

# **SPEED ENFORCEMENT POLICIES AND PRACTICE**

**DAVID K. WITHEFORD**

**ENO FOUNDATION FOR TRANSPORTATION  
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## FOREWORD

This publication on speed enforcement is both a survey of current practices and a plea for greater uniformity. The lack of uniformity in laws is more shocking than the variety in enforcement policies and practices. Different enforcement situations can require differences in both policy and practice. But differences in laws relating to conditions that demand uniform skill and responsibility in driver behavior are inexplicable. At the present time, there is such a diversity from place to place in regulations that drivers are hard put to know what they should comply with. Yet the almost universally accepted reason for speed enforcement, according to police officials, is to encourage voluntary compliance with the laws. The ultimate objective of encouraging law observance is to increase highway safety. Is this being done most effectively when enforcement practices vary and when the regulations being enforced are so variable?

Better communications may be the simple key. The main point of this study is to increase understanding, particularly between enforcement officials and all other groups having a legitimate interest in the speed of travel on the nation's highways. Better public understanding of the needs and circumstances for speed enforcement is likely to lead to safer use of the highways. Better understanding of the enforcement problem may lead to more suitable applications of speed zones by traffic engineers. Greater awareness of the disparity in laws, policies and practices between jurisdictions (whose boundaries are meaningless to travelers) may lead to improved regulations.

At this point, thanks must be expressed to nearly three hundred police officials who took the time to complete the questionnaires and to return them. The returns, and many of the comments appended to them, give evidence of the concern and interest in this problem. We hope that the results that have been summarized here will be of sufficient value to repay our debt.

# CONTENTS

	PAGE
Chapter I: INTRODUCTION . . . . .	1
Changes in Highway Travel . . . . .	1
Purpose of Study . . . . .	4
Organization of Report . . . . .	4
II: THE SURVEY . . . . .	5
Study Design . . . . .	5
Questionnaire Distribution and Return . . . . .	6
III: ANALYSIS OF REGULATIONS . . . . .	10
Maximum Speeds . . . . .	10
Minimum Speed Regulations . . . . .	22
Speed Zones . . . . .	22
Advisory Speed Signs . . . . .	28
Some Observations . . . . .	29
IV: ENFORCEMENT PRACTICES . . . . .	32
Speed Enforcement Objectives . . . . .	32
Methods of Enforcement . . . . .	33
Usage of Various Methods . . . . .	39
Possible Influences on Methods . . . . .	44
Open and Concealed Methods . . . . .	46
Time and Place for Enforcement . . . . .	50
Public Information Practices . . . . .	55
Emphasis on Speed Enforcement . . . . .	57
Some Observations . . . . .	63
V: APPREHENSION PRACTICES . . . . .	66
Tolerances . . . . .	66

	PAGE
Use of Warnings, Citations and Arrests. . . . .	71
The Number of Speeding Violations . . . . .	75
Attitude Toward Procedural Changes . . . . .	78
Comments . . . . .	81
VI : THE NEED FOR NEW APPROACHES . . . . .	83
Speed Characteristics . . . . .	83
Relating Traffic Engineering and Enforcement . . . . .	87
VII : SUMMARY AND CONCLUSIONS . . . . .	89
Summary of Findings . . . . .	89
Conclusions . . . . .	96
Appendix A. : SELECTED REFERENCES . . . . .	103
B. : QUESTIONNAIRE FORMS . . . . .	106
C. : EXCERPTS FROM UNIFORM VEHICLE CODE . . . . .	112
D. : AN INFORMATIONAL REPORT ON SPEED ZONING . . . . .	114
E. : REPORT ON SPEED ENFORCEMENT METHOD . . . . .	125
F. : SURVEY DATA SUMMARIES . . . . .	127

# FIGURES

	PAGE
Chapter II	
II-1 First Questionnaire Returns . . . . .	8
Chapter III	
III-1 State Speed Limit Types, 1947 and 1968 . . . . .	13
III-2 Comparison of State and City Laws . . . . .	15
Chapter IV	
IV-1 Techniques in Pacing . . . . .	34
IV-2 Summary of Usage, All Methods . . . . .	40
IV-3 Percent of Speed Enforcement by Pacing . . . . .	41
IV-4 Percent of Speed Enforcement by Time-Distance Methods . . . . .	42
IV-5 Percent of Speed Enforcement by Radar. . . . .	43
IV-6 Proportions of Concealed and Open Enforcement . . . . .	47
IV-7 Public Relations Activity Regarding Speed Enforcement . . . . .	56
IV-8 Speed Enforcement as Percent of All Traffic Enforcement . . . . .	60
Chapter V	
V-1 Use of Warnings, Citations, Arrests, and Bonds . . . . .	72
V-2 Relationship of Speeding Violations to All Moving Violations . . . . .	76
V-3 Speeding Violations and Radar Usage . . . . .	78
Chapter VI	
VI-1 Typical Speed Distribution Curve . . . . .	84
VI-2 Changes in Speed Distribution with Volume Increase . . . . .	85
VI-3 Envelope of Speed Distributions in a Speed Zone . . . . .	86

## T A B L E S

	<i>Page</i>
Highway and Travel Characteristics — 1947 and 1948 (I-1) . . . . .	2
Changes In Highway Speeds (I-2) . . . . .	3
Distribution and Return — First Questionnaire (II-1) . . . . .	7
Distribution and Return — Second Questionnaire (II-2) . . . . .	9
Types of Speed Limit By Size of City (III-1) . . . . .	14
City Speed Limit Types By Region (III-2) . . . . .	15
Truck and Auto Maximum Speed Limit Differences By Area and Highway Type (III-3) . . . . .	19
Day and Night Speed Limit Differences By Area and Highway Type (III-4) . . . . .	21
Source of Authority In Establishing Speed Zones (III-5) . . . . .	25
Urban School Zone Speed Limits (III-6) . . . . .	26
Effective Time Periods of School Zone Speed Limits (III-7) . . . . .	27
Usage and Interpretation of Advisory Speed Signs (III-8) . . . . .	29
Principal Objective of Speed Enforcement (IV-1) . . . . .	32
Frequency of Speedometer Calibration (IV-2) . . . . .	35
Usage of Time-Distance Methods (IV-3) . . . . .	37
Radar Use and Method of Employment (IV-4) . . . . .	38
Regional Differences In Enforcement Methods of Cities (IV-5) . . . . .	45
Open Enforcement Versus Enforcement by Radar (IV-6) . . . . .	46
Regional Use of Open and Concealed Methods (IV-7) . . . . .	49
Open and Concealed Enforcement By Type of Law (IV-8) . . . . .	50
Speed Enforcement Locations By Order of Importance (IV-9) . . . . .	51
Enforcement Under Very Low Volume Conditions (IV-10) . . . . .	54
Proportion of Respondents Using Various Media Combinations (IV-11) . . . . .	57

	PAGE
Time Distribution on Selected Activities By Motorized Traffic Division (IV-12) . . . . .	58
Moving Hazardous Violations By Type (IV-13) . . . . .	58
Speed Enforcement As A Proportion of All Traffic Activities (IV-14) . . . . .	59
Opinions On Adequacy of Speed Enforcement Activity (IV-15) . . . . .	61
Methods To Increase Driver Compliance (IV-16) . . . . .	62
Ranked Reasons For Granting Tolerance By State and City Groups (V-1) . . . . .	67
Comparison of Tolerance Practices In 1947 and 1968 (V-2) . . . . .	69
Change In Use of Warnings, Citations, and Arrests — 1947 to 1968 (V-3) . . . . .	73
Usage of All Enforcement Actions (V-4) . . . . .	73
Regional Patterns In Enforcement Actions (V-5) . . . . .	74
Enforcement Action Against Nonresident Drivers (V-6) . . . . .	75
Relationship of Speeding Violations To Use of Radar (V-7) . . . . .	77

## APPENDIX TABLES

	<i>Page</i>
Maximum Speed Limits Reported By States By Highway Type and Location (I) . . . . .	127
Summary of City Speed Limit Values By Highway Type and City Size (II-A) . . . . .	128
Absolute Speed Limit By Highway Type By Size of City (II-B) . . . . .	128
Prima Facie Speed Limit By Highway Type By Size of City (II-C) . . . . .	129
Prima Facie and Absolute Speed Limits By Highway Type and City Size (II-D) . . . . .	129
Speed Limit By Highway Type By Size of City (Speed Limit Type Not Indicated) (II-E) . . . . .	130
Minimum Speed Limits By Route Type and Area (III) . .	131
Warning Tolerances (IV-A) . . . . .	132
Summons Tolerances (IV-B) . . . . .	132
Arrest Tolerances (IV-C) . . . . .	133

## CHAPTER I

### INTRODUCTION

In 1903, New York City Police Commissioner William McAdoo introduced what was perhaps the first modern speed enforcement technique. As described in "Traffic is a Monster,"<sup>1</sup>

"The system, put to work along the Hudson drives, consisted of three dummy tree trunks set up at one-mile intervals along the roadside. A policeman equipped with a stopwatch and a telephone was concealed inside each fake tree.

"When a car sped past the first station, the policeman telephoned the exact time to the officer in the next tree. The second officer set his watch accordingly. When the car went by his post, he computed its speed for the mile. If this was above the limit, he telephoned the policeman in the third tree, who lowered a pole across the road and stopped the car."

Though time and distance measurements are often still essentials, policies and techniques in speed enforcement have come a long way since then. Speed limits at that time were typically from eight to ten miles per hour in cities, and fifteen miles per hour on rural roads. Today, 70 mile per hour speed limits are common, and radar devices and electronic computers do the work of calculating speeds for police officers.

Some things have not altered, however. The principal reasons for controlling vehicle speeds are the same: protection of life and property against the hazards of highway travel, and efficient use of street and highway systems. Vehicle speed, either high or low, may in itself be a cause of accidents; it is clearly a factor in determining the severity of accidents. Speed is also a factor in determining a highway's capacity to move traffic. There is, therefore, an interest in speed control from the viewpoint of safeguarding not only the public welfare but also the public investment in highway systems. As travel growth has been accompanied by higher tolls in accidents and increasing levels of highway investment, this concern has grown.

#### Changes in Highway Travel

Table I-1 shows some of the changes that have taken place in selected highway and travel characteristics in the past two decades. Since a previous study of speed enforcement in 1947, the mileage

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<sup>1</sup>Rufus Jarman, "Traffic is a Monster," Saturday Evening Post, Volume 228, No. 31, Philadelphia 1956, p. 41. Reprinted by permission of the Saturday Evening Post, 1956, Curtis Publishing Company.

## SPEED ENFORCEMENT

of all surfaced streets and highways in the United States has increased more than one and one-half times. Urban mileage has almost doubled, to 479,000 miles, while rural surfaced highway mileage has increased from 1.5 million miles to more than 2.3 million miles. The number of licensed drivers has nearly doubled and exceeds 100 million. During the same period, vehicle registrations have more than doubled, from less than 40 million vehicles to 100 million. Vehicle usage has gone up from 371 to 1000 billion vehicle miles per year, a little more than two and one-half times. Slightly more than half the total vehicle travel in 1968, about 510 billion vehicle miles, took place in urban areas. The gain in travel in urban

TABLE I-1

## HIGHWAY AND TRAVEL CHARACTERISTICS, 1947 AND 1968

<u>Characteristic</u>	<u>1947</u>	<u>1968</u>	<u>Percent Increase</u>
Miles of Surfaced Streets and Highways (thousands)			
Urban	241	491	+104
Rural	1544	2336	+51
Motor Vehicle Registrations (millions)	37.8	100.0	+165
Licensed Drivers (millions)	56	103	+84
Annual Vehicle Miles of Travel (billions)			
Urban	184	510	+177
Rural	187	500	+167
Annual Motor Vehicle Accident Fatalities			
Urban	11400	17400	+53
Rural	20900	37800	+81

Source: U. S. Department of Commerce, Bureau of Public Roads, "Highway Statistics 1948," Washington, 1948.

U. S. Department of Transportation, Federal Highway Administration, Bureau of Public Roads, 1967 and preliminary 1968 estimates.

National Safety Council, "Accident Facts," Chicago, 1968.

areas has been faster (177 percent) than in rural areas (167 percent). Highway fatalities have increased from 32,200 to 55,200 since 1947. Urban fatalities are a little less than one-third of the total and have increased less rapidly than rural, which increased by 81 percent.

Highway speeds have also increased during the period. Table I-2 shows statistics reported in speed studies conducted by state highway departments in Arizona, Connecticut and South Dakota.

TABLE I-2

## CHANGES IN HIGHWAY SPEEDS

<u>State</u>	<u>Speed Measure Defined</u>	<u>Year</u>	<u>Speed (mph)</u>	<u>Percent Increase</u>	
				<u>Total</u>	<u>Per Year</u>
Arizona	85 Percentile Passenger Cars- Daytime	1951	63.0	9.1	0.61
		1966	68.7		
Connecticut	Average Speed of Passenger Cars on Parkway	1948	52.6	12.3	0.65
		1967	59.1		
South Dakota	Average Speed of All Vehicles	1948	47.4	20.2	1.35
		1963	57.0		

Sources: Arizona Highway Department, "Annual Speed Study—1966"  
 Connecticut State Highway Department, "Highway Speed Study," 1968  
 South Dakota Department of Highways, "Annual Speed Study—1963"

From 1951 to 1966, the 85th percentile speed (that speed at which or less than which 85 percent are traveling) of passenger cars in Arizona increased by more than five miles per hour. This percentile speed is one of several criteria usually used in establishing speed limits. The average speed of all cars showed a similar rate of increase in Connecticut over a 20-year period. In South Dakota, the speeds of cars, trucks and buses showed a more rapid rate of increase, with a difference of almost ten miles per hour within fifteen years. Modifications in vehicle design and improvements in high-

way design—such as control of access and divided highways—insure that the trend will continue. Changes such as these are one reason for this study.

### **Purpose of the Study**

The principal objectives have been to ascertain how speed enforcement is being accomplished today and what changes might be appropriate considering the highway conditions that now prevail. As in a previous study, a survey by questionnaire was conducted. Most of the questions asked in 1947 were still valid in 1968. The purpose in asking them again was as before: first, to discover the degree of variation in regulation and practice; and second, to discover the prevailing attitudes of enforcement officials and the resultant effects on enforcement policies.

Publication and distribution of the findings is intended to encourage greater uniformity in speed regulations and more effective enforcement, as well as to increase understanding of the speed control problem among all concerned.

### **Organization of Report**

Following chapters describe the study design and report the findings, comparing them where appropriate with the previous study. Chapter II describes the development of the survey and the response. Chapter III discusses the collected data on speed regulations for both states and cities. Chapter IV describes the enforcement techniques and applications reported by police agencies. Chapter V discusses procedures for apprehending and dealing with speeding violators. Chapter VI introduces some considerations interrelating speed zoning and enforcement. Chapter VII summarizes the findings and draws conclusions on the present status of speed enforcement policies and practices.

Several appendices provide information on references, excerpts from the Uniform Vehicle Code, a procedural guide for speed zone establishment, tabulations from the survey and a description of one of the most recent techniques of speed enforcement.

## CHAPTER II

### THE SURVEY

To compile a summary of speed enforcement practices meant canvassing police departments across the nation. This chapter describes how the definition of the study scope was reached, the procedures that were followed in developing and distributing questionnaires, and the nature of the response by type of department and region.

#### Study Design

Speed enforcement is influenced by many areas of public activity besides police functions. There is an obvious relationship between enforcement and the nature of statutes in force. There is a direct relationship between enforcement and the quality and source of speed-zone establishment. There is also an important relationship between speed enforcement and the judicial process of dealing with violators. Legislative actions determine the type of speed limits, to what vehicles different limits apply, and what levels of penalties may be invoked upon violators. Traffic engineering actions, almost without exception, determine speed zone values upon which enforcement must be based. Judicial decisions on acceptability of evidence, varying court policies on the harshness of penalties meted out, and so on, have a profound effect on both practice and policy in speed enforcement.

The difficulty in designing the present study, therefore, was in drawing the boundaries of what was to be covered in a questionnaire. Some of the influences mentioned above have been fully treated by other recent publications, such as "Legal Aspects of Speed Measurement Devices."<sup>1</sup> Others are so nebulous as to defy qualitative, let alone quantitative, analysis of their effect on speed enforcement practices. For example, the outlook of a local magistrate, which may range from extreme leniency to harshness in violator treatment, may well affect local enforcement policy and arresting officer procedures.

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<sup>1</sup> Fisher, Edward C., "Legal Aspects of Speed Measurement Devices," Traffic Institute, Northwestern University, 1967, 76 pages.

Like the previous study, the questionnaire reflected the need for information on present speed regulations, on present speed measurement methods and their usage, and on procedures for apprehending violators. Unlike the previous study, the questionnaire did not ask for information on the type of courts having jurisdiction, or about fine and penalty structures, court costs, and so on. The original study had showed that the titles of courts with jurisdiction over speeding cases were almost as varied as were the scale of penalties applied. It was not possible then to relate the different methods of judicial treatment to the level or quality of speed enforcement. It was considered equally unlikely in the present study.

One further practical consideration limiting the questionnaire scope was its length. It was suspected that too lengthy a questionnaire would discourage voluntary cooperation and lower the response rate. As it was, the questionnaire filled three pages with questions requiring factual answers on regulations and procedures.

Partly to make up for the loss of information on judicial practices, a second questionnaire was developed to determine police attitudes toward speed enforcement. In what was primarily an opinion survey, questions were asked relative to the influence of traffic engineering and judicial policies on speed enforcement. Both the questions and the choice of responses were designed to elicit comments, for which space was provided on the form.

Before the final questionnaire designs were completed, they were reviewed by students in a police training course at Manchester Community College in Connecticut. The students, all police officers enrolled in the program by the state police and local departments, completed the forms for their own jurisdictions and provided additional comments. Their assistance was valuable in editing the forms and in clarifying terminology.

Sample copies of both questionnaires are reproduced as Appendix B.

### Questionnaire Distribution and Return

#### *The First Questionnaire*

The forms were sent to state highway patrol agencies, to all cities with over 50,000 inhabitants, and to 100 cities in a popula-

tion range of 25,000-50,000 persons. Two cities in the latter category were designated in each state. In addition, copies were sent to several toll-road agencies and 25 counties. All of the recipients, except for some counties, were on Eno Foundation mailing lists. They had reason, therefore, to be aware of the foundation's general interest in studies of this nature.

Table II-1 summarizes the mail out and return characteristics, excluding late returns received after the analysis cutoff date. The quality of response varied considerably. Some cities and states completed the questionnaires and sent additional material, including excerpts from state codes, driver manuals, and annual reports. On the other hand there were many failures to respond. Follow-up letters produced replies in several cases: "Did not receive", "Manpower requirements make it impractical", or "Not completed because certain information is confidential". Three states wrote back to say that they would not complete the questionnaire.

