TEXAS Model system data directory is searched. If a file name and/or path is included on the command line, it is used for the search. A standard file is installed in the TEXAS Model system data directory. This standard file should be adequate for most cases. Including the DXF\_HDR parameter implies that the DXF file format is desired.

PROPRINT - IBM Proprinters and Proprinter XLs. Plotting area is 8.0 x 10.0 inches. Plotting of text is currently not implemented. If data is placed into a file, use the DOS copy command to plot. The

Example: COPY GEOPLOT.PPR /B LPT1

[PRN] BINARY

EPSON - Epson FX and LQ printers. Plotting area is 8.0 x 10.0 inches. Plotting of text is currently not implemented. If data is placed into a file, use the DOS copy command to plot. The /B parameter Example: COPY GEOPLOT.EP /B LPT1

[PRN] BINARY

GKS\_FIT - Similar to GKS, but the plot will be scaled to fit the available plotting surface. This scaling is done automatically for GKS if the selected device doesn't have a specific, fixed size. A CRT

CONSOLE - PC graphics screen. This is the GEOPLOT default output device. The PC hardware will be inspected and the most advanced graphics mode will be used. For PC's with more than one monitor, the user must first switch to the monitor that will be used. Supports standard IBM CGA,

POSTSCRIPT - Data file that can be plotted on a PostScript compatible device.

## DVPRO - Driver-Vehicle Processor

I - Input data in converted format.

[GDV]

L - Listing of input data.

[DVLIST]

T9 - Output data, for input to SIMPRO.

[FORT9] (DOS)

PRE - Input data in preprocessor format. Will be converted and used by DVPRO and written to file defined by C, below. [fort.9] (UNIX)

[GDDATA]

C - Output data in converted format.

[GDV]

LDV - Same as L, for compatibility with GDVPRO. [DVLIST]

## SIMDATA - Simulation preprocessor data entry

L - Listing of input data. SIMDLST

## SIMCONV - Convert Simulation preprocessor data

PRE - Input data in preprocessor format.

C - Output data in converted format. For input to Simulation Processor. [SIM]

## SIMPRO - Simulation processor

I - Input data in converted format.

[SIM]

L-Listing of input data and summary statistics.

[SIMDLST]

STA - Output of summary statistics in compact format

[SIMSTAT]

T8 - Data from Geometry processor.

[FORT8] (DOS)

[fort.8] (ŪNIX)

T9 - Data from Driver-Vehicle Processor.

[FORT9] (DOS)

PVA - Output of vehicle position and velocity data. For input to Animation Preprocessor.

[POSDAT] (DOS) (UNIX) ERR - Listing of detected errors.

[SIMERR] PRE - Input data in preprocessor format (VAX VMS).

C - Output data in converted format. For input to Simulation Processor (VAX VMS).

REP - Replicate run number, 1 through 10. If present, "Rn" is put in columns 56 through 59 of the title and the compressed summary statistics option is forced "YES".

DISPRE - Animation Preprocessor (DOS and UNIX)

PVA - Input data with vehicle position and velocity data from Simulation Processor.

DIS - Output data with animation data for use by Animation Processor.

PAR - Input, animation setup data. [DISPAR]

DISPRO - Animation Processor (DOS)

DIS - Input of animation data from Animation Preprocessor.

DISPRO - Animation Processor (UNIX)

One, two, three or four positional parameters. Each is a file with input of animation data from

REPRUN - Replicate Run Processor

All parameters are positional parameters. The first three are required. The fourth is optional. All must be in the order shown below.

first - Number of replicate runs to be processed.

second - Name of Geometry & Driver-Vehicle preprocessor data file. This is the file created in

third - Name of Simulation preprocessor data file. This is the file created in SIMDATA.

fourth (optional) - Sequence number of first replicate run to be processed. If this parameter is present, the first parameter becomes the sequence number of the last replicate run to be

REPTOL - Replicate Run Processor with Tolerance Checking

All parameters are positional parameters. All are required. All must be in the order shown below. first - Percentage for tolerance check.

second - Name of Geometry & Driver-Vehicle preprocessor data file. This is the file created in

third - Name of Simulation preprocessor data file. This is the file created in SIMDATA.

## SIMSTA - Simulation Statistics Processor

TOL - Percentage for the optional tolerance check. Must be 1 to 50. TOL uses 10 while TOL=n uses

STA - Name of summary statistics file from SIMPRO. The file extension(DOS, VMS) or suffix (UNIX) ".Rn" will be added before opening and reading the data from the files. L - Name of listing of summary statistics file.

[SIMSLST] (DOS)

[SIMSLST.LST] (VMS) (UNIX)

SS - Name of the optional spread sheet compatible data file. If not present, the spread sheet [SPRDSHT.DAT]