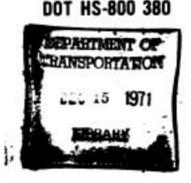DOT HS-800 380

MAXIMUM SPEED LIMITS. v.3.

A Programmed Implementation Manual for Setting a Speed Limit Based on the 85th Percentile

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of this package and suggestions for its application accompany
the programed text.

Table of Contents

1.0 INTRODUCTION

This report presents a programed implementation manual concerning a valid procedure for setting a speed limit using the "85th percentile" method. This package was developed in connection with a study (FH-11-7275) entitled "Maximum Speed Limits," funded by the National Highway Safety Bureau of the U. S. Department of Transportation.

This research was conducted by the staff of the Institute for Research in Public Safety of Indiana University, Bloomington, Indiana.

2.0 DESCRIPTION OF PROGRAM DEVELOPMENT

In order that the findings of this study might be translated into a usable form, it was decided that an implementation manual would be designed. Such a manual would be designed to apply to any level of traffic personnel involved in the setting of speed limits, but primarily it would be directed toward those people without a college engineering background who are responsible for setting speed limits in smaller communities and jurisdictions.

Since the findings of this study indicate that at present the best speed limit is a "reasonable" one, this manual is an implementation of the 85th percentile method. According to the literature and the survey conducted for this study, the 85th percentile criterion is not only reasonable but is also familiar and acceptable to numerous people in the traffic field.

Because the 85th percentile is familiar to many traffic specialists, it is put to use in various ways throughout the country. The purpose of this manual, then, is twofold. First, it is to teach traffic specialists how to correctly derive a speed limit from the 85th percentile criterion using statistically valid procedures. Secondly, it is to promote uniformity throughout the country in the setting of speed limits.

Since this educational package is to reach a widely dispersed audience, a self-instructional method of presenting

the materials was chosen. This method is programed learning. Through the programed text, traffic specialists nationwide can simply sit down at the time and place of their choice and administer the materials to themselves. Thus, the implementation manual can reach a wide audience with a minimum amount of expense.

In order that this manual might be an effective, self-instructional unit, much care was taken in its design and testing. The following explanation will describe the nature of programed learning, the structure of the implementation text, and the procedure through which it was designed.

Although previously programed texts relied strictly on repetition or "copying" as a mechanism for learning, today's programing is structured to literally pull all of the material out of the student. The text consists of series of individual frames each teaching one or more pieces of information. In nearly every frame, the student is required to respond to some type of question. The questions are designed so that the student can discover, reason out, or even guess the answer. It is not of prime importance that the student correctly respond to a given frame as long as he can progress clearly through the entire text to fulfill its objectives. After he has responded, he refers to the correct answer supplied in a

Confirmation Book. If his response was correct, he is rein-
forced by the Confirmation Book. On the other hand, if his
answer is incorrect, he is provided with the correct response
and continues to the next frame with the correct answer in mind.
When the student has to use information to answer a question
in a frame, we say that this information has been "established"
(in his mind). Thus, essentially the student learns through
participation in answering the questions before him.

The programed text consists of four primary components.
The first is the Confirmation Book. As explained previously,
this booklet contains the correct responses to all the questions
in the program. The uses of the Confirmation Book will be
described shortly.

The instructional components of the text consist of a
Pretest, two instructional Chapters, and a Posttest. The use
of the Pretest is optional. This must be clearly understood!
The Pretest is used to determine whether or not the student
already knows the material contained in the instructional
chapters. The Pretest is functional mainly during the develop-
ment of the program to enable the programer to evaluate how
much the student has learned from the instructional chapters.
Quite obviously, if the student could correctly answer the
Pretest questions before working through the Chapters, there
would be no reason for him to finish the program. If the

student wishes to test himself before working the chapters, he can complete the Pretest and then check his answers by referring to the Confirmation Book. The student must, however, clearly understand that he is not expected to be able to answer any of the Pretest questions and frankly that the learning experience will be more profitable if he is unable to work the Pretest. This must be stressed to prevent the student from becoming frustrated at such an early point in the program.