TABLE II-1  
DISTRIBUTION AND RETURN—FIRST QUESTIONNAIRE

<i>Group</i>	<i>Questionnaires</i>	
	<i>Sent Out</i>	<i>Returned</i>
	<i>Number</i>	<i>Percent</i>
States	48	29 60
Cities Over 100M	111	65 59
Cities 50-100M	200	86 43
Cities 25-50M	100	33 33
Counties and Toll Roads	47	12 26
Total	506	225 44%

State agencies and those in cities with over 100,000 population provided the best rates of return at 60 and 59 percent, respectively. The rate of return dropped with decreasing city size to only one in three for cities between 25,000 and 50,000 population. Toll roads and counties provided the lowest rate, not unexpectedly. Toll facility policing is often done by a special troop of state police, and some of the county police agencies may not even have had a traffic function. The toll facility and county replies have been excluded as a rule from later analyses.

## SPEED ENFORCEMENT

No geographic bias appeared to exist in the pattern of returns. With the possible exception of the Coastal Northwest, all regions were adequately represented in both state and city returns. Figure II-1 denotes the 29 states where returns were received from state police organizations. Numbers within each state's borders indicate the number of cities which returned completed questionnaires.

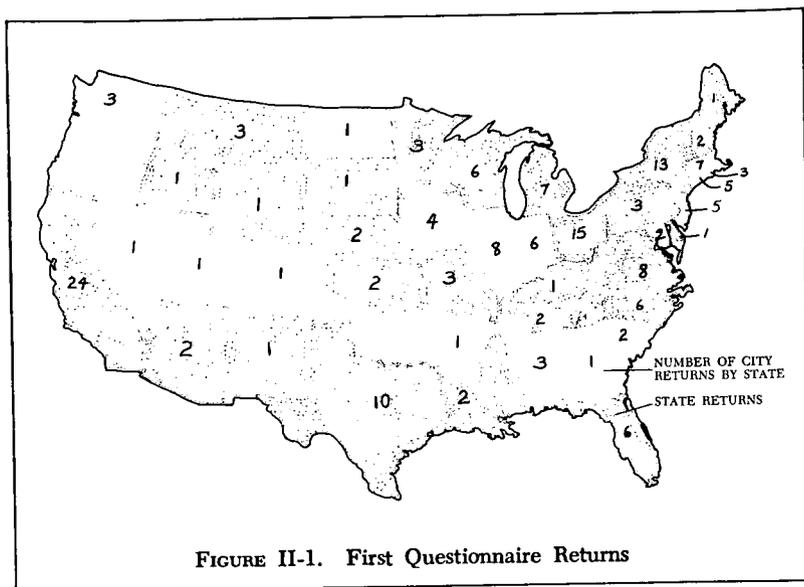


FIGURE II-1. First Questionnaire Returns

Between the state and city department returns, every state except Alaska was represented by one or more returns. The 65 cities over 100,000 in population that returned questionnaires were located in 27 of the 38 states containing cities in this population range. The 86 cities in the 50,000-100,000 population range were located in 29 states. The 33 replies from the smallest cities represented 24 different states.

### *The Second Questionnaire*

While the first questionnaire was distributed to over 500 police departments, the second went only to 100 selected recipients. The International Association of Chiefs of Police supplied a list including eight states and 16 cities, most of which were large urban areas. A listing of graduates of the Traffic Police Administration

Program at Northwestern University's Traffic Institute was the source for the remainder of the mailing list. Representatives of eight additional states and 68 additional cities were selected.

Table II-2 summarizes the mail out and indicates the response rates. The overall response was considerably better than that for the first questionnaire, as high as 77 percent for the 31 cities with less than 100,000 population. The response rates for larger cities, counties, and states were similar to those for the first questionnaire.

No geographic bias was evident in the returns from state police departments. Six of the eleven returns came from states west of the Mississippi, five from east of the Mississippi. The 16 states sampled were equally divided between these regions. The 54 city returns came from cities in 31 states, while the sample was made up of 84 cities in 39 states. At the city level, the southern region is least represented. In the states of Texas, Louisiana, Mississippi, Alabama, Georgia, and Florida, returns came from only five of the 13 cities to which forms were sent. The 38 percent return compared to 69 percent for the remainder of the nation.

The returns in both questionnaires, however, provide a representative sample of geographic regions and cities of different size. Twenty years ago, the overall rate of return was 43 percent. In this study, for the comparable first questionnaire, the rate was 44 percent. In both surveys, the class of smallest cities was least responsive.

TABLE II-2  
DISTRIBUTION AND RETURN—SECOND QUESTIONNAIRE

<i>Group</i>	<i>Questionnaires</i>		
	<i>Sent Out</i>	<i>Returned</i>	
		<i>Number</i>	<i>Percent</i>
States	16	11	69
Counties	5	3	60
Cities Over 100M	48	27	56
Cities Under 100M	31	24	77
Total	100	65	65%

## CHAPTER III

### ANALYSIS OF REGULATIONS

Before examining survey results regarding enforcement methods, it is appropriate to review the status of regulations being enforced. This chapter presents the findings reported on maximum and minimum speed limits, speed zones, differential limits for day and night conditions, those for trucks and automobiles, and practices with respect to school zones and advisory speed signs.

Comparisons are made between the present study and that made over 20 years ago. Comparisons are also made between the reported results and summaries provided in the Uniform Vehicle Code,<sup>1</sup> partly to demonstrate that the sample returns are reasonably representative of nationwide conditions. Other current publications that contain summaries of motor vehicle laws are identified in the list of references. Pertinent excerpts from the Uniform Vehicle Code and Model Traffic Ordinance<sup>2</sup> concerning speed limits are included as Appendix C to this report.

Throughout this chapter, it should be noted that the replies on regulations were provided by police officials, whose responsibilities are for enforcement rather than establishment of statutes. In a few cases, this part of the questionnaire was completed by other departments.

#### Maximum Speeds

The principal interest in speed enforcement is centered on maximum speed limits. These may be of two types, and values may vary according to highway type, vehicle type, or time of day.

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<sup>1</sup> National Committee on Uniform Traffic Laws and Ordinances, "Uniform Vehicle Code: Rules of the Road with Statutory Annotations," Washington, D. C., 1967.

<sup>2</sup> National Committee on Uniform Traffic Laws and Ordinances, "Uniform Vehicle Code and Model Traffic Ordinance," revised 1968.

The characteristics are discussed in turn below, for both state and city conditions.

### *Types of Speed Limit*

There appears almost complete agreement among the states with the philosophy if not the complete terminology of the basic speed law, which requires "reasonable and prudent" speeds (see Section 11-801 in Appendix C). But there are considerable differences between the states in the maximum values and the types of speed limits imposed.

Speed limits are of two types, "absolute" and "prima facie." In most states, all limits regardless of location are one or the other; in some states, certain speed limits are "absolute" and others are "prima facie." A clear distinction between the two is drawn in "Speed Offenses,"<sup>3</sup> a training manual of the Traffic Institute at Northwestern University. When absolute limits are in effect: "All drivers exceeding these limits have simply violated the absolute speed law. When the law prescribes a definite maximum speed limit, driving in excess of the limit, regardless of conditions, is a violation. The only proof required is that the driver exceeded the limit. Circumstances, conditions, actual and potential hazards have no bearing on the driver's guilt or innocence."

The difference with prima facie speed limits is that they always refer to the basic speed law. Again, according to "Speed Offenses," "Speeds greater than those named in the law are prima facie evidence that the basic speed law has been violated. Prima facie means at first sight or in the absence of further proof as to circumstances or conditions." Thus, a violator may demonstrate in his defense the conditions suggesting that his speed was not unreasonable or imprudent, even if it exceeded the prescribed numerical limit.

Apart from enforcement based on either speed limit type, drivers also face the possibility of arrest for violating the basic speed law. The following condition, even when operating speeds may be less than posted absolute limits, may be cause for basic speed law arrests:

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<sup>3</sup> The Traffic Institute, Northwestern University, "Speed Offenses," 1966.

Failure to reduce speed when encountering intersections, horizontal and vertical curves, pedestrian activities, railroad grade crossings, and bad weather conditions.

Clearly, from a police or court viewpoint, the treatment of speed violations is much simpler when based on an absolute law than it is when the issue is whether or not the basic speed law or a prima facie limit has been violated. Several questionnaire returns provided gratuitous comments on this point. Noted as benefits of an absolute limit were: "better understanding," "uniform enforcement," "no misunderstanding", "motorist more aware of speed", and so on. Since 1956, the Uniform Vehicle Code has recommended the absolute speed limit, no doubt because of such reasons. Prior to 1956, the Uniform Vehicle Code provisions on speed limits followed the "prima facie" rule.

In contrast, at the 1968 Annual Meeting of the Institute of Traffic Engineers, a resolution was passed recommending that the following statement be included among other speed limit considerations as a policy of the Institute: "Prima facie rather than absolute limits are considered more logical and equitable because blanket limits, and to a lesser extent speed zones, are of necessity based on conditions of traffic density and composition, weather and visibility which are continuously varying." The statement was later approved by the Board of Direction. One reason for the Institute recommendation may be found in its earlier study, "An Informational Report on Speed Zoning."<sup>4</sup> It is noted there that: "Speed excessive for prevailing conditions, rather than high speed per se, is thus the principal factor to be considered in controlling maximum speeds of vehicles for improved traffic safety."

At the present time, 30 states conform to the Uniform Vehicle Code by providing absolute speed limits, 10 have prima facie provisions, and 10 have a combination of both. This represents a considerable change from the time of the previous study. Figure III-1 compares the present percentage distribution to that of the earlier study and that of the samples returned in the present survey. Absolute limits exist in 60 percent of the states compared to 40 percent about 20 years ago, while prima facie limits are found

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<sup>4</sup> Institute of Traffic Engineers, Washington, D. C., 1961.

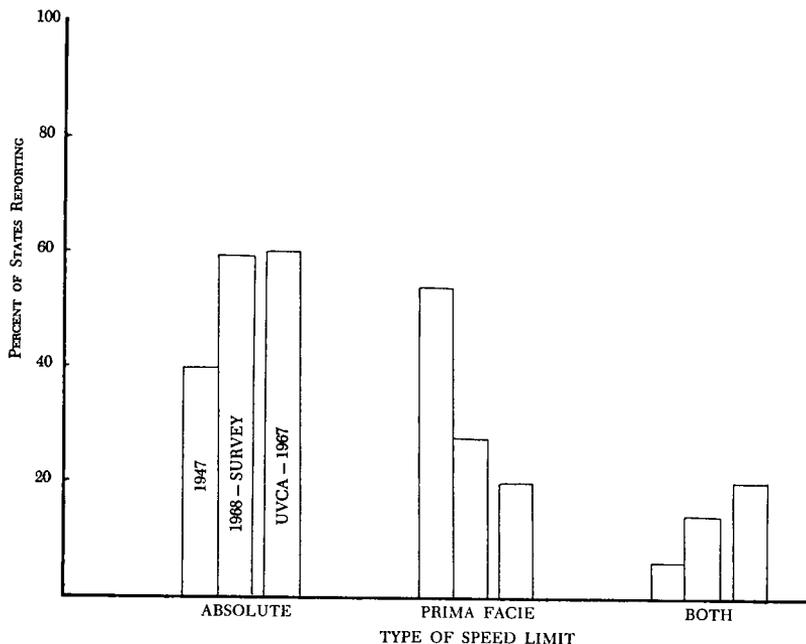


FIGURE III-1. State Speed Limit Types, 1947 and 1968

in only 20 percent compared to 54 percent previously. The proportion of states employing both types of limits has risen from six to 20 percent. The influence of the change in the Uniform Vehicle Code seems clear.

Those states with both types of speed limits employ them in different ways. Some states establish an overall maximum absolute limit at a level of 60, 65, 70, or 75 miles per hour, and provide prima facie limits in speed zones with lower limits. Others establish absolute limits on certain types of highways such as turnpikes, or on either urban or rural highways, and employ prima facie limits on other highway types or in other jurisdictions. Another method of using both types of limits is to establish absolute limits for certain vehicle types, such as school buses, trucks, and other buses, while automobiles are governed by prima facie limits.

Some regional differences can be observed. While 10 Northeast-

ern states were evenly divided between prima facie and absolute limits, with two others in the region having both types, eight of 10 Southeastern states provide absolute limits, with two others also having both types. The Midwest also shows a preponderance of absolute limit states, with only one prima facie state. The differences are less marked when the Mississippi River is used as a division between East and West. In the East, 59 percent of the states have absolute limits and only 19 percent have prima facie limits. In the West, 47 percent have absolute limits and 29 percent have prima facie limits. States with both forms make up the remaining 22 and 24 percent in the East and West, respectively.

Table III-1 summarizes speed limit types reported by the cities returning the questionnaire. Of all 184 cities, 38 percent reported prima facie limits. Eight percent reported both types of limits, and 34 percent absolute limits. Twenty percent did not answer the question. There was little difference by size of city, but those with 100,000 population or more were more likely to have absolute limits. Changes between 1947 and 1968 parallel those at the state level. The principal difference is the increased proportion of absolute limits and decline of prima facie limits, regardless of city size. Prima facie limits still predominate in the smaller cities, but to a lesser degree than in 1947.

City responses on speed limit types were examined by major regions. Differences are evident in Table III-2. For example, out of 74 cities in the Northeast and Southeast, 42 percent reported absolute limits and 23 percent prima facie limits. For the Midwest and Mountain states, with 68 returns, the proportions were 32 and 47 percent respectively. Considering the Southwest and West Coast

TABLE III-1  
TYPES OF SPEED LIMIT BY SIZE OF CITY

<i>City Size</i> <i>(Population</i> <i>in thousands)</i>	<i>Percent of Total by Speed Limit Type</i>				<i>Total</i>
	<i>Absolute</i>	<i>Prima</i> <i>Facie</i>	<i>Both</i>	<i>No</i> <i>Answer</i>	
Over 100M	39	32	9	20	100
50-100M	30	41	8	21	100
25-50M	<u>36</u>	<u>43</u>	<u>3</u>	<u>18</u>	<u>100</u>
Total	34	38	8	20	100

TABLE III-2  
CITY SPEED LIMIT TYPES BY REGION

*Percent of Total by Speed Limit Type*

Region	Absolute	Prima Facie	Both	No Answer	Total
Northeast/Southeast	42	23	8	27	100
Midwest/Mountains	32	47	3	18	100
West/Southwest	<u>23</u>	<u>51</u>	<u>14</u>	<u>12</u>	<u>100</u>
Total	34	38	8	20	100

together, only 23 percent had absolute limits while 51 percent had prima facie limits. The further west a city is, the less likely it is to have absolute limits. For example, in the Southeast, cities with absolute limits outnumber those with prima facie limits by nearly three to one, but cities west of the Mississippi report prima facie limits over absolute limits by a ratio of two to one.

Figure III-2 shows a comparison after grouping city responses by their state law types and then examining the types of city speed limits reported. For example, within seven states having

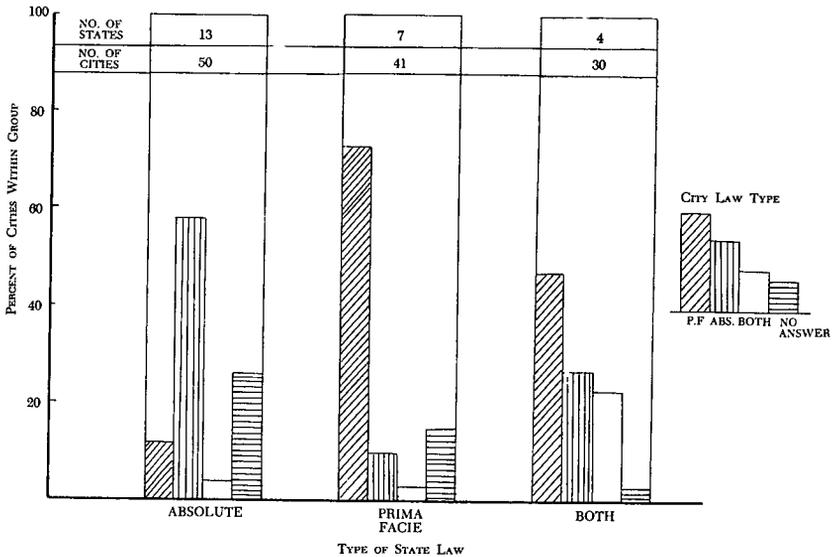


FIGURE III-2. Comparison of State and City Laws

prima facie laws, 30 of 41 cities, or 73 percent, also reported prima facie laws. Only four cities (10 percent of the responding cities in the group) in those states reported absolute limits, one reported both types, and six cities (15 percent) did not specify a type. In 13 states with absolute limits, 58 percent of the responding cities reported absolute limits, only 12 percent had prima facie limits, four percent had both types and 26 percent did not specify the type of limit. In four states with both types of limit, out of 30 cities, 47 percent had prima facie laws, 27 percent had absolute, 25 percent had both, and only one failed to specify the type.

The Model Traffic Ordinance article on Speed Regulations stipulates in its first section that "The state traffic laws regulating the speed of vehicles shall be applicable upon all streets within this city," and goes on to note the procedure for making exceptions by ordinance. Considering the state and city responses compared in Figure III-2, it appears that there are a significant number of conflicts. The possibility exists, of course, of erroneous information on the returns, a problem that was thought to have occurred in the previous study over the question of speed limit type. Reported discrepancy between state and local speed regulations may be evidence of the following: misunderstanding the questionnaire, lack of knowledge on the part of the individual respondent, or of a difference between state and local regulations because of time delays in changing laws from one type of limit to another. However, differences between state and local regulations are legislated in some states. For example, all limits within Minnesota municipalities are absolute while state highways are usually controlled by prima facie limits, according to one report.<sup>5</sup>

It is no wonder that the author of "Speed Offenses" notes: "Few drivers know the difference between absolute and prima facie speed limits, and few know which type is in force in the area in which they are traveling."<sup>6</sup> Considering the differences between states and the demonstrated conflicts between state and local regulations, it is not surprising if the general public is either uninformed, misinformed, or confused.

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<sup>5</sup>National Highway Users Conference, "State Laws Governing Motor Vehicle Speeds," Washington, 1968, 17 pages.

<sup>6</sup>National Committee on Uniform Traffic Laws and Ordinances, *op. cit.* page 5.

*Maximum Speed Limit Values*

The distribution of maximum speed limit values reported by the states, with prima facie and absolute law states listed separately, is summarized in Appendix F, Table 1. The table shows that there is a wide dispersion of values between states. Urban freeways are reported with speed limits ranging between 30 and 70 miles per hour (mph). The most common freeway speed limits, regardless of location, are 70 mph in prima facie states, and 65 mph in absolute limit states. Multilane facilities show an equally broad range of values for urban and suburban conditions. Two prima facie states show statutory limits of 25 mph on such streets, and others are as low as 30 mph. Rural prima facie speed limits are very similar for both multilane and two-lane facilities. Values range from a low of 55 mph to a high of 75 mph. Twelve responses for multilane facilities average 65 mph and twelve for two-lane highways average 62.5 mph.

The characteristics of most absolute limits differ from the foregoing possibly because the statistics reflect statewide absolute limits not modified for conditions of highway type or type of area. Thus, absolute speed limits for urban and suburban freeways are frequently no different from rural limits, although lower posted limits may be applied through speed zoning. It is notable that seven out of 18 states report absolute speed limits of less than 70 mph on rural freeways. Only one out of 11 prima facie limits is less than 70 mph.

