

A Modular Simulation Model
for the Design of Traffic Networks. (August 1968)

Robert L. Baker, B. S., University of Arizona;

M. S., Texas A&M University;

Directed by: Dr. Albert W. Wortham

Considerable literature has been published on the analysis of traffic flow. These studies include mathematical models of various parts of traffic networks, the development of probability distributions of expected travel times, and simulation models for parts of traffic networks.

A modular simulation model is developed which allows any of these various models to be incorporated into the simulation of a network.

The consideration of this model is to provide a flexible and easily used method for the simulation of traffic networks. Previous simulation methods have required that the position of all vehicles be physically represented in the computer, and that their positions be accounted for during each time period. The necessity of keeping track of all vehicles simultaneously has been too cumbersome to allow simulation of very large systems.

The method of representing vehicles in the simulation model presented here is a departure from methods previously used. The method is based on a single-vehicle-multi-interference movement concept. Instead of the vehicle

being physically represented in the computer, the method developed represents the vehicles as tallies in time and position dependent arrays. A basic assumption in this model is that the interferences which cause a vehicle to be delayed during its travel through the system can be represented by mathematical equations, statistical distributions, or simulation models. Consequently, there is no need to physically represent and account for the vehicle or its position at any point in time. An even more important observation is that there is no need to have any other vehicle in the system because the interactions between vehicles may be simulated by interferences.

Mathematical validation of the method is presented along with sample outputs from several simulation runs.

Operating instructions, a description, and program listings of the program are included.