The main part of the instruction is given in the two Chapters. These consist primarily of two types of frames. Teaching frames contain instructional material and require the student to somehow respond. A criterion frame follows a series of teaching frames and tests the student on the task learned in the preceding teaching frames. Criterion frames present no new material. It is in the criterion frames that the student's response is more important because this frame is indicative of the student's learning. The student works through the chapters, referring to the Confirmation Book after he has worked each frame.

The Posttest is taken to determine whether the student has learned the materials presented to him in the chapters. It is parallel to the Pretest in design, but is not optional.

After the student has completed the Posttest, he can check his answers with the Confirmation Book.

In addition to the programed text itself, a Workguide has been prepared. This is a step-by-step work sheet, directing the traffic specialist through the procedure of setting a speed limit by the 85th percentile method. After the traffic specialist has completed the programed text, he should be able to use the Workguide as an aid in setting or changing speed limits within his jurisdiction.

This program was developed through a four-step procedure. First a "task analysis" is conducted. During this phase the programer must determine exactly what it is that the program is to teach and what individual skills and information the student will need to complete the desired task. This task analysis results in a list of clearly stated general and specific objectives for the program. The objectives for this programed text can be found on the following page.

From this list of objectives an initial version of the program is designed. At this stage in the development of this program, the author was assisted by programing advisors and a subject matter specialist. The initial version was then edited by the programing advisors and reviewed for content. Finally, the edited version underwent developmental testing.

OBJECTIVES

General:

On completion of this program the student shall set a speed limit for a given road under given conditions using the 85th percentile method.

Specific:

Chapter I: The student shall

- define "85th percentile speed"

- list and describe the factors essential to proper speed measurement for setting a speed limit, including equipment for unobtrusively measuring speeds; clear and dry or predominant weather conditions; average volume conditions or specific volume to be dealt with; and, a representative measurement site.

Chapter II: The student shall

- plot a volume graph given traffic volume data

- divide a volume plot into high, average, and low volume levels, and select the measurement intervals for a specified volume level

- use systematic sampling to select an equal or nearly equal number of speeds from those collected during each measurement interval

- determine the 85th percentile of a group of speeds either by arranging the speeds from lowest to highest or by constructing a frequency table

- derive a speed limit from an 85th percentile speed

During this stage the program was administered to a number of individuals (over 30 people were involved in this testing), observing each person's responses and reactions to determine what parts of the text were unclear or misleading. Changes were made during and after each administration of the program and these changes were then tested on the next individual. This testing continued until further testing yielded few or no improvements to the text. The result of developmental testing was the final version of this text.

3.0 APPLICATION OF THE IMPLEMENTATION PACKAGE

The method put forth in the implementation manual should be considered in its use as a "best-estimate" procedure. The speed limit resulting from the application of this method may not be the only possible speed limit, but should be accurate within 5 mph. That is, there may not be one optimum value of a speed limit, but a 10 mph speed band containing the best speed limit for the road.

Thus, in using this method, the traffic specialist must not employ it blindly. He must first be aware of the traffic situation with which he is dealing and why the speed limit is being set or changed. He must set the speed limit with an objective in mind so that this objective can be used as a criterion for evaluating the effect of the speed limit.

Probably the overriding objective of most speed limits will be to minimize accidents, in number and/or severity. In these cases the traffic specialist will want to evaluate the accident picture after the new limit has been posted to determine whether the situation has improved, remained the same, or worsened.

If, in terms of the purpose of the speed limit, the traffic situation worsened after the new limit was posted, the traffic specialist should closely examine the situation and re-measure speeds to see if the traffic picture has changed.

Perhaps a second application of the 85th percentile method will result in a speed limit that will improve the situation. At any rate, the traffic specialist should not dispose of common sense and good judgment in using this implementation method.

4.0 THE PROGRAMED IMPLEMENTATION MANUAL

The various parts of the implementation package comprise the remainder of this report. This package has been designed as an independent unit, and consists of the programed educational text and the field workguide.