It might have been expected that absolute limits would be higher than prima facie limits, which was the experience in the earlier study. Yet the present finding suggests that higher speed will be tolerated in prima facie states than in absolute states. Furthermore, enforcement units are likely to tolerate greater margins above the limit in prima facie conditions than in absolute limit situations. Thus the speed limit disparity tends to be enhanced. The driver who might travel at 70-75 mph on freeways without fear of arrest under the average 70-mph prima facie conditions could be almost certain of arrest under the average 65-mph absolute limit condition. If average values were reversed for the two types of speed limits, the risk of arrest would be approximately equal.

There is little difference between absolute speed limits for two-lane and multilane facilities in urban and suburban areas. Compared to the reported *prima facie* limits for these highway groups, the absolute limits appear slightly higher. The absolute maximum limits for rural multilane highways, taking 18 replies, averaged 64.5 mph, or about the same as the *prima facie* limits for that class. Eighteen responses for two-lane rural highways averaged 61.5 mph, compared to 62.5 mph in *prima facie* jurisdictions.

#### *Maximum Speed Limit Values—Cities*

Table II in Appendix F presents the maximum speed limit values reported by the cities. These also are shown by type of highway and type of area. For the most part, speed limit values follow the pattern shown by the states. For example, the prevalent values for freeways are 65 mph for urban and suburban locations. The most frequently reported values for multilane arterials are 35 mph for urban locations and 45 mph for suburban. Two-lane streets are reported most frequently with speed limits of 25 and 30 mph for urban and suburban conditions, respectively.

The table indicates the wide range of speed limits reported for different areas and highway types. The patterns of responses do not appear to differ much between cities of different sizes. Regardless of city size, freeway speed limits are generally in the 60-70 mph range, followed by multilane limits in the 35-45 mph range, and by two-lane speed limits in the 25-35 mph range. Adjustment of speed limits according to highway and area type seems more likely in *prima facie* conditions than where absolute limits exist.

#### *Truck Speed Limits*

Only 11 of the states responding to the 1947 survey indicated that speed limits for trucks differed from those for automobiles. Twenty-two states now reported having such differences. Percentagewise, proportions have changed from 34 percent in 1947 to 76 percent today.

Table III-3 shows the reported differences, by type of highway and location. The speed limit differential is most likely to apply in rural conditions. Only four states reported a difference for urban freeways, and only two states may post different limits for lower

TABLE III-3. TRUCK AND AUTO MAXIMUM SPEED LIMIT DIFFERENCES BY AREA AND HIGHWAY TYPE\*

*Number Reporting Indicated Speed Limit Difference*

<i>Speed Limit Differential</i>	<i>FREEWAY</i>			<i>MULTILANE</i>			<i>TWO-LANE</i>		
	<i>Urban</i>	<i>Sub- urban</i>	<i>Rural</i>	<i>Urban</i>	<i>Sub- urban</i>	<i>Rural</i>	<i>Urban</i>	<i>Sub- urban</i>	<i>Rural</i>
5	-	1	1	1	1	3	-	-	2
10	4	7	10	1	2	12	2	3	16
15	-	-	4	-	1	5	-	-	3
20	-	-	3	-	-	2	-	-	1

\* Twenty-two states reporting

class urban highways. Ten miles per hour is the most frequently adopted differential, accounting for about two-thirds of the total, but three states reported differences of 20 mph on rural freeways.

The six responding states that do not have truck/auto speed limit differentials have no common attribute that sets them apart from other states. Some are principally urban, others rural. They vary geographically, some on the East Coast and others in the Rocky Mountain region.

#### *Day/Night Speed Differentials*

Since 1938, the Uniform Vehicle Code has recommended different speed limits for day and night driving outside built-up areas. The suggested differential is 5 mph, making the present recommendation of 55 mph for night-time absolute limits. Seventeen of the states currently providing data reported different day and night limits, compared to only four states in 1947. Table III-4 lists the incremental differences reported for different types of highways. In some states, reduced speed limits at nighttime are not required on freeways even though such reductions are applied to other route types. Where applicable, freeway differentials are most likely to be 5 mph. On multilane highways, the differentials are evenly distributed between 5 and 10 mph, and on two-lane highways, a 10-mph difference is most common. Again, as with the truck limits, the differences are principally found only on high speed or rural highways.

Generally, truck speed limits are not reduced at nighttime except where they would otherwise exceed nighttime automobile limits. Only three of the responding states indicated a statutory requirement for nighttime truck limit reductions. In most cases, the daytime truck speed limits are equal to or less than the nighttime limits for automobiles, and no changes are required.

Probably because city speed limits are usually so low that day/night differentials would not be meaningful, only 22 cities reported such differences. In 11 cases, the differential was 10 mph; in the remaining 11, it was 5 mph. Most of these were probably reflections of overriding state laws. In 1947, several cities indicated day/night speed limit differences for business and residential districts. Most had higher limits at night than in the daytime; increasing, for example, from 20 or 25 mph in the daytime to 35 mph at

TABLE III-4. DAY AND NIGHT SPEED LIMIT DIFFERENCES BY AREA AND HIGHWAY TYPE\*

*Number Reporting Indicated Speed Limit Difference*

<i>Speed Limit Differential</i>	<i>FREEWAY</i>			<i>MULTILANE</i>			<i>TWO-LANE</i>		
	<i>Urban</i>	<i>Sub- urban</i>	<i>Rural</i>	<i>Urban</i>	<i>Sub- urban</i>	<i>Rural</i>	<i>Urban</i>	<i>Sub- urban</i>	<i>Rural</i>
5	—	—	6	1	1	8	1	1	6
10	—	1	4	—	—	8	—	—	9
Variable	2	1	1	1	1	1	1	1	1

\* Seventeen states reporting

night. No such practice was evident in the present data, where all the reported differences were reductions.

### Minimum Speed Regulations

The statement that "No person shall drive a motor vehicle at such a slow speed as to impede . . ." has survived almost intact through many revisions of the Uniform Vehicle Code. It is perhaps one of the most widely accepted clauses enacted by both states and cities, judging by the questionnaire responses. The 1954 Code revision providing authority for numerical minimum speed limits has also been widely adopted.

Data from 31 state codes, provided either by the states or by cities within the states, show that 23 were authorized to enact minimum speed limits, and only eight apparently were not. Table III in Appendix F shows what limits are posted, by route type and area. In some cases, statutes permit minimum limits to be posted on only specified classes of highways; for example, Interstate System highways, Federal Aid Primary System highways, trunk highways, freeways only, and so on.

The principal application of minimum speed limits is to freeways. Predominant values are 40 or 45 mph, regardless of location. Only 15 states indicated minimum speed limit application to non-freeway facilities. Even so, this is a considerable gain since the previous survey, when only 60 percent of the states reported the existence of the basic minimum speed law, and no information was reported concerning specific numerical limits.

At the city level, minimum speed limits are less widely accepted. Fifty-two percent of cities with over 100,000 population reported being authorized to establish minimum speed limits, compared to 30 percent of cities in the 50,000-100,000 population range and only eight percent of those with 25,000-50,000 population. Overall, an increasing usage and awareness of minimum speed limits on both urban and rural highways is evident. Still broader usage may result as additional freeway mileage is constructed.

### Speed Zones

When it appears necessary to establish speed limits different from statutory maximum limits, all states and most cities are em-

powered to modify the speed limits to fit conditions. The following responses about speed zones are those of police officials, for the most part, rather than responses from state or local traffic agencies charged with investigating, recommending, and establishing speed zones.

### *Interagency Relationships Regarding Speed Zones*

The following question appeared in the questionnaire with restricted circulation: "Is there any feedback between speed enforcement activities and the authorities establishing speed limits, so that locations with excessive violation rates (or those with unreasonably high speed limits and no violations) are identified and studied for possible speed limit changes?"

The responses suggested that better working relationships exist between police and other agencies in the states and larger cities than in the smaller cities. All but one of the states reported some form of information flow between them and state highway or other agencies, as did 21 out of 26 cities with over 100,000 population. None replied that "feedback" did not exist, although five failed to answer the question. Only in the smaller cities were there any negative replies; nine out of 28 replied "No," and three cities failed to answer.

Comments in answer to this question were more revealing. At the state level, most police agencies work closely with State Highway Departments. One response noted: "Feedback is based primarily upon accident experience, rather than violation." Others reported: "Yes, coordinated with traffic engineering", "Yes, we work with the Department of Highways", "Division of State Police with Department of Transportation establishes speed limits."

Larger cities commented more on this question than on any other. Those that did not answer directly offered such comments as ". . . we, unfortunately, do much of the engineering ourselves," "Police agencies sometimes disagree with established speed limits." Apart from these negative extremes, the following were typical: "We have very close coordination between police and traffic engineering. Our speed zones are continuously being re-evaluated and altered." "All radar logs are forwarded to such authorities." Generally, the comments amplified a "Yes" response.

Comments from smaller cities expressed more dissatisfaction,

ranging from "There should be," "No, there is a need for change according to experience," and "There is very little feedback between these two authorities and there should be more," to "Good working relationship with city and county traffic engineers," and "Reports are forwarded to our traffic engineer for survey study." Others noted: "No feedback, but regulations are adopted on basis of mutual recommendations." The responses mostly suggest a willingness to develop a closer relationship where it is presently inadequate for one reason or another. In all, the favorable comments outweigh the unfavorable by at least two to one.

#### *State Established Speed Zones*

The Uniform Vehicle Code recommends that state highway agencies should be empowered to declare speed zones as needed on any highway in the state highway system; that alterations must be based on a traffic engineering investigation and signs must be posted; and that speed limits may be raised or lowered, or may vary by time of day, weather conditions, vehicle type, or any other condition relating to safe speed. Twenty-five states conform precisely or substantially with this section (see Appendix C). The remaining states are authorized to change speed limits, but requirements or permitted changes differ from those described above. In some cases, limits may be lowered but not raised. In others, authority is limited to some types of highways, or to rural locations.

Twenty-three of the 26 states answering the question about traffic engineering studies reported that such studies were required before establishing speed zones. The three states where studies were not required noted that engineering studies were undertaken "Sometimes", "Usually", "On occasion". The Uniform Vehicle Code notes that such investigations are not expressly required in Connecticut, Maine, Massachusetts, Missouri, New York, and South Dakota; they are also not required in certain conditions in Michigan and Tennessee.

#### *City Speed Zones*

The Model Traffic Ordinance,<sup>7</sup> which supplements the Uniform Vehicle Code at the local level, begins Article V on speed regulations with a statement that state laws shall apply on all streets

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<sup>7</sup> National Committee on Uniform Traffic Laws and Ordinances, *op.cit.*

except as the ordinance may specify. Annotations in the Uniform Vehicle Code describe the great variety of prevailing conditions and practices in the manner that states delegate this authority to the local jurisdictions.

Table III-5 suggests the variety by listing the responses from state and city groups concerning the agencies authorized to make speed limit changes. The raw responses are given in this table, since many respondents failed to answer and others noted more than one choice. For example, some responses which noted "local only" or "both state and local" also checked "local with state approval." Perhaps the significance of the table lies mostly in the suggestion of conflicts between state and local replies regarding authority. Thirteen cities, many located in states where the state agency noted that local authority existed, provided the "state only" response. Part of the conflict may have stemmed from a failure to distinguish between state and city control on urban highways and streets. Some "local only" responses obviously referred only to city street systems. The answer "local with state approval" usually applies to city authority in changing speed limits on state-maintained highways within urban communities. Yet there are some cases where speed limits, regardless of highway status, cannot be changed except with state approval.

There is much variety in the types of changes (decreased limits at intersections, increased limits in urban districts, decreased limits outside urban districts) that are granted to local authorities by the states. The preponderance of replies (62 percent), regardless of city size, were that speed limits can be either raised or lowered. In only a few cases can speed limits be adjusted upward but not

TABLE III-5

## SOURCE OF AUTHORITY IN ESTABLISHING SPEED ZONES

<i>Group Responding</i>	<i>Reported Source of Authority</i>			
	<i>State Only</i>	<i>Local Only</i>	<i>Both State &amp; Local</i>	<i>Local with State Approval</i>
States	2	-	25	17
Cities over 100M	6	7	44	17
Cities 50-100M	3	7	53	35
Cities 25-50M	4	2	18	16

downward. In a considerable number of cities, 28 percent, speed limits may only be reduced and not raised.

Traffic engineering investigations are almost universally required before establishing city speed zones. All counties and cities over 100,000 population indicated that a traffic engineering study was necessary, compared with 83 percent 20 years ago. Among smaller cities, the percentage requiring traffic studies has grown from 65 percent to 90 percent, with another five percent replying "sometimes" or "usually." But even if all jurisdictions have not yet adopted a statutory requirement, it is clear that most enforcement agencies are well aware of the traffic engineering function with regard to speed zoning.

One reference to traffic engineering practice with respect to speed zoning is, "An Informational Report on Speed Zoning," published in 1961 by the Institute of Traffic Engineers. Because of its value in describing appropriate conditions for speed zoning and outlining the procedures for determining proper speed limits, the report is presented here in its entirety as Appendix D.

### *School Zones*

The Uniform Vehicle Code and Model Traffic Ordinance have not contained provisions for regulating vehicle speeds in school zones since 1934. However, numerical speed limits are mentioned in the state code excerpts provided here by 11 states, and judging from the tabulation below, may appear in many others.

Surprisingly, although most states report a 15-mph limit in urban school zones, higher limits were reported by most cities. Table III-6 shows the values reported by city size. Regardless of size,

Table III-6  
URBAN SCHOOL ZONE SPEED LIMITS

<i>Group</i>	<i>Percent Reporting Indicated Limit (mph)</i>					<i>Total</i>
	<i>15</i>	<i>20</i>	<i>25</i>	<i>30</i>	<i>Other *</i>	
States	42	15	12	0	31	100
Cities over 100M	30	31	27	2	10	100
Cities 50-100M	26	27	36	1	10	100
Cities 25-50M	33	33	24	3	7	100

\*Other—School zone speed limits not applicable or not specified.

only one-third or less use the 15-mph limit, and the values of 15, 20, and 25 mph are all used to about the same degree. In approximately 10 percent of the cities, again regardless of size, school speed limits were either not used or the speed limit was not specified. In the latter cases, it is possible that speed zones for schools are treated like any other speed zone, which seems the apparent intent of the Uniform Vehicle Code.

The manner of applying school zone limits varies. All states reporting on school zones stated that the time period of effectiveness is specified. Signs are sometimes worded "When children present," or else the time period is indicated by flashing signal lights incorporated in the signs. Table III-7 indicates the distribution of city responses concerning the effective time period. There is a greater tendency in small cities for the time to be unspecified. In other words, posted school zone speed limits apply day and night, weekdays and weekends, winter and summer. The same problem may occur where times are specified by ordinance, but not posted or otherwise indicated in the zone. Obviously, such situations should be changed, since the limits are realistically unenforceable at inappropriate seasons and consequently encourage disregard for these as well as other regulatory measures. Where times are specified but not posted, the public may be misled regarding the speed limit conditions prevailing at different periods.

In short, there is probable ambiguity in the use of school zone speed limits in more than half the cities responding to the survey.

#### *Transition Zones*

The survey did not treat the subject of transition zones from high rural limits to low urban limits, conditions commonly arising in smaller municipalities. Typically, where reductions from

Table III-7  
EFFECTIVE TIME PERIODS OF SCHOOL ZONE SPEED LIMITS

<i>City Groups</i>	<i>Percent Reporting</i>			<i>Total</i>
	<i>Time Not Specified</i>	<i>Time Not Posted</i>	<i>Time Posted</i>	
Cities over 100M	12	43	45	100
Cities 50-100M	14	40	46	100
Cities 25-50M	17	48	35	100

50-60 mph limits to 25-30 mph limits are necessary, the limits will be reduced by increments of 10-15 mph in successive zones at least 1,000 feet in length.

Drivers are aware of speed limit changes in such zones and also of the typically increasing development. One study found, even so, that the speed limits were generally exceeded, and that reductions in mean speeds to zone levels took place only well beyond the beginnings of the zones.<sup>8</sup>

### Advisory Speed Signs

State and local traffic engineering agencies are making increasing use of the advisory speed sign. This is a square black-and-yellow sign, giving a speed value, to be used only in conjunction with other warning signs. It is intended to be used, for example, at sharp curves where sight distance is restricted, or at other hazardous locations where a suitable safe speed needs to be indicated. The "Manual on Uniform Traffic Control Devices"<sup>9</sup> states that the advisory speed value should be determined by a traffic engineering study. It is not a regulatory sign, "as the speed is not intended as an enforceable limit."

Questions were aimed primarily at determining how advisory speed signs are interpreted by police officials. The responses, summarized in Table III-8, show generally complete awareness of the function and proper application, although a surprising number of departments clearly consider advisory speeds enforceable. While some of these interpretations may have been due to misunderstanding the question or lack of familiarity, particularly in smaller cities, this is not the significant explanation. One state police respondent stated that advisory speed signs may be used as a guide for prima facie speed enforcement actions. A good number of police officials construe the signs as indicating a "reasonable and prudent speed," exceeding which may be interpreted as a violation of the basic speed law. As an example of another interpretation, one city reported that a reckless driving charge would be

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<sup>8</sup> John H. Shortreed, "Speed Transition Zones for Small Municipalities," University of Waterloo, Ontario, Canada, 1968.

<sup>9</sup> U. S. Department of Commerce, Bureau of Public Roads, "Manual on Uniform Traffic Control Devices," Washington, D. C., 1961.

TABLE III-8  
USAGE AND INTERPRETATION OF ADVISORY SPEED SIGNS

Group	Percent of Those Reporting					
	Using Black and Yellow Advisory Speed Sign		Is A Traffic Study Required?		Is Advisory Speed Enforceable	
	Yes	No	Yes	No	Yes	No
State	93	7	100	—	23	77
Cities over 100M	95	5	98	2	55	45
Cities 50-100M	69	31	92	8	42	58
Cities 25-50M	82	18	86	14	73	27
All Cities	81	19	94	6	53	47

made for violations rather than a speeding charge.

The replies regarding enforceability indicate a difference in attitude between state and city police officials. In two states that regard advisory speeds as enforceable, four cities also regarded them enforceable and three did not; in nine states regarding advisory speed limits as unenforceable, 32 cities regarded them as enforceable and 35 did not. In three of the latter states, the cities disagreeing with the state policy outnumbered those in agreement by 18 to five. In only two states did all the city responses match those of the state organizations.

### Some Observations

This examination of state and city speed regulations has shown that there is much diversity, not only between states and between cities, but even between cities and the states in which they are located. While some of these disparities may be minor and not significant, others seem important. The varied application of absolute, prima facie, and combination speed limits is a good example. There appear to be many cities that possess speed regulations of a type different from that prevailing at the state level. Similar or perhaps greater differences between jurisdictions existed 20 years ago, when maximum speed limits ranged from eight mph in some urban cases to no limit at all in some rural areas. A review of the changes that have occurred may indicate the rate of progress toward reasonable and uniform measures of speed regulation.

Perhaps the most significant trend is that from prima facie to absolute limits. While the balance was roughly 60-40 in favor of

prima facie limits in 1947, it is now roughly reversed in favor of absolute limits. To many police officials and to proponents of the Uniform Vehicle Code, the change represents progress. To traffic engineers, at least as their opinion is reflected by the Institute of Traffic Engineers, the change is retrogressive. To the public, the fact remains that there still exist two very different and conflicting philosophies determining speed enforcement procedures. The average driver, by both education and experience, is likely to be a better driver than the average driver of 20 years ago. The fact that he now has less opportunity to exercise his own judgment on safe travel speeds seems contradictory.

Other changes that have taken place in two decades are a greater degree of standardization in the values of maximum rural limits and a general increase in their level. Twenty of the 28 states quoted speed limits of 70 mph or more on rural freeways. On other rural highways, the average speed limits now range between 60 and 65 mph. The Uniform Vehicle Code recommendation has increased from 50 to 60 mph during the same period.

In recent years, more states have adopted different speed limits for day and night driving and for passenger cars and commercial vehicles. Even though the Uniform Vehicle Code has recommended a 5-mph differential between day and night speed limits since 1938, only four of the states responding in 1947, and 17 of 27 in the current survey reported such differences. The differential is as likely to be 10 mph as 5 mph.

Another change that seems significant, but which is based only on impressions from comparing the two studies, is that the city speed regulations today tend to conform more closely to the state regulations. City speed ordinances are now more likely to be enacted as variations and exceptions to state legislation. Some evidence on this point is suggested by changes in the types of speed zone alterations that cities are authorized to make. Fewer cities now are permitted both to raise and to lower state specified limits. More cities are permitted to reduce but not to raise speed limits.

Two aspects of interest to traffic engineers have experienced changes in recent years. First, traffic engineering investigations are almost universally required before speed zone limits can be established. Second, the use of advisory speed signs has become widely adopted by most police officials, although a discrepancy

in understanding the enforceability of advisory signs often exists. To many police officials, because advisory signs do indicate a maximum safe and reasonable speed, it seems entirely proper that violators traveling in excess of such speeds are eligible for arrest under prima facie or basic speed law provisions. Such an interpretation certainly appears reasonable. In some respects, the divided opinion on advisory speed sign enforceability exemplifies the confusion, both within and between professions, that can stem from the application of different types of speed regulations.

An overall impression arising from a review of state regulations and the survey responses to this first group of questions is that there is no reason to be complacent about speed regulation. The variety of regulations in effect is enough to explain why some police departments might feel their activities are misunderstood by the public. Considering the variations in speed laws and the mobility of American families, any other result would appear unlikely. While the Uniform Vehicle Code provides a unifying influence, it is incompletely accepted at best.

In "An Informational Report on Speed Zoning" the following statement appears:

"As is true in other aspects of traffic control, it is highly desirable that there be uniformity in the fundamentals followed in speed regulation. The meaning of speed limits, the principles and practices followed in their application, and the requirements placed upon drivers who must observe them, should be consistent among various jurisdictions."<sup>10</sup>

There is clearly a need for much continued emphasis towards achieving such uniformity, in both regulations and their interpretation.

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<sup>10</sup> Institute of Traffic Engineers, *op. cit.*

## CHAPTER IV

### ENFORCEMENT PRACTICES

In addition to examining the methods employed in speed enforcement, the study was concerned with the attitude of police officials to this phase of their activities. This chapter opens, therefore, by discussing the reported objectives of speed enforcement before describing the methods employed. After describing techniques in use and characteristics of their application, the chapter concludes with a review of public information practices related to speed enforcement.

#### Speed Enforcement Objectives

The enforcement of any laws governing community life is broadly aimed at maintaining and protecting the public order, safety, and welfare. Respondents in the selective survey were asked to note which one of the following would be chosen as best describing a more limited objective of speed enforcement:

- a. Increasing obedience to existing traffic regulations.
- b. Apprehending dangerous or reckless drivers.
- c. Encouraging safer driving.

The purpose was to draw out whether the primary goal was regulatory, punitive, or preventive. Fifty-eight of the 65 respondents answered the question and 15 added constructive comments. Table IV-1 tabulates the results by state and city groups, and shows

TABLE IV-1  
PRINCIPAL OBJECTIVE OF SPEED ENFORCEMENT  
*Response as Percent of Total*

<i>Group</i>	<i>To Increase Compliance</i>	<i>To Apprehend Reckless Drivers</i>	<i>To Encourage Safe Driving</i>	<i>No Answer</i>	<i>Total</i>
States	36	9	28	27	100
Cities over 100M	42	4	50	4	100
Cities under 100M	<u>36</u>	<u>14</u>	<u>39</u>	<u>11</u>	<u>100</u>
All Departments	38	9	42	11	100

an almost even choice between increasing compliance and encouraging safer driving. The only sizeable response emphasizing "apprehension" came from the smallest cities. Many comments pointed out that the answers are not mutually exclusive; for example, four state returns commented, "We consider all three," "(c) in conjunction with (a) and (b)," "Basically all three," "I think that (a) and (c) are the same. Our objective is to secure substantial compliance with the speed law, which produces safer driving."

Comments from six cities with over 100,000 population also were weighted toward encouraging compliance. Among comments from smaller cities was the following: "To promote voluntary compliance with existing regulations is the main reason for speed enforcement — this can reduce collision factors much more than hoping for increased manpower and on-site enforcement to reduce same." The following comment from another small city emphasizes a different consideration: "City has more than a passing interest in the dollar amount of fines." This was the only comment among all the returns to indicate the possibility of enforcement as a revenue-generating device. None of the cities that selected the response "Apprehending dangerous or reckless drivers" offered any comments on their choice.

The evidence is that most enforcement agencies regard their role in speed enforcement as one that contributes primarily to improved highway safety, even if the immediate objective of the enforcement is regulatory or punitive. In turn, this may explain in part the use of warning and "tolerance" in allowing minor excesses over speed limit to pass unenforced and unreported.

### Methods of Enforcement

The variety of speed enforcement techniques available to police departments is much greater today than it was two decades ago. Then, pacing was the most common method, frequently specified by law as the procedure to be used. Other techniques were reported by only a few cities. For example, only 30 cities then reported using two-way radios, and 54 cities reported the use of time-distance methods. As a result, the discussion on enforcement methods in the previous report centered on the relative use of automobiles and motorcycles, and the type of speedometers employed in pacing.

Enforcement methods are treated here by the classes of pacing, time-distance methods, radar, and other. An analysis of the proportionate use of each method is also presented.

### *Pacing*

The most widely used method 20 years ago was pacing, i.e., following the alleged violator with another vehicle and thereby determining his speed. In 1947, 20 percent of the states required that speeders had to be paced by police officers. City ordinances in over one-quarter of cities with over 100,000 population, and nearly half the smaller cities, also required that the method be employed.

Even today, except for one small city, all respondents reported using the method. Figure IV-1 shows the types of vehicle used by cities of different sizes and by states. All states and all the largest cities use distinctively marked automobiles. The proportion decreases only to 91 percent for cities in the smallest size group. This does not mean that distinctive vehicles are used exclusively. Fully 59 percent of the state agencies also use unmarked cars, and 24 percent also use cars marked only by a shield or seal. The use of unmarked cars is noticeably less in all city groups. Regardless of city size, less than one third report their use. Cities make far

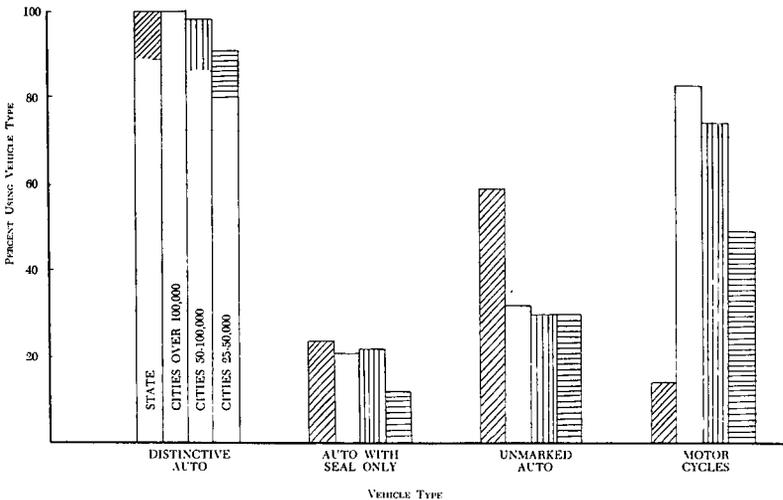


FIGURE IV-1. Techniques in Pacing

greater use of motorcycles. While only 14 percent of the states employ motorcycles for speed enforcement, 83 percent of the largest cities do. The percentage drops for smaller cities, to 74 percent in cities with populations between 50,000 and 100,000 and to 49 percent in cities with less than 50,000 population.

A change in motorcycle use for pacing offers probably the greatest contrast with the previous study. Although motorcycles were used by more than one-third of the states reporting 20 years ago, they are now used by only one out of seven. Four percent of the cities with populations greater than 100,000 use motorcycles exclusively, and 90 percent use both motorcycles and automobiles. In these cities, motorcycles account for 56 percent of the speed enforcement effort. The use of motorcycles has diminished most rapidly in the smallest cities, from 85 percent in 1947 to only 49 percent today.

The questionnaire inquired about the use of ordinary versus calibrated speedometers in pacing. All reporting states use only calibrated speedometers, but 33 of the 184 cities (18 percent) reported the use of ordinary speedometers all or part of the time. In 1947, over 90 percent of the smaller cities and almost 80 percent of the largest cities used ordinary speedometers. There is, therefore, clearly much more attention given now to obtaining accurate measurements than 20 years ago.

The frequency of speedometer calibration was found to be highly variable, as Table IV-2 indicates. The state police responses, for

TABLE IV-2  
FREQUENCY OF SPEEDOMETER CALIBRATION

*Percent by Type of Department*

<i>Frequency</i>	<i>States</i>	<i>Cities 25-50M</i>	<i>Cities 50-100M</i>	<i>Cities Over 100M</i>
Weekly	4	—	—	—
Monthly	11	24	23	42
2-Months	7	10	3	4
3-Months	22	17	29	17
6-Months	11	24	25	16
Annually	—	21	4	5
Other	45	4	16	16
Total	100	100	100	100

example, showed the greatest range, from weekly intervals to intervals greater than one year. Among the smaller cities, the responses tend to cluster around intervals of one month, three months, six months, and annually. Only in the largest cities is there a tendency for any one interval to dominate, and that is monthly calibration. The Pennsylvania law requires proof of calibration within 30 days of the alleged violation, but no comparable statute was reported elsewhere.

The Pennsylvania law has another clause governing speed measurement by pacing. Alleged violators must be followed for at least one-quarter of a mile. No other state return indicated that a minimum distance was specified. Only five of the 66 cities over 100,000 population and 16 of the 85 cities in the 50,000-100,000 population range reported a minimum pacing requirement, varying between one block and one-quarter mile. The trend appears to have been to eliminate the minimum distance requirement, but even in 1947 only one-quarter to one-third of the cities reported such a regulation.

#### *Time-distance Methods*

The fundamental technique of time-distance methods involves the measurement of the time interval taken by a vehicle to traverse a distance of known length. A variety of methods employ the principle: the earliest use, dating back to the beginning of the century, was noted in the introductory chapter. Only one state and 19 percent of the cities employed the technique in 1947, usually by using mirror-boxes or Enoscopes as they were sometimes called. In addition to mirror boxes or pavement markings and a stopwatch, the cities also reported using two-way radio (presumably between two vehicles a known distance apart) and speed meters. These usually consisted of two air hoses, placed a known distance apart, which when activated by a vehicle first started and then stopped a timing device.

All time-distance methods, as then employed, fell under the generic heading of "speed traps," and some states and many cities prohibited their use in speed enforcement. Four states (California, Maryland, Oregon, Washington) still prohibit their use, according to "Legal Aspects of Speed Measurement Devices."<sup>1</sup>

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<sup>1</sup> Fisher, *op. cit.*

Usage of time-distance devices today is still not widely prevalent. Table IV-3 shows that most cities and one-third of the states do not use time-distance methods. Because some jurisdictions use more than one time-distance method, percentages do not total to 100 across. For example, 41 percent of the states employ aerial surveillance, though it accounts for only a minor part of total enforcement.

Forty-one percent of the states reporting also are using or testing a new technique, named "VASCAR." In effect, VASCAR is a portable computer into which distance and time measurements can be put for instantaneous speed calculations. The method is fully described in several references,<sup>2</sup> excerpts from which are given in Appendix E.

TABLE IV-3  
USAGE OF TIME-DISTANCE METHODS

Group	Percent of All Departments Reporting Use				Percent Not Using T-D Methods
	Stop Watch	Electric Timer & Tubes	Aerial Surveillance	VASCAR	
State	28	17	41	41	31
Cities Over 100M	8	8	2	2	86
Cities 50-100M	7	8	1	1	86
Cities 25-50M	12	9	—	—	79

At the city level, time-distance methods are used by fewer cities than was the case 20 years ago. Aerial surveillance and VASCAR, the most widely used time-distance methods at the state level, are rarely used. Less than 10 percent of all the cities report usage of stopwatch methods, and less than 10 percent use speed meters today.

Over the past 20 years, time-distance methods for the most part have been superseded by radar. Whether VASCAR in turn will become recognized and accepted as an effective method of speed enforcement still remains to be seen.

<sup>2</sup> Patricia F. Waller, *et. al.*, "An Evaluation of the Operational Efficiency of 'VASCAR'—A Speed Measuring Device," University of North Carolina, Highway Safety Research Center, Chapel Hill, 1968, also Highway Research News, No. 31, pg. 5. Highway Research Board, Washington, D. C., Spring 1968.

*Radar*

Just as VASCAR is beginning to be applied now to speed enforcement, the use of radar was just beginning at the time of the 1947 study. The radar method, born of wartime technology, employs the Doppler principle by measuring the change in frequency of a transmitted signal that occurs when it is bounced back from a moving object. Much has been written about the legality and technical requirements for effectuating radar arrests for speed violations. Some legislation authorizing radar speed measuring devices even specifies the degree of training for radar operators, the intervals for testing measurement accuracy, and so on. Training manuals of the Traffic Institute of Northwestern University, and "Legal Aspects of Speed Measurement Devices"<sup>3</sup> are references that deal with such problems.

Table IV-4 summarizes the wide extent of radar use. Only one state reported that it was not used. Taking all cities together, one out of eight does not use radar, though the proportion is higher for cities with more than 100,000 population.

TABLE IV-4  
RADAR USE AND METHOD OF EMPLOYMENT

<i>Jurisdiction</i>	<i>Percent of Respondents Using Radar</i>	<i>Methods of Use (Percent of Users)</i>		<i>Both</i>
		<i>Concealed</i>	<i>Open</i>	
State	96	4	53	43
Cities over 100M	85	6	75	19
Cities 50-100M	88	3	85	12
Cities 25-50M	91	0	100	0

Users of radar were asked to estimate the percent of enforcement by open or by concealed methods. Because terminology was not precisely defined, results must be considered somewhat subjective. What may be considered open by one enforcement official may not seem so to another, or to the general public. Table IV-4 sums these responses also. Regardless of city size, the exclusive use of open methods is reported by more than a majority of the respondents, but the proportion increases as the jurisdiction becomes smaller.

<sup>3</sup> Fisher, *op. cit.*

Beginning with only a bare majority of the state responses, the proportion is 75 percent for the largest cities, and 100 percent for the smallest cities. One state and five cities reported the exclusive use of concealed methods for radar enforcement. Nearly half the states use radar in both open and concealed operations, while less than a quarter of the largest cities do. The percentage declines further for the smaller cities.

There is a difference between cities and states in the respective use of marked and unmarked cars for radar enforcement. Most states use both types of vehicles, and only 14 percent use unmarked cars exclusively. Less than one-third of the cities use both types of vehicles. The exclusive use of marked cars is reported by 37 percent of the largest cities, 51 percent of those with 50,000 to 100,000 population, and 41 percent of the smallest cities surveyed. The exclusive use of unmarked vehicles for radar enforcement is reported by 39 percent of the largest cities, a bigger proportion than for any other group.

These results suggest that police use of radar in smaller cities is more likely aimed at encouraging voluntary compliance through conspicuous methods than it is in the states and largest cities.

### *Other Methods*

A category of "other" was set up in the questionnaire as a catch-all for unusual methods that might be employed in some jurisdictions. With the exception of some returns incorrectly reporting motorcycle methods here, about the only responses came from smaller cities. The methods described were "officer observation," "police estimation," and "measuring skid marks," the last presumably in relation to accident investigations. Three cities responded with "officer observation" or its equivalent as a method of speed enforcement.

### **Usage of Various Methods**

Figure IV-2 summarizes the reported usage of all the different methods. For example, 42 percent of the reporting states use time-distance methods, compared to only 11 percent of the cities over 100,000, six percent of those in the 50,000-100,000 range, and 17 percent for those under 50,000 population. All agencies use the

## SPEED ENFORCEMENT

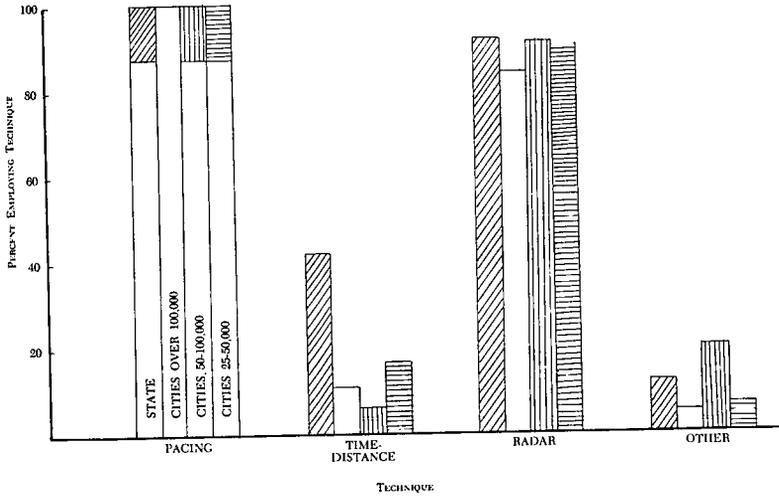


FIGURE IV-2. Summary of Usage — All Methods

pacing method, and almost all use radar. In the largest cities, radar is used by 84 percent; in all other jurisdictions, radar is used by 90 percent or more. "Other methods," which are unadjusted for possibly incorrect responses, are reported by between five and 20 percent.

In addition to being asked the methods used for speed enforcement, police departments were asked to estimate the amount of the total enforcement effort accounted for by each method.

Figure IV-3 shows the results reported for the pacing technique. State police agencies reported that pacing averaged 57 percent of the total speed enforcement. Stratifying the responses shows, however, a wide dispersion of results. Nearly one-third of the states reported that pacing was between 20 and 39 percent of the total, while another third said between 40 and 59 percent. An even greater spread in responses is evident for each of the city responses. For example, among the largest cities, pacing accounts for an average of 59 percent of the total enforcement. But over one-third of these cities reported that pacing accounted for more than 80 percent of speed enforcement activity. In cities with population between 50,000 and 100,000, where pacing averaged 47 percent of the total enforcement, the pattern of responses was distinctly

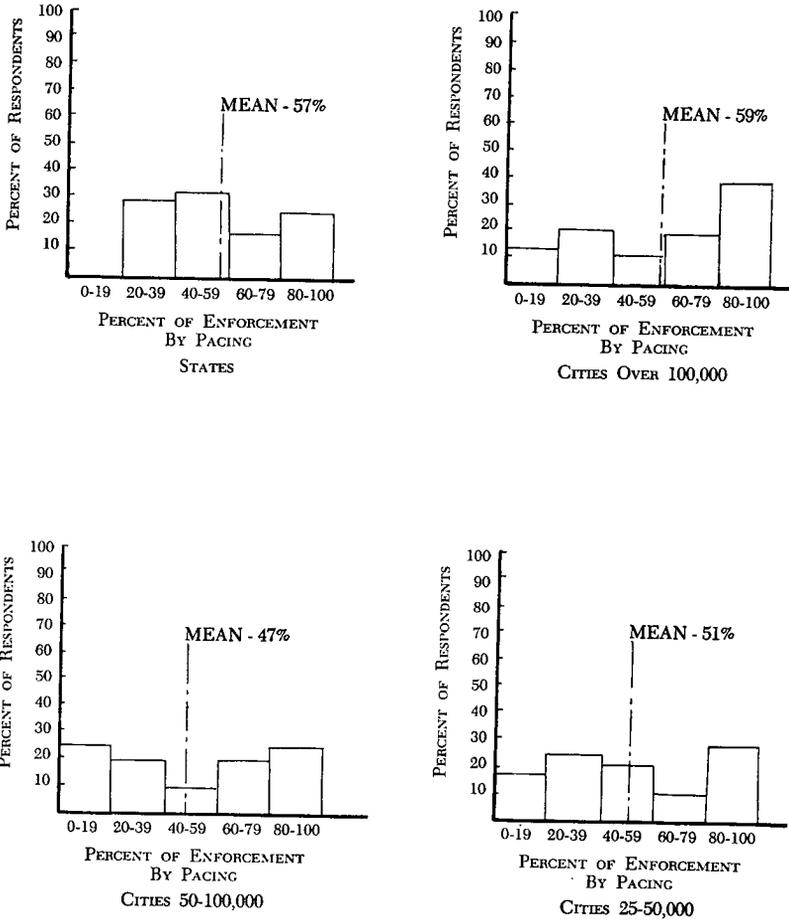


FIGURE IV-3. Percent of Speed Enforcement by Pacing – State and City Groups.

polarized. One-quarter of the replies showed that the method accounted for less than 20 percent of the enforcement, while another quarter showed pacing accounting for more than 80 percent. In the smallest class of cities surveyed, pacing averaged 51 percent of the enforcement effort, but the range in responses was also wide.

Figure IV-4 shows similar statistics for time-distance methods,

## SPEED ENFORCEMENT

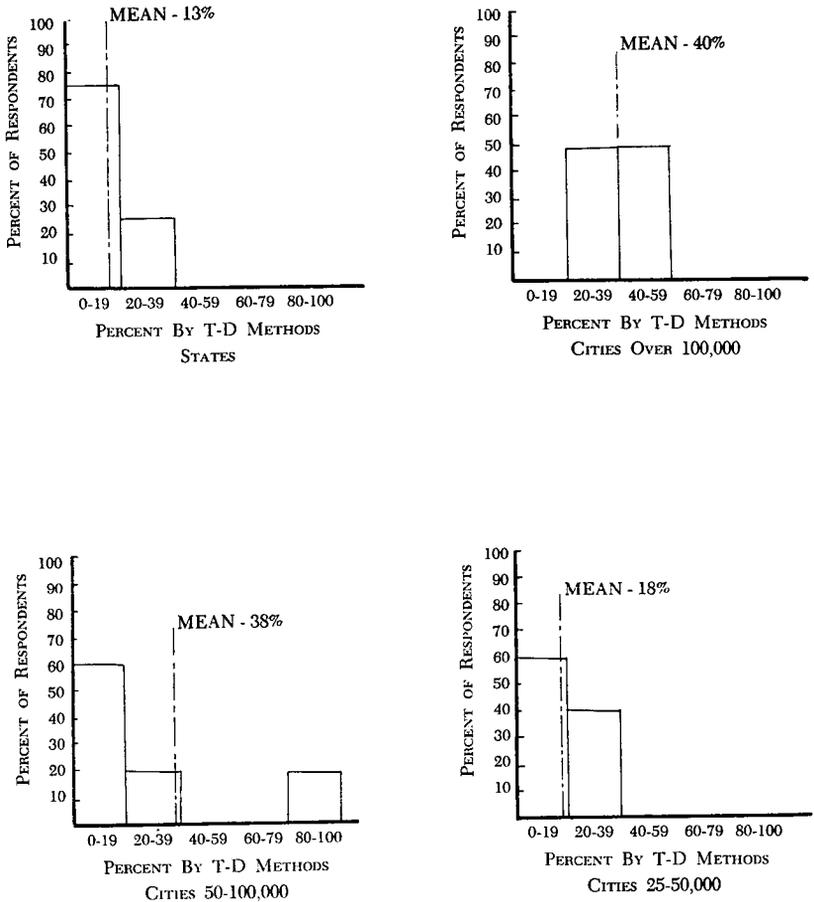


FIGURE IV-4. Percent of Speed Enforcement by Time-Distance Methods — For States and Cities Using Method.

where they are used. In the states and smallest city departments, time-distance methods accounted for only 13 and 18 percent of the total enforcement effort, respectively. In the two other city groups, they account for 38 percent in cities in the population range between 50,000 and 100,000, and 40 percent for those with more than 100,000 population respectively.

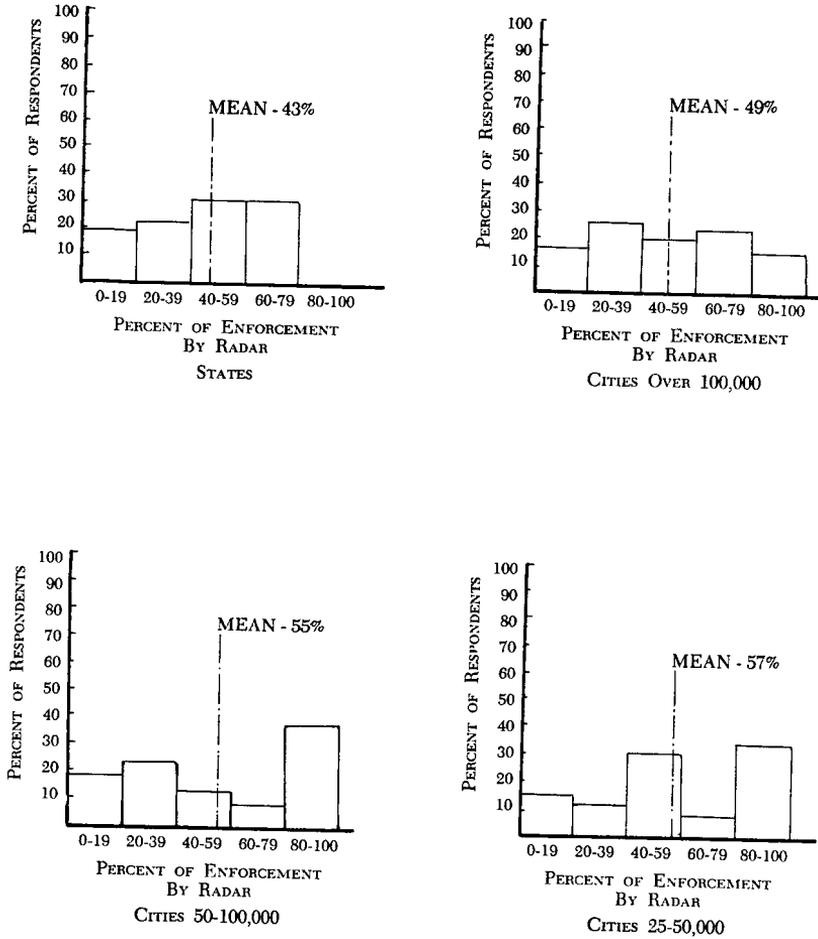


FIGURE IV-5. Percent of Speed Enforcement by Radar — for States and Cities Using Method.

Radar's share of the total enforcement in the states and three classes of cities is shown in Figure IV-5. At 43 percent, the state agency use of radar is less than that for any of the city groups. Usage in the cities increases from 49 to 57 percent, on average, as the cities decrease in size. As with other methods, there is a wide range in usage within each group. The most distinctive difference

between the state and city responses is in the proportion reporting radar usage as 80 percent or more of total enforcement effort. None of the states use radar to this degree, but in the cities under 100,000 population, more than a third use radar for 80 percent or more of their speed enforcement. Only 15 percent of the cities over 100,000 population use radar to this extent.

Accumulating the average values indicated in Figures IV-3, IV-4, IV-5 adds to more than 100 for each group because the averages are based on usage. For example, time-distance method usage would account for very little of the total if weighted by all departments rather than by merely those using them. An element of rounding upwards is also involved in computing the average figures cited above.

### Possible Influences on Methods

Because of the considerable spread in degree of usage of the various speed enforcement techniques, the survey returns were analyzed for possible explanations. The possibility of regional differences was examined, and the returns were also stratified according to the type of speed limit, i.e., *prima facie* versus absolute. The returns were also inspected for possible correlation between the use of radar and the proportionate use of open versus concealed methods.

#### *Regional Differences in Methods*

Table IV-5 summarizes the average use of different methods reported by cities in six regions of the United States. Several results can be deduced from the table. Evidence of the "speed trap" prohibition in the West Coast state regulations shows clearly in the very dominant role of pacing and the nonexistence of time-distance methods. Radar also plays a significantly lesser role in the speed enforcement effort on the West Coast and is also of somewhat lesser importance in the Southwest. Pacing is least favored in the entire middle section of the nation, where radar accounts for more than half the speed enforcement effort. The reverse is true on the Eastern Seaboard, where radar accounts for a little less than half the speed enforcement. Also evident in Table IV-5 is the fact that cities of the Midwest, and Plains and Mountains states are the only significant users of time-distance methods.

TABLE IV-5  
REGIONAL DIFFERENCES IN  
ENFORCEMENT METHODS OF CITIES

Region	No. of Responses	Percent of Total Enforcement by Each Method				
		Pacing	Time-Dist.	Radar	Other	Total
Northeast	42	50	1	46	3	100
Southeast	31	53	1	45	1	100
Midwest	53	40	3	56	1	100
Mtn. & Plains	15	35	9	54	2	100
Southwest	17	62	11	35	2	100
West Coast	26	77	0	22	1	100

#### *Differences in Methods by Speed Limit Type*

Sixty cities with absolute limits were compared to 55 cities with prima facie limits. Difference in the average use of different methods was slight. In cities with absolute limits, 59 percent of all enforcement was accounted for by pacing and 37 percent by radar. Comparable figures were 48 and 46 percent, respectively, for the other cities with prima facie limits. There seems little evidence of an interrelationship between the type of speed limit and preferred methods of enforcement.

#### *Radar Use and Open versus Concealed Enforcement*

Some correlation between the type of enforcement policy followed and the extent to which radar is employed shows up in Table IV-6. Only those cities that both use radar and reported a mixture of open and concealed enforcement are represented in the table. Out of 115 cities that reported using radar, 62 also reported that speed enforcement was carried out completely with open methods. The table is made up from the remaining 53 responses.

The results suggest that those departments reporting the greatest emphasis on open enforcement are likely to make less use of radar as an enforcement method. Out of those cities reporting 80 percent or more of their enforcement by open methods (31 percent of those responding), *most* (more than two-thirds) use radar for less than 40 percent of their enforcement. Of those reporting 40-59 percent open enforcement (17 percent of the total), *none* use

## SPEED ENFORCEMENT

TABLE IV-6

Percent of Enforcement by Radar	Percent of Total Enforcement by Open Methods					Percent of Cities Responding
	0-19	20-39	40-59	60-79	80-99	
0-19	-	-	-	-	11	11
20-39	-	4	-	15	13	32
40-59	-	-	9	8	2	19
60-79	-	4	2	4	4	14
80-100	10	7	6	-	1	24
Percent of Cities Responding	10	15	17	27	31	100

radar for less than 40 percent of their enforcement activity. In fact, one-third of this group uses radar for 80 percent of their enforcement. In the group of cities with the least enforcement by open methods (10 percent), *all* reported using radar for more than 80 percent of their enforcement efforts.

In short, then, it seems evident that enforcement policy (such as the relative emphasis on open versus concealed methods) probably has some bearing on the enforcement methods most likely to be used.

### Open and Concealed Methods

The results reported in the questionnaire regarding open and concealed methods are analyzed here by type of department reporting, by region and by type of speed limit law. As used in the questionnaire, the term "concealed" implies the use of a concealed device or unmarked vehicles, and "open" implies using highly visible vehicles or open-to-view methods.

#### *Usage by State and City Departments*

The percentage of all departments that use entirely open methods for speed enforcement was compared with the results reported two decades ago. The proportion of state departments using wholly open methods has dropped from 86 to 28 percent. A less dramatic decline, from 79 to 58 percent, was recorded by

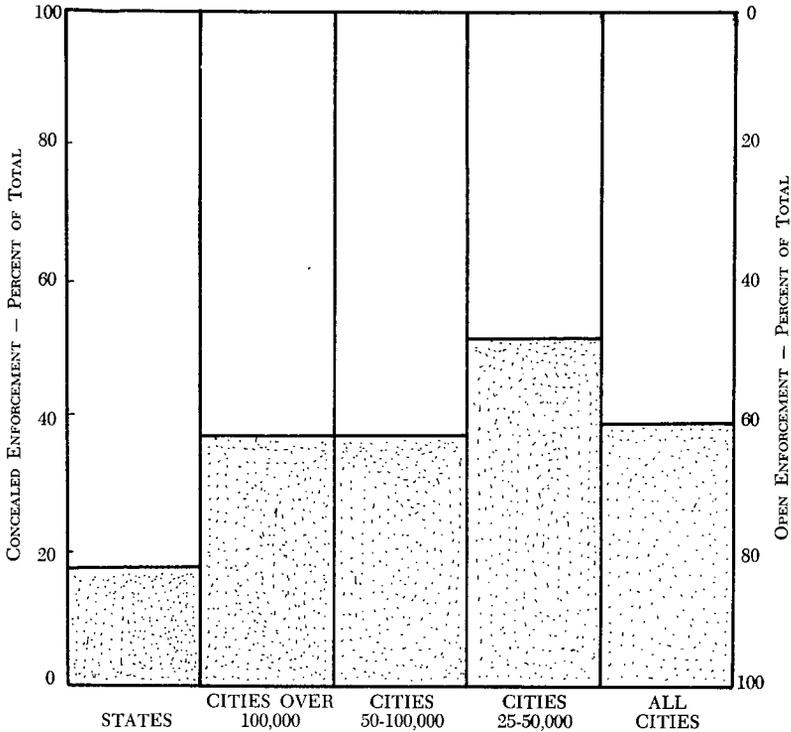


FIGURE IV-6. Proportions of Concealed and Open Enforcement

cities under 50,000, while the changes were minimal for the larger cities.

There is varying emphasis among departments using both methods. Figure IV-6 shows that concealed enforcement accounts for less than 20 percent of the state police enforcement, but double that amount for all cities over 50,000 population, and slightly over 50 percent for cities under 25,000 population. Combining all city results, the proportion is approximately 40 percent concealed to 60 percent open, compared to approximately 20 and 80 percent respectively for the states. Thus, even though cities as a group are less likely than states to use concealed methods, those cities that do use them tend to use concealed methods twice as intensively as the state police departments.

The second questionnaire provided subjective opinions on open

and concealed enforcement to supplement the factual responses. The dominant preference was for using a combination of methods; 82 percent of the state replies and over 75 percent of all city replies favored a mixture. The state department preference for exclusive open enforcement was slightly less than that practiced among the departments reporting (see the 28 percent given above). The difference was greater for cities. Although 51 percent of the cities over 100,000 practice completely open enforcement, the policy is reportedly preferred by only 31 percent. And while 62 percent of the smaller cities practice wholly open enforcement, only 15 percent of the respondents prefer such an approach. No respondents chose concealed enforcement exclusively in answer to the question about preferred techniques.

Many of the respondents provided supplementary comments. From those preferring completely open methods, these were typical: "If you have adequate personnel", "Omnipresence of marked cars—voluntary compliance would be ideal", "Marked cars and motorcycles operated conspicuously are a very effective deterrent." Most comments concerned the combination of methods, generally with respect to using marked and unmarked cars: "A mixture will secure a higher degree of compliance", "Unmarked cars should be considered in areas of high accidents", "Using unmarked cars with uniformed officers is most desirable but lacks public acceptance. We use unmarked radar cars with marked chase vehicle", "Both marked and unmarked cars are required for effective traffic law enforcement. The sneak violator can only be stopped by unmarked vehicles." These are representative comments. The overriding sentiment appeared to be that unmarked cars were desirable for selective enforcement, particularly with respect to high accident locations.

### *Regional Differences*

The proportional uses of open and concealed methods were examined by the same regional groups used earlier. Not surprisingly, cities on the West Coast reported only four percent concealed enforcement and 96 percent open enforcement. An average here is misleading, however, since 23 out of 26 cities reported 100 percent open enforcement, and two of the remainder evenly divided their effort by concealed and open methods. Table IV-7 indicates the pattern for cities in the six regions. At the other ex-

TABLE IV-7  
REGIONAL USE OF OPEN AND CONCEALED METHODS

<i>Region</i>	<i>Percent Using Open Methods Exclusively</i>	<i>Average of All Cities in Region</i>	
		<i>Percent Concealed</i>	<i>Percent Open</i>
Northeast	62	24	76
Southeast	45	20	80
Midwest	58	15	85
Mtn. & Plains	29	27	73
Southwest	41	12	88
West Coast	89	4	96

treme from the West Coast are cities in the Mountain and Plains States, which apparently are least likely to use open methods. In these cities, 27 percent of the total enforcement is by concealed methods. Next highest in the average use of concealed methods is the Northeast, with 24 percent, even though a majority of the cities report using open enforcement exclusively. The high average of concealed enforcement in this case is mainly produced by six cities that reported 80 percent or more of their enforcement by concealed methods. The three remaining regions of the nation averaged less than 20 percent concealed enforcement, although the proportion of cities using open methods entirely varied from 41 percent in the Southwest, to 45 percent in the Southeast and 58 percent in the Midwest.

With the clear exception of the West Coast, it would appear that the difference between cities in their emphasis on concealed versus open methods is not so much based on regional patterns as it is on other factors. Excluding this one region, out of 159 cities only eight percent use concealed methods for more than 80 percent of their enforcement, while 47 percent do not use concealed methods at all.

#### *The Influence of Speed Limit Type*

Table IV-8 compares the proportions of open and concealed enforcement in cities with prima facie limits to those with absolute limits. In the largest cities, those with prima facie limits are less likely to practice entirely open enforcement. Even so, the overall average proportion of open enforcement is high. In the smaller cities, 73 and 75 percent of those with prima facie limits practice

## SPEED ENFORCEMENT

TABLE IV-8  
OPEN AND CONCEALED ENFORCEMENT BY TYPE OF LAW

<i>Group</i>	<i>Absolute</i>		<i>Prima Facie</i>	
	<i>Percent of Cities Entirely Open</i>	<i>Average Percent of Open Enforcement</i>	<i>Percent of Cities Entirely Open</i>	<i>Average Percent of Open Enforcement</i>
Cities Over 100M	50	79	36	77
Cities 50-100M	44	73	73	92
Cities 25-50M	45	76	75	84
All Cities	48	77	66	87

completely open speed enforcement, which explains the high overall average proportions of open enforcement. Considering all cities, those with prima facie limits appear more likely to use 100 percent open methods, and therefore show a higher proportion of open enforcement.

### Time and Place for Enforcement

An indication of the values attributed to speed enforcement by police officials was gained by the answers to two questions from respondents on the selected list. One concerned the type of locations at which speed enforcement was most desirable. The second concerned the level of traffic volume, related particularly to time, as a factor in speed enforcement.

#### *Speed Enforcement Locations*

Police departments were asked to rank the following considerations in order of their importance in selecting speed enforcement locations: heavily traveled streets and highways, high-accident locations, locations with a history of many speed violations, and complaints from residents. Respondents were further invited to note any other considerations that might apply.

Results were uniformly consistent when grouped by cities and states. High-accident locations were first. In many cases, this choice was qualified by a comment in the nature of "If speed is a factor in accidents at these locations." Second were locations with a history of speed violations. In third place were locations where

TABLE IV-9  
SPEED ENFORCEMENT LOCATIONS BY ORDER OF IMPORTANCE

<i>Type of Location</i>	<i>Ranking By Weighted Average</i>	<i>Percent of All First Choices</i>
High Accident Locations	1	73
Locations—Many Speed Violations	2	11
Complaints	3	6
Heavily Traveled Streets	4	8
Other	5	2

complaints had been received, and in last place were “heavily traveled streets and highways.”

Table IV-9 groups all responses together and shows the weighting assigned to the different locational factors. The overall pattern is quite clear. High-accident locations plainly dominate with 73 percent of the respondents ranking them first. Locations with a history of speed violations received more second place votes than any other type of location. Enforcement in response to citizens complaints received more third place votes than any other factor, also consistent with its weighted average ranking. But the greatest spread in ranking occurred here. While most states ranked complaints third, city responses varied from 17 ranking them second, 14 third, and 14 fourth, with no differences according to size of cities. No geographic bias seemed to be involved. Those cities attaching most importance to complaints were as widely distributed as those attaching least.

Comments noted that locations with high-accident rates resulting from speed violations or suggesting excessive speed as an accident cause would be the first choice. All of the comments from smaller cities pertained to the relationship of accidents and speed: for example, “Speed and traffic law enforcement is applied selectively, based on analysis of current enforcement and collision spot maps maintained by this department at high-frequency collision locations.”

The emphasis on speed enforcement at high-accident locations bears out what appeared to be the primary objective of most departments; i.e., to encourage voluntary compliance that will result in safer driving. Unfortunately, research evidence suggests that speed enforcement does little to reduce accidents. There have been

several carefully executed studies indicating that accidents are related more to the degree of deviation from mean speeds than to the actual speed, whether high or low.<sup>4</sup> To the extent that enforcement might tend to improve uniformity in travel speeds and to call public awareness to hazardous locations, however, it is probably conducive to accident reduction.

Some discussion of the second choice for speed enforcement locations—those with a history of violations—seems warranted, as this particular condition has a direct relationship to the “feedback” question discussed earlier under regulations. A location with a long history of speed violations may be one that has an unreasonable speed limit, or it may be one where particular classes of drivers congregate (teenagers, for example). In the first case, the remedy may be a traffic engineering study followed by a change in speed limits. In the second case, continued enforcement is probably the only answer. But a third possibility is that such an area may be one where physical hazards are not immediately evident. Locations that show a high rate of violations should be evaluated to determine whether the cause is due to an inappropriate speed limit, stems from particular driver groups, or is a result of inadequate warning of hazards. Corrective measures of a permanent nature, rather than occasional enforcement, may be necessary.

Complaints were listed as the primary consideration for speed enforcement by four cities. Only one provided a reason for the choice: “Above order due to manpower problem, making enforcement difficult.” Five cities ranked “heavily traveled locations” first, but gave no comments in explanation. Another city, ranking heavily traveled streets second, noted, “Heavily traveled street enforcement is desirable; however, it is impossible in most cases to use radar. Motorcycles are used on heavily traveled streets.” Other locations for speed enforcement were school zones and areas where speed limits had been recently changed.

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<sup>4</sup> Such studies are reported in: E. F. Fennessy, Jr., *et. al.*, “Police Traffic Services and Road Safety: An Evaluation of Literature.” Travelers Research Center, Hartford, Connecticut, 1968.

R. M. Michaels, “The Effects of Enforcement on Traffic Behavior.” *Public Roads*, Vol. 31, No. 5, December 1960, and J. A. Cirillo, “Interstate System Accident Research, Study II, Interim Report II,” *Public Roads* Vol. 35, No. 3, August 1968.

Generally, the lack of emphasis on enforcement for heavily traveled streets and highways arise, as one comment noted, from the practical difficulties of enforcement. But a high number of speed limit violations under high volume traffic conditions plainly suggests that the speed limit is too low. Rather than continuing to encourage violation and to discourage compliance, a more appropriate speed limit should be determined. The solution is more likely to be found in a review of the speed limit than in either an excess or absence of speed enforcement.

None of the responses commented on the possibility that some of the suggested locations for speed enforcement could be incorrectly zoned, or inadequately posted with warning signs, for example. There can be little doubt that such conditions either exist or develop. Changes in the highway network often lead to changing usage of given streets and highways. When such conditions do arise and become evident through police application of speed enforcement measures, the feedback process is an essential element in bringing about adjustments.

#### *The Time for Speed Enforcement*

Speed limits in speed zones are customarily based on a survey of vehicle speeds taken at off-peak periods on weekdays. Since vehicle speeds vary according to the volume of traffic and traffic volumes vary by time of day, day of the week, and season of the year, there are undoubtedly many time periods and conditions producing speeds higher or lower than those observed during the speed survey period.

The question was asked, therefore, if it was considered reasonable to enforce a speed limit based on average volume conditions under conditions of very low volume. Respondents were given the following choices: "Yes, if highway or other conditions were below average", "Yes, regardless of any conditions", and "No". Table IV-10 summarizes the results. Most replies, regardless of state or city origin, gave an unqualified "Yes," but one-quarter of the department qualified their "Yes" answers. Eleven percent of those responding said, "No;" i.e., enforcement under low volume conditions would not be reasonable.

From the latter group, made up of two states and five cities, the following comments were received: "Enforcement still effective in obtaining voluntary compliance with all existing and posted

## SPEED ENFORCEMENT

TABLE IV-10  
ENFORCEMENT UNDER VERY LOW VOLUME CONDITIONS

<i>Group</i>	<i>Should Limit be Enforced with Low Volumes?</i>				<i>Total</i>
	<i>Percent of Total Replies</i>		<i>No</i>	<i>No Answer</i>	
	<i>Yes</i>	<i>Conditional Yes</i>			
State	55	27	18	0	100
Cities Over 100M	65	23	4	8	100
Cities Under 100M	50	29	14	7	100
All Responses	57	26	11	6	100

requirements." "Speed of vehicles during other than average conditions is supposed to be governed by prevailing conditions, time and density of exposure to other traffic." Several respondents not choosing an answer offered the following comments: "In urban areas, yes; rural, no." "Only if there is a high-accident problem in a given area during those times—again, selective enforcement."

Five of the six states providing an unqualified "Yes" answer commented to this effect: "Since speed limits are set by law, should be enforced at all times," and "You enforce 100 percent (cannot have different rules)." Cities approving unqualified enforcement provided the following comments, among others: "Should enforce posted speed at all times, in order for signs to have meaning to the driving public", "At urban intersections, accidents happen at all times. The enforcement effort should match the accident experience as closely as possible", "Many times, road conditions which are permanent hazards are there at all hours", "Enforcement is really an educational factor—you can't educate or enforce at certain times and then allow or give permission to violate at other times", "No room for adjustable standards", "The public can recognize a standard policy more readily than fluctuating policy".

Of the 14 cities endorsing a flexible policy on this question, only four provided comments. One suggested the use of "slightly higher tolerances coupled with warnings, depending on conditions." Another said virtually the same, adding "but excessively high speeds should not be tolerated." A third city commented: "Prevailing conditions (i.e., fog, rain, accidents) would determine the necessity for enforcement." The fourth noted that there were "fac-

tors to consider (weather, accidents, road characteristics).”

In all, it was somewhat surprising that over one-third of the departments responding (adding conditional yes plus no) should support a flexible position on speed enforcement with respect to volume conditions—and thus indirectly with respect to time of day. The response suggests a recognition of the difficulties inherent in applying one numerical speed limit value to all the conditions prevailing on a given section of highway.

These are the same difficulties recognized by traffic engineers in the resolution described earlier. Clearly, for the reasons that over one-third of the responses indicated, a *prima facie* speed limit seems a more reasonable approach to speed regulation. On the other hand, the desire for uniform and consistent treatment of violators, preferred by nearly two-thirds of the police agencies, leads just as clearly to a choice of absolute speed limits. It may be just as well that the distinctions and differences between the two types of laws tend to become blurred by the employment of tolerances, a subject of the following chapter.

### Public Information Practices

Most police agencies inform the public to some degree about speed enforcement activities, even if merely by after-the-fact newspaper accounts listing how many drivers received warnings or citations on a particular street the previous day. In the questionnaire there was no attempt to single out after-the-fact announcements from advisory bulletins regarding pending or current operations. The following discussion, therefore, presumably reflects both types of public information.

#### *Type of Information Released*

Figure IV-7 shows the proportions of respondents who do inform the public about techniques and the times and locations of their use. Almost all departments report the technique being used for speed enforcement, whether marked or unmarked vehicles, radar or aerial surveillance, and so on. Even among the smallest cities, which are least likely to advise the public of techniques, 80 percent reported doing so. The public is not generally advised about the times that speed enforcement is being carried out. One-quarter of the cities indicated such a practice, but only 11 percent of the

## SPEED ENFORCEMENT

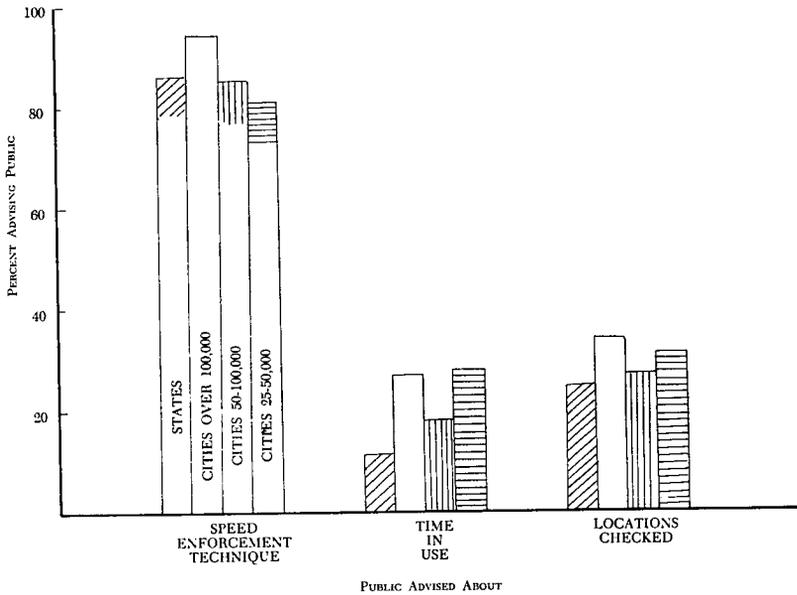


FIGURE IV-7. Public Relations Activity Regarding Speed Enforcement

states. Cities and states are both more likely to give out information on the locations of speed checks; about one-third of the cities and one-quarter of the states followed this practice.

Those few departments that do provide information on time periods also are likely to provide information on locations and techniques as well. The proportions giving out no information are virtually the same for cities and states.

#### *Communications Media Employed*

Radio and television are used by nearly two-thirds of the state organizations in connection with speed enforcement information but only by about half the city departments. As expected, large cities tend to make more use of radio and television than do smaller cities. Newspapers are used by 80 percent or more of all enforcement agencies. Signs are used by about two-thirds of the cities and states, except in the smaller towns, which apparently rely more on signs than other means. Only nine cities and one state

reported making no use of media to inform the public about speed enforcement activities.

At the state level, the tendency is to use all three media to inform the public. Table IV-11 compares city and state practices in this respect. The principal difference is that the states tend to make more use of radio and television in conjunction with other methods, which implies greater attention to public information and public relations. While this cannot be supported by data on the emphasis accorded to public information, it should be noted that a higher proportion of the cities tended to provide information on time and location of speed enforcement than did the states.

TABLE IV-11  
PROPORTION OF RESPONDENTS USING VARIOUS  
MEDIA COMBINATIONS

Group	<i>Percent Using Indicated Methods</i>				
	<i>Radio/TV Newspaper Signs</i>	<i>Radio/TV Newspaper</i>	<i>Signs Newspaper</i>	<i>Other</i>	<i>None</i>
States	48	14	7	24	7
Cities	30	12	22	27	9

### Emphasis on Speed Enforcement

While one questionnaire asked for estimates of time allocated to speed enforcement compared to other traffic activities, the other directed several questions to the subject of whether speed enforcement efforts should be modified.

#### *Traffic Law Enforcement Effort*

The relative effort expended on traffic law enforcement with respect to other functions is suggested by Table IV-12, compiled from supplemental data provided by one major city. A report on state police activities<sup>5</sup> estimated that uniformed personnel averaged between 58.5 and 75.0 percent of their time on traffic functions, depending on the organization and overall responsibilities of

<sup>5</sup>Edward A. Gladstone and Thomas W. Cooper, "State Highway Patrols—Their Functions and Financing," Highway Research Record 138, "Highway Finance and Benefits," Highway Research Board, Washington, D. C., 1966.

## SPEED ENFORCEMENT

TABLE IV-12  
TIME DISTRIBUTION ON SELECTED ACTIVITIES  
BY MOTORIZED TRAFFIC DIVISION

<i>Activity</i>	<i>Percent of Total Hours</i>
Accident Investigation	20.5
Traffic Law Enforcement	54.1
Administration	13.3
Miscellaneous	10.2
Time in Court	1.9
	100.0

their departments. Combining accident investigation and traffic law enforcement for the city data given above provides a similar order of magnitude.

*Speed Enforcement as Part of All Traffic Activities*

One measure of the speed enforcement effort in relation to all traffic work is the number of violations recorded by type. Table IV-13 shows a summary compiled from the annual report of a city with over 100,000 population (A) and another with population between 25,000 and 50,000 (B). Insufficient data were available from other cities to suggest whether these two cities are representative, but the percentages of speeding to total violations are strikingly different.

The present survey asked for estimates of time spent on speed enforcement, accident investigations, traffic control, vehicle checks

TABLE IV-13  
MOVING HAZARDOUS VIOLATIONS BY TYPE

<i>Violations</i>	<i>Percent of Total</i>	
	<i>City A</i>	<i>City B</i>
Improper Turns	18	2
Speeding	17	48
Traffic Control Device and Stop Sign	13	22
Careless and Reckless Driving	13	-
Failure to Yield Right-of-Way	13	13
Improper Pass or Lane Usage	9	1
Pedestrians	8	-
Other	9	14
	100	100

and inspections, and on nontraffic functions. Many departments replied that they were unable to classify the time distribution by individual functions; and although replies were provided by two-thirds of the cities, less than half the states provided data. Table IV-14 gives the average proportions of total traffic activity accounted for by speed enforcement. There is a remarkable similarity among all the grouped responses, results varying only between 24 and 29 percent. Despite the uniformity of averages, there is a wide distribution in individual responses among all the groups, as Figure IV-8 shows. Eighteen respondents indicated that speed enforcement amounted to less than 10 percent activities, while 14 indicated that speed enforcement accounted for more than 50 percent. More than half the responses, however, were between 10 and 30 percent.

TABLE IV-14  
SPEED ENFORCEMENT AS A PROPORTION  
OF ALL TRAFFIC ACTIVITIES

<i>Group</i>	<i>Percent of all Traffic Activity</i>
States	22
Cities Over 100M	24
Cities 50-100M	28
Cities 25-50M	29

#### *Adequacy of Present Emphasis on Speed Enforcement*

Respondents to the questionnaire with the limited circulation were asked for their opinions on the adequacy of speed enforcement activity. Sixty-one of 65 respondents provided answers, and these are summarized in Table IV-15.

The range in response was broad. Ten percent of the replies, all from cities, felt that speed enforcement was adequate but overemphasized compared with enforcement against other types of violations. Thirty-one percent, including more than half the states replying, felt that the present level of enforcement activity was adequate. The majority of responses, 59 percent, replied that present activities needed to be increased along with all other traffic enforcement activities.

In noting the need for more enforcement, one state police re-

SPEED ENFORCEMENT

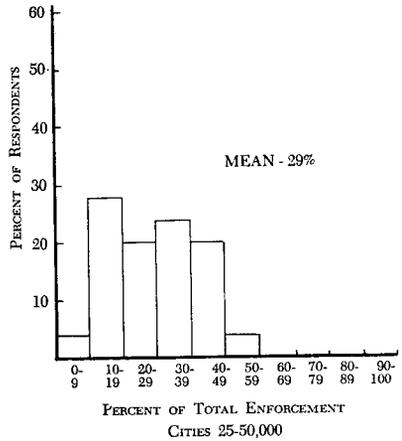
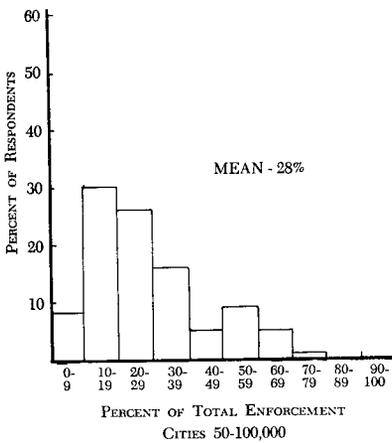
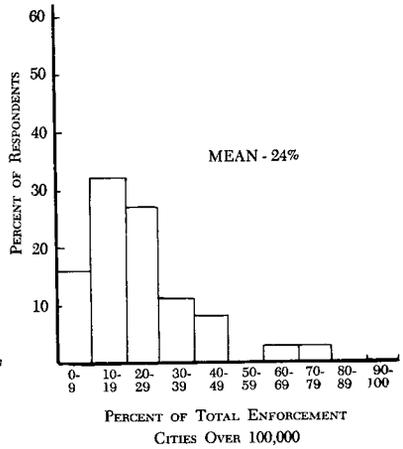
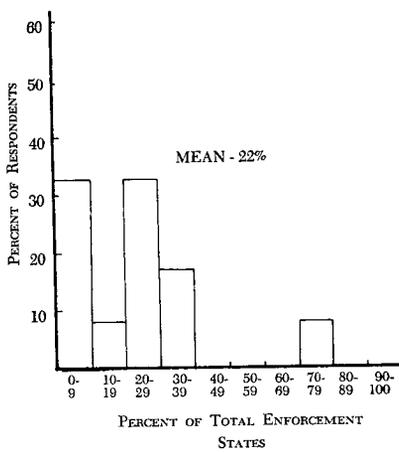


FIGURE IV-8. Speed Enforcement as Percent of Total Enforcement

TABLE IV-15  
 OPINIONS ON ADEQUACY OF SPEED ENFORCEMENT ACTIVITY

<i>Jurisdiction</i>	<i>Percent Indicating Opinions</i>			<i>Total</i>
	<i>Adequate but Over-emphasized</i>	<i>Adequate at Present Level</i>	<i>Needs to be Increased</i>	
States	0	55	45	100
Cities Over 100M	13	25	62	100
Cities Under 100M	12	27	61	100
All Departments	10	31	59	100

sponse commented, "Compliance is poor," but most states did not comment at all. The most repeated comment from cities concerned the shortage of personnel to undertake desirable levels of enforcement. Two replies that checked speed enforcement as being overemphasized added the following comments: "Enforcement efforts are not directed according to accident data as much as they might be", "Can be improved by more sophisticated application." Several responses advocating higher traffic enforcement levels suggested the "accident deterrent" value of increased enforcement. One comment noted, "Enforcement adequate—court policy on violators inadequate."

Two other possible choices for answers were given: "Present activity . . . is not adequate compared with enforcement against other moving violations," and "Present activities . . . should be reduced to free personnel for other activities." No respondents selected either one of these choices.

As a supplement to the preceding question, respondents were asked to note their opinion about changing the level of speed enforcement compared to changes in other traffic law enforcement. The question was framed so that any proposed change in speed enforcement should be offset by equal changes in other activities, which included enforcement against driving under the influence, defective vehicles, improper passing, ignoring stop signs or signals, etc. Most respondents ignored this aspect, failing to designate decreases in one item corresponding to increases in some other. The results still revealed, however, the areas of traffic law enforcement thought to need the greatest change and those commanding the least need.

Among the state responses, 78 percent of the respondents felt that enforcement against drunken driving should be increased, and 75 percent that improper passing enforcement should be increased, while only 44 percent felt that speed enforcement should be increased. In the larger cities, the response was similar. In the smaller cities, all types of violations received about the same emphasis for increased enforcement, almost two-thirds of the respondents favoring increases and one-third feeling that no changes were necessary. At all levels, the need for more attention to defective vehicles received equal or greater emphasis than speeding. Regardless of jurisdiction, there were almost no recommendations for reduced enforcement.

#### *Effect of Changed Emphasis on Compliance*

Another question asked what changes in speed enforcement emphasis might bring about an increased degree of driver compliance with speed regulations. The choices for response included: less emphasis on enforcement, more intensive enforcement with same tolerance and arrest policy, more intensive enforcement with stricter policy on arrests, more intensive enforcement but with greater use of warnings and easier policy on arrests.

The results are summarized in Table IV-16. Since no department chose less enforcement, the value of the table lies in the policy that might be associated with more intensive levels of speed enforcement. State organization replies were divided almost evenly between maintaining present policies on the use of warnings, summonses, and arrests and adopting a more severe policy. At the city level, there was a marked difference in the outlook. Less than

TABLE IV-16  
METHODS TO INCREASE DRIVER COMPLIANCE  
*Response as Percent of Total*

Group	Less Enforcement	More Intensive Enforcement, with			Total
		Same Policy	Stricter Policy	Easier Policy	
State	..	55	45	..	100
Cities Over 100M	..	62	23	15	100
Cities Under 100M	..	69	23	8	100
Total	..	64	27	9	100

a quarter of the cities preferred a stricter policy, and approximately two-thirds indicated a continuation of present policies. The remainder, 15 percent of the cities with over 100,000 population and eight percent of the smaller cities, selected an easier policy, i.e., "greater use of warnings and reserving summonses and arrests for only most extreme cases."

The question prompted only two comments from state police respondents: "Severe penalties have proven to be a deterrent to violators," and "This applies only to our jurisdiction" (answer, more enforcement using same policy). From the cities advocating more enforcement with the same warning and arrest policy, among the six comments received were the following: "The presence of enforcement personnel at all locations and at all hours would be an ideal situation for reducing all types of violations," "Our present policy seems to be working, we just need more men." Of the three comments associated with stricter policies, one noted, "We have proven to our satisfaction that intensive enforcement of speed laws, at all times and locations, not only reduces accidents but also severity." Six comments were received from city departments recommending greater use of warnings, mainly to the effect that warnings should be recorded. One respondent commented, "Most citizens respond to an intelligent written warning under our present 'no-fix' traffic law enforcement citations (system)."

### Some Observations

Additional comments on the principal findings with respect to methods follow below. Emphasis is given separately to those aspects which are treated uniformly by most or all departments, and those which exhibit considerable divergence in practices or attitudes. Some changes that appear to have taken place since the previous study are noted first.

Comparison of the present survey results with those of 1947 shows that police officials today have many more weapons in the speed enforcement arsenal than they previously did. Twenty years ago, most speed enforcement was done by pacing and less than 20 percent of the departments made use of mechanical speed measurement devices. Pacing is still used by all departments, but mechanical methods (including radar) are now also used by nearly

all departments. In 1947, none of the states reported time-distance techniques. Now, aerial surveillance and VASCAR are each reported by 41 percent. Probably because radar has largely replaced speed meter devices based on road tubes, cities are rarely using time-distance methods. Another change has been the declining use of motorcycles for speed enforcement.

A significant difference is a shift in the relative use of open and concealed speed enforcement methods. Probably due to the employment of radar, a smaller number of states and cities now report the exclusive use of open methods. Most departments evidently prefer to use a combination of both methods, feeling that the mixture leads to a more effective enforcement program. The greater proportions of concealed enforcement appear to be associated with greater proportional use of radar.

There are several areas of general agreement in policy and practices. Although its proportion of the total speed enforcement varies from one department to another, for instance, pacing still accounts for more than half the effort for each group of cities and for all the states. Radar is now used by almost all cities and states, and accounts for most of the remainder of speed enforcement activity. Respondents were also in general agreement that the objective of speed enforcement is to promote greater highway safety. Evidence on this point is given by answers to the direct question on the subject, and by the almost universal choice of high accident locations as the primary location for speed enforcement activity. Another significant area of agreement is that most departments favor the use of either entirely open methods of speed enforcement or a combination of open and concealed methods. And most departments prefer to inform the public, by signs or news accounts, of the techniques employed in speed enforcement.

Some of the more notable survey results gave evidence of differences in attitude and method in the field of speed enforcement. These are in some part regional differences, or differences that appear to be associated with the type of speed limit law. On a regional basis, the most important differences may be due to legislative action. Western States show the highest use of pacing and the greatest emphasis on open enforcement for this reason. The type of speed limit (i.e., absolute or *prima facie*) may have some

bearing. Cities with *prima facie* limits were more likely to employ entirely open methods than those with absolute limits, and the same cities tend to make more use of pacing and less use of radar.

The type of jurisdiction seems to explain other variability in practices. City usage of motorcycles in pacing has been noted already to decline from 80 percent in the largest size class to 49 percent in the smallest. Comparable differences exist in the usage of unmarked cars, employed by two-thirds of the states but only one-third of the cities. Possibly because of different availability, there is also a difference in the usage of media for presenting enforcement information. States and large cities tend to make the greatest use of radio and television; and states are more likely than cities to use radio and television together with highway signs and newspaper releases.

Other differences between state and city departments exist on the matter of emphasis. All state departments feel that present levels of emphasis on speed enforcement should either be continued or be increased, and that the same or stricter policies on penalties and arrests should be imposed. While most city respondents agreed, one out of seven city replies felt that speed enforcement was adequate and overemphasized, and a few cities reported that easier policies (i.e., more warnings) might be appropriate even though speed enforcement efforts could be intensified.

Several differences appeared to cut across regional or jurisdictional lines. Even though speed enforcement by city groups accounted for one-quarter of all traffic law enforcement on average, in individual departments the proportions ranged from 10 percent or less to as much as 70 percent. Conflicting attitudes, regardless of city or state group, were revealed in response to a question about enforcing a fixed speed limit under varying conditions. Overall, it would seem that differences in attitude, policy, and practice generally tend to outweigh the similarities. In view of the differences in regulations reported in the preceding chapter, perhaps no other finding could have been expected.

## CHAPTER V

### APPREHENSION PRACTICES

The type of regulations that govern speed enforcement and the methods employed in its practice have been reviewed so far. Among the unanswered questions are these: Under what conditions should violators be stopped? Under what conditions should warnings or citations be given or arrests be made? In view of changing highway conditions, are present policies always appropriate?

Part of the present survey was designed to provide answers to such questions and to permit further comparisons with the earlier study. The reported policies on "tolerance," the use of warnings, citations, and arrests, and some opinions on possible changes in speed enforcement policy are discussed in this chapter.

#### Tolerances

Most police departments allow for some increment of speed above the posted limit before stopping violators and taking action against them. Superficially, such "tolerance" may seem unnecessary considering that maximum speed limits should either be known to all drivers or else be based on observed speeds and local conditions. Yet it is a general practice. As a result, the survey attempted to discover the reasons for granting tolerances, and the circumstances surrounding the practice.

The first finding was that all cities under 100,000 population reported granting tolerances, as did 96 percent of the larger cities reporting. Of the 29 states replying, two did not answer the question, and three reported that tolerances were not granted. In explanation, one of the latter states noted, "Arrest all violators with good evidence."

Historically, there has been no significant change in the states on this point, but the percentage of cities granting tolerances has increased, up from approximately 80 percent in 1947.

*Reasons for Granting Tolerances*

Several choices were given as reasons for allowing tolerances and respondents were asked to rank them by order of importance. Because not all returns ranked the entire list, Table V-1 outlines the results obtained after applying a weighted-average procedure. The sequence shown for the state responses reflects the ranking obtained by counting merely the number of times each reason was picked first. For example, in 184 responses, driver speedometer error came first 94 times, measuring device error 31 times, public goodwill 26 times, and so on. There is only one category in which driver speedometer error failed to place first in weighted averages. Among cities in the 50,000-100,00 group, "other" was heavily weighted as first. In fact, combining all city responses, the category of "other" ranks second. Explanations for "other" fell primarily into two categories: first, "error" unclassified as to source; and second, the existence of prima facie or "reasonable and prudent" limits.

TABLE V-1  
RANKED REASONS FOR GRANTING TOLERANCE BY  
STATE AND CITY GROUPS

<i>Reason</i>	<i>States</i>	<i>Cities</i>		
		<i>Over 100M</i>	<i>50-100M</i>	<i>25-50M</i>
Driver Speedometer Error	1	1	2	1
Measuring Device Error	2	4	5	3
Public Goodwill	3	3	4	2
Court Requirements	4	5	3	5
Unreasonable Speed Limit	5	6	6	6
Other	6	2	1	4

All other choices received about the same weight regardless of the type of respondent. "Public goodwill," presumably its creation or preservation, ranked third as a reason for tolerance. "Court requirements" ranked fourth. On this point, it is interesting to note that Pennsylvania requires that radar observations must be six miles per hour in excess of the legal speed limit before a conviction can be made.<sup>1</sup> A New England city respondent commented in similar vein on the questionnaire form, "The court requests

<sup>1</sup>Fisher, op. cit. pg. 73

that the officer make the summons out five miles per hour less than the clock.”

Least important as a reason for tolerance is the existence of an unreasonable speed limit. This may be an indication of the scarcity of unreasonable speed limits. Or it may reflect a failure to enforce speed limits in areas where they are violated by large number of drivers. Or it may reflect the opinion that speed limits are to be enforced without regard to reasonableness.

The rankings reported above vary only slightly from those reported in the previous study. Then as now, the principal reason was to allow for speedometer errors. The earlier study did not comment on “other” reasons, but ranked “goodwill”, “court requirements”, and “unreasonable limits” as the succeeding reasons for permitting tolerances.

#### *Determining Acceptable Tolerances*

Respondents were asked to select one of three factors as being the most significant in determining tolerance. Among the states replies, officer judgment applied at the scene of enforcement was credited as the most important factor by two-thirds. The numerical value of the speed limit and the type of area were given much less weight, although they undoubtedly contribute to the judgment of enforcement officers. The responses from cities were almost uniform regardless of city size. Less freedom seems to exist for officers to establish their own limits on tolerance. Compared to a 66 percent response citing officer judgment at the state level, the average for the cities is only 43 percent. While several responses provided comments or additional information, three states and three cities reported that their tolerance policy was confidential. Two states and 11 cities reported that a fixed tolerance value (usually five miles per hour) was established regardless of conditions.

Comparing these results with those of the previous study required some approximation and regrouping of both data sets. Table V-2 gives an impression of the changes in policy that have occurred. First, as noted above there has been a significant decline in the total number of cities (from 20 to two percent) that do not grant tolerances. For both cities and states, there has been a marked drop in the number reporting fixed tolerance values, from 32 to seven percent of the states, and from 59 to only six percent of the cities. Twenty years ago, the most common practice was to

TABLE V-2  
COMPARISON OF TOLERANCE PRACTICES IN 1947 AND 1968

<i>Tolerance Determinants</i>	<i>Percent Reporting</i>			
	<i>States</i>		<i>Cities</i>	
	<i>1947</i>	<i>1968</i>	<i>1947</i>	<i>1968</i>
No Tolerances	14	11	20	2
Fixed Values	32	7	59	6
Speed Limit Related	3	12	2	25
Area Type	28	16	4	27
Officer Judgment	23	54	15	40
Total	100	100	100	100

establish a blanket tolerance of five miles per hour. Today such a practice is apparently almost nonexistent—unless it is masked by “officer judgment.” The practice of relating tolerance values to the speed limit values has increased considerably, more so at the city level (from two to 25 percent), than in the state organizations (three to 12 percent). Basing speed tolerances on the type of area is less practiced now at the state level, dropping from 28 to 16 percent. Area type has become a determinant in setting tolerances in 27 percent of the cities today, compared to only four percent in 1947.

Apart from the decline in using fixed values, the biggest change lies in the trend toward authorizing police officers in the field to decide tolerance limits. The percentage of both states and cities reportedly leaving the judgment to officers has more than doubled: from 23 to 54 percent of the states, and from 15 to 40 percent of the cities. In many cases, however, “enforcement guidelines” are issued as department policy and these may be the principal influence on field judgments.

#### *Tolerance Limits*

The questionnaire asked what increments of speed above the legal limit would be permitted before warnings or citations would be issued or arrests would be made. The replies, together with a review of associated comments, are treated below for each level of enforcement action.

A typical policy in these cases, provided by one city respondent, is given below:

**“Enforcement Guidelines”**

## 1. Tolerances and contingent action

- a. At 10 miles per hour or more over the zone speed, the officer *shall* stop and *should* cite.
- b. From 5-9 miles per hour over the zone speed, he *should* stop and either warn, or, if facts to sustain a violation of the basic speed law are observed, *should* cite.
- c. If below or up to 5 miles per hour over the prima facie limit, an officer *may* cite.

Some departments have a diametrically opposite position on the disclosure of tolerance policies. It was noted earlier that three states and three cities declined to reveal any aspects of their tolerance policy in answering one question. On the question concerning specific tolerance values, 15 states failed to provide data. Only 11 cities, or six percent of the total, left the question unanswered.

The fact that most departments establish guidelines for speed tolerances is borne out by the pattern of replies given in Appendix Tables IV-A, B, and C. Of the states supplying data, 75 percent had established specific values, as had 87 percent of the cities providing information. Reliance on the arresting officer's judgment may still be a factor, even though specific limits are set, as the following policy example shows:

“When the speed of a vehicle is checked at a speed of three (3) to and including five (5) miles per hour over the posted speed limit the officer *may* warn the driver.

When the speed of a vehicle is checked at six (6) or more miles per hour over the posted speed limit, the driver shall be cited for court.

This policy shall not deprive an officer from using sound reasoning and discretion in the application of the regulations in each individual situation.”

*Warning Tolerance*

Appendix Table IV-A summarizes the data on tolerances related to warnings. Regardless of the type of area, tolerances of between one and five miles per hour are most common. Cities tend to be more liberal than states, as at least 20 percent of all

cities grant tolerances greater than 5 miles per hour regardless of location. There is also a tendency for small cities to be more liberal than large ones. Only 17 percent of the states allow a tolerance up to 10 miles per hour in rural conditions. The proportion is 100 percent for the smallest cities under rural conditions. Furthermore, tolerances of up to 15 miles per hour are found only in the smallest cities.

### *Summons Tolerance*

Tolerances allowed before summonses or citations are issued follow a pattern similar to those for warnings. Five miles per hour is the prevalent individual value in the state and large city responses, although the majority of responses fall in the range between six and 10 miles per hour. In the smallest cities, tolerances are greater. Of those between 25,000 and 50,000 population, one-quarter allow tolerances between 11 and 15 miles per hour. Of the cities between 50,000 and 100,000 population, one-quarter reported such tolerances under rural conditions (which assumes that rural areas do exist within some city jurisdictions). On the other hand, state police organizations reported no tolerances greater than 10 miles per hour, with the greatest proportion being five miles per hour.

### *Arrest Tolerance*

The pattern of tolerances before arrests are made, shown in Appendix Table IV-C, is based on limited information since only three states and few cities provided data. For the cities between 50,000 and 100,000 population, 17 replies showed a scattering of values under urban conditions, the most common response being "arrest at 25 miles per hour over the posted limit." Of the responses from all cities with over 50,000 population, the most frequently reported tolerance was from six to 10 miles per hour.

## **Use of Warnings, Citations, and Arrests**

### *Extent of Use*

The degree to which warnings, citations, arrests, and bonding are employed is summarized by Figure V-1. The most widespread use of warnings (89 percent) is by states. The percentage for cities is lower; only 78 percent of all cities issue warnings, and

## SPEED ENFORCEMENT

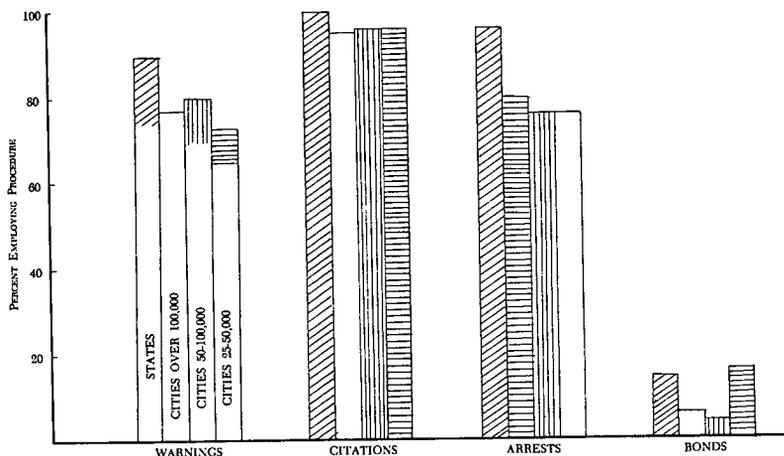


FIGURE V-1. Use of Warnings, Citations, Arrests and Bonds

the smallest cities make the least use. Citations are given for speeding by all state organizations, but not by all cities. Of the 182 cities providing answers on this question, eight failed to check this item. Three of these noted the use of warnings only, and five reported the use of both warnings and arrests, without listing the use of summonses. All but one state reported making arrests for speeding violations, and again the city response is lower at 78 percent. Four returns noted that the city had no right of arrest for speeding violations, and nine other cities reported that arrests would be made on drunk driving or reckless driving charges.

The question of whether officers were authorized to accept bond was asked specifically to measure the change from the postwar years. Four states and 13 cities reported that arresting officers could accept bond. One city noted that bond could be posted at the police station, two that drivers' licenses would be accepted as a bond, and another that bond other than cash could be accepted. In the immediate postwar period, three of the reporting states allowed arresting officers to accept a bond. Contrary to expectations, a slightly higher proportion of the present survey respondents permit this practice than apparently did twenty years ago. The gain was greatest among the smallest cities, five out of 51 respondents now, compared to three out of 91 in 1947, reportedly allow arresting officers to accept bond.

TABLE V-3  
CHANGE IN USE OF WARNINGS, CITATIONS, AND ARRESTS  
1947 to 1968

<i>Group</i>	<i>Increase in Percent Reporting Use of</i>		
	<i>Warnings</i>	<i>Citations</i>	<i>Arrests</i>
States	6	26	46
Cities Over 100M	69	16	36
Cities 50-100M	39	22	36
Cities 25-50M	46	39	30

Table V-3 shows the apparent broader usage of all types of enforcement action that has developed since the previous survey. The greatest difference has been the increased employment of warnings by cities of all sizes, most notably the change from eight to 77 percent in the largest cities. The increased use of arrest by states and cities of all sizes is also marked; the proportion of states making arrests has increased from approximately 50 to 96 percent, and the proportion of cities from approximately 43 percent to 78 percent.

The combinations of reported enforcement actions are summarized in Table V-4. Obviously, most departments employ all three possible actions of warnings, summons, and arrests. Three-quarters of the states and almost two-thirds of the cities follow such practice. Cities are more likely than states to use warnings and summonses together with no arrests. The use of summonses and arrests without the concurrent use of warnings is practiced by 10 percent of the states and 12-14 percent of the cities. The

TABLE V-4  
USAGE OF ALL ENFORCEMENT ACTIONS

*Percent Using Indicated Combinations*

<i>Group</i>	<i>Warnings</i>	<i>Warnings</i>		<i>Summons</i>	<i>Other</i>	<i>Total</i>
	<i>Summons</i>	<i>Summons</i>	<i>Arrest</i>	<i>Only</i>		
	<i>Arrest</i>					
States	76	3	10	0	11	100
Cities Over 100M	67	9	14	6	4	100
Cities 50-100M	60	14	12	8	6	100
Cities 25-50M	64	9	12	12	3	100

use of summonses only is not reported by any state and by less than 10 percent of all the cities reporting. Returns were stratified according to the type of speed limit, but no differences in practice were apparent as a result.

Stratifying the returns by region did reveal differences. Table V-5 indicates that while five of the six regions show use of warnings by 77 to 92 percent of the cities within them, only 59 percent of the 32 Southeastern cities used warnings. A difference in the use of arrests is also evident. From 81 to 93 percent of the cities in five regions make arrests for speeding, but only 57 percent of those in the Northeast do so. The other outstanding regional difference is that 19 percent of the cities in the Midwest reported that officers could accept bond. In the rest of the nation, only three cities out of 132 providing data apparently permit the procedure.

TABLE V-5  
REGIONAL PATTERNS IN ENFORCEMENT ACTIONS  
*Percent of Cities Reporting Use of*

<i>Region</i>	<i>Warnings</i>	<i>Summonses</i>	<i>Arrests</i>	<i>Officer Bond Acceptance</i>
Northeast	79	91	57	2
Southeast	59	97	81	6
Midwest	77	91	81	19
Mountain & Plains	80	100	93	0
Southwest	82	100	82	0
West Coast	92	92	81	0

#### *Treatment of Nonresident Violators*

Enforcement actions against out-of-state or out-of-town violators generally differ from the treatment accorded residents. The smaller the jurisdiction, the more likely that differences will exist. Sixty-one percent of the states reported different treatment; 63 percent of cities over 100,000 population; 68 percent of those with between 50,000 and 100,000 population; and 80 percent of those between 25,000 and 50,000 population.

Table V-6 shows the principal types of action against out-of-state or out-of-town drivers. The practice of most state and city departments is either to have the violator post bond or to hold an im-

TABLE V-6  
ENFORCEMENT ACTION AGAINST NONRESIDENT DRIVERS  
*Percent Taking Action Indicated*

<i>Group</i>	<i>Warnings or None</i>	<i>Immediate Arrest and Fine</i>	<i>Post Bond</i>	<i>Reciprocity and Other</i>	<i>Total</i>
States	12	29	47	12	100
Cities Over 100M	34	14	49	3	100
Cities 50-100M	13	25	57	5	100
Cities 25-50M	23	19	58	0	100

mediate hearing. Table V-6 indicates that posting bond is most common, reported by 47 percent of the states and between 49 and 58 percent of the cities. Although one-third of the largest cities give warnings or "consideration" to out-of-town drivers, the remaining departments are less lenient and are more likely to conduct an immediate hearing.

A departure from the national pattern again occurred in the West Coast responses. In the remainder of the nation, 71 percent of the city departments treat out-of-town violators differently. Of 26 West Coast cities, only 42 percent have such a policy. Furthermore, of those with a different policy, only one city requires out-of-town violators to post a bond. Two-thirds of the Western and Southwestern cities either give warnings or "consideration" to nonresidents, compared to only 21 percent of all other cities.

### The Number of Speeding Violations

Respondents were asked to estimate what proportion of all moving violations were accounted for by speeding. Figure V-2 groups the range in responses and shows the mean percentage reported by each group of cities and the states. Among state police, speeding violations generally account for a majority of all violations, averaging 61 percent of the total. Nineteen of 29 states reported that speeding violations were more than half the total recorded. The largest cities reported that speeding violations accounted for only 36 percent of the total (which excludes parking violations), only nine of the 60 cities in this group reporting speeding as more than half of the total. The speeding violation propor-

## SPEED ENFORCEMENT

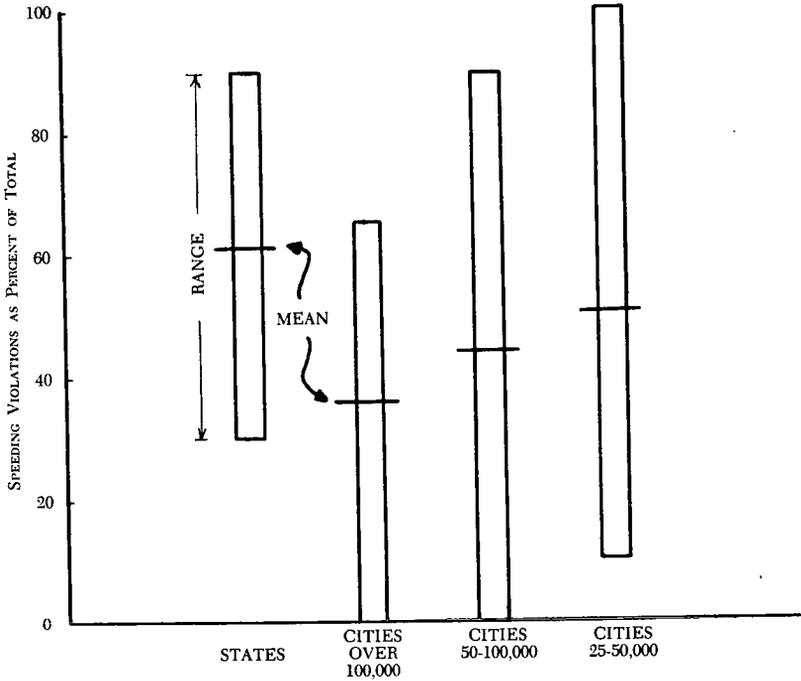


FIGURE V-2. Relationship of Speeding Violations To All Moving Violations

tion averaged as much as 50 percent in the smallest cities.

Because of the broad range in responses, it was thought that the enforcement methods employed might have some bearing, and a comparison was made between the percentage of all violations due to speeding and the percentage of all enforcement using radar. The summary in Table V-7 shows the percent of all cities giving usable data on both radar enforcement and speeding violation proportions, by different levels of radar use and speed enforcement activity. For instance, 12 percent of the cities reported that radar was used for 20-39 percent of speed enforcement and that speeding violations were from 20-39 percent of the total. At the ends of the rows in the table are averages of speeding violations expressed as a percentage of total violations. For example, speeding violations average 33 percent of the total in cities using radar for between 0 and 19 percent of their enforcement. The last figures in the columns present the results in a different way and suggest

TABLE V-7  
RELATIONSHIP OF SPEEDING VIOLATIONS TO USE OF RADAR  
*Percent of Cities Responding*

<i>Radar Use as Percent of Total Speed Enforcement</i>	<i>Speed Violations as Percent of All Moving Violations</i>					<i>Percent of All Cities</i>	<i>Speeding Violations as Percent of Total</i>
	<i>0-19</i>	<i>20-39</i>	<i>40-59</i>	<i>60-79</i>	<i>80-100</i>		
0-19	4	10	2	1	1	18	33
20-39	2	12	7	2	0	23	38
40-59	1	5	4	3	1	14	47
60-79	1	6	4	1	1	13	42
80-100	2	11	9	8	2	32	47
Percent of Cities	10	44	26	15	5	100	
Ave. Percent Radar Use	40	48	58	67	62		

that cities having the lowest proportions of speeding violations also have the lowest levels of radar use (40 percent). Those with 60-79 percent or 80-100 percent of their total violations from speeding use radar to a greater degree (67 and 62 percent, respectively). Figure V-3 shows the same data plotted. Despite the scatter of points, there is some tendency for greater radar usage to be associated with an increased proportion of speeding violations.

The possibility of regional differences in the proportion of speeding to total violations was also examined. Cities in the three West Coast States reported an average of 29 percent, compared to the national average for all cities of 42 percent. The only other region departing significantly from the norm was the Mountain States group, whose speeding violations accounted for 53 percent of total violations. The extent to which radar was used for speed enforcement in these areas averaged 22 and 57 percent of total speed enforcement, respectively.

The implications of such correlations may be several. Obviously, the results suggest that radar is the most efficient and productive measure presently available for speed enforcement. Or it may indicate that police departments which place a serious emphasis on speed enforcement are more likely to use radar than any

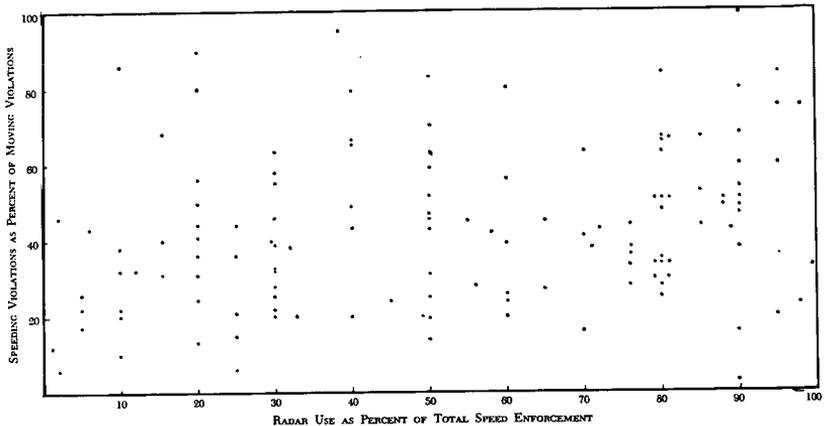


FIGURE V-3. Speeding Violations and Radar Usage

other technique. On the other hand, it may indicate that departments which make heavy use of radar for speed enforcement are perhaps not directing enough attention to other important areas of traffic law enforcement.

### Attitude Toward Procedural Changes

The previous chapter reported on departmental attitudes toward increasing or decreasing activity and easing or stiffening the penalty structure for speeding violations. Approximately one-half of the states, and one-quarter of the cities were in favor of both more enforcement and stiffer penalties. None of the states, and very few cities, were in favor of more enforcement combined with a reduction in penalties for violations. The majority of responses were in favor of increased enforcement without change in the treatment of violators.

A related question was also asked: "Do you think that greater compliance with reasonable regulations might result if speed enforcement were separated from the 'criminal stigma' of present police and court functions, and were administered instead, for example, by Motor Vehicle Departments?" Three of the 11 states did not answer the question, and the others replied negatively. Only seven percent of the cities failed to answer the question; of the remainder, 17 percent replied affirmatively and 76 percent

negatively. The question elicited much comment in addition to the expected negative response. Two of the three states which did not answer commented as follows: "Not necessarily", "Depending on penalties by Motor Vehicle Departments and consistency of such penalties, etc." These, at least, imply recognition of possible values in such a change. The remaining four comments came from states replying in the negative: "I believe in both court and administrative action", "If we remove the stigma from traffic violations, we are then saying there is no need for traffic enforcement", "It is a violation of law and should be treated as such", "The criminal stigma is minimal and to eliminate it completely would probably subtract from voluntary compliance".

The largest cities provided the greatest number of "Yes" and least "No" replies. More than half the replies contained comments on the question. The comments from cities answering "yes" were as follows: "Traffic violations—other than drunken driving, unauthorized use, manslaughter—could be administered at the Motor Vehicle Department level with penalty of suspension or revocation of driving privilege", "Yes, for many varied reasons", "All traffic arrests could be handled in this manner".

Only three cities failed to answer "Yes" or "No;" each supplied comments: "Possibly by the average driver—however, the habitual (violation) should come under the courts", "Perhaps—but must be maintained at local level, not through the state. Many smaller communities could not afford such a separation", "Serious motor vehicle violations are a criminal offense and should be properly adjudicated by a magistrate. Any leniency shown, or (if) the person feels no serious act has been committed, will raise the annual figure of traffic deaths to 100,000 instead of 50,000", "It sounds interesting—could possibly be effective."

Seven comments were associated with the negative replies. These included: "There is no 'criminal stigma' attached to traffic citations in \_\_\_\_\_", "This is a police function and should remain a police function", "At rate accidents are increasing stiffer criminal action should be taken", "Such action would tend to lessen the importance of traffic violations as hazardous, accident-causing acts", "No—although I would like to see the police service separated from traffic enforcement".

Eleven comments accompanied the 28 responses from cities with

less than 100,000 population. All but two were associated with negative replies, which at 82 percent were a larger majority of the total than they were for either the states or larger cities. Representative of the comments were: "A law violation is just that; not an indiscretion", "Basically, compliance is obtained through reasonable regulations, fair and sound enforcement, and public education and information", "No, just the opposite would occur; however, the Motor Vehicle Department should continue the present point system", "I don't see how this would change driver attitudes".

Separating the cities into Eastern, Central and Western groups, (18 in each group), pointed up a regional difference in attitudes. After assigning four uncertain or equivocal answers half to "Yes" and half to "No," the following pattern emerged: One-third of the Eastern city departments felt compliance would improve; one out of six Central cities agreed; but only one out of ten Western cities agreed. It might be noted that the city commenting on the present lack of a "criminal stigma" was a major West Coast city.

A reflection of the viewpoint of one state administration and one segment of public opinion is offered by the following editorial:

#### **Punishing Traffic Offenders**

Governor Rockefeller's recommendation that responsibility for most moving traffic infractions be taken out of the courts and transferred to the Motor Vehicle Department merits acceptance by the Legislature. The bill's passage would be a boon not only to motorists but also to the courts, now clogged with more than three million traffic cases a year.

The more serious offenses, such as drunken driving, reckless driving, or leaving the scene of an accident, would remain under the jurisdiction of the criminal courts, but these constitute only a small fraction of the total. The rest would be heard by referees appointed by the Motor Vehicle Department. Drivers could plead guilty by mail or could appeal convictions they considered unjustified.

Parking offenses would be handled by another administrative agency to be set up by the city. Taking all but the really serious offenses out of the courts would abate the crowded conditions and semi-automatic judgments that now prevail and do so much to breed disrespect for the law. Judges and courtrooms would be freed to deal more promptly with the backlog of trials for major crimes.<sup>2</sup>

The bill discussed above was passed into law, and implementing procedures have been prepared by a task force appointed by the Governor.

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<sup>2</sup>Editorial, New York Times, March 27, 1969. ©1969 by The New York Times Company. Reprinted by permission.

### Comments

Granting tolerances in speed enforcement has apparently become a more widespread practice in recent years among city police departments, and virtually all cities now permit certain increments in speed over the limit before issuing warnings or citations.

There is also an increasing tendency to permit officers in the field to use their discretion in taking enforcement action. Adding to this the broader use of all three actions of warnings, citations, and arrest indicates that more flexible speed enforcement policies are perhaps being developed. If so, the development appears somewhat uneven, proceeding at a different pace in cities of different size and with different regional patterns. For instance, the Southeast reported the least use of warnings, the Northeast reported the least use of arrests, and the Midwest reported the greatest proportion of officers accepting bonds.

The treatment of out-of-state or out-of-town drivers differs from that for residents in almost two-thirds of all jurisdictions, whether state or local. One principal reason is clearly police recognition of driver unfamiliarity with local regulations. In itself, this may be a powerful argument for greater uniformity in both regulations and enforcement practice. There can be little justification for two levels of treatment for the same violation, whether the out-of-town violator is treated more leniently than the resident, or more severely (the likely effect of posting a bond in lieu of court appearance).

None of the state police agencies felt that an improvement in compliance would result from a shifting of speed enforcement offenses from the courts to a Motor Vehicle or similar civil administration. The response from cities varied significantly by region, least favorable on the West Coast and most favorable on the East Coast. Judging from the legislative recommendation in at least one state, the pressures of overcrowded courts may well force a change in this direction for lesser traffic offenses. A re-examination of what constitutes a speeding offense serious enough for criminal action may then become necessary.

One aspect of the trend toward permitting officer judgment in the field on enforcement action deserves additional comment. The

variable highway conditions that warrant such flexibility in enforcement are the same as those that warrant the use of prima facie limits to govern driver speeds. Recognizing the variability when it applies to enforcement action, but not when it applies to public travel (through the advocacy of absolute limits), seems a contradiction which needs examination.

## CHAPTER VI

### THE NEED FOR NEW APPROACHES

A concern with highway speeds is shared by many diverse groups — legislators, highway and traffic engineers, police and court officials, as well as associations representing driver interests. Some of the problems and inconsistencies that have become apparent in this study may well stem from this diversity of concern and a lack of communication between groups. Resolving some of the apparent contradictions may require new approaches. This chapter explores some possibilities for change, and begins by examining the present condition.

#### Speed Characteristics

Patterns of driver speeds are the principal interest in traffic engineering investigations for speed zones, and Appendix D details the recommended procedures for such studies. For reasons evident in Figure VI-1, the 85th percentile speed (the speed at which or at less than which 85 percent of the vehicles are traveling) is that most desirably approximated by a speed limit. Because of the generally straight and steep slope of the curve below the 85th percentile, a speed limit set only a little lower will cause a large number of drivers to be violators. In the illustration, for example, where the 85th percentile speed is 49 miles per hour and the proposed speed limit is 50 miles per hour, a reduction of the speed limit to 45 miles per hour would make violators of 37 percent of the drivers. On the other hand, if the speed limit were raised to 55 miles per hour, only an additional 10 percent of the drivers would be included under the speed limit.

The curve shape in Figure VI-1 is characteristic of most highways under most conditions. However, the position of the curve and its steepness will vary, even for a given segment of one highway. For example, Figure VI-2, based on Figure 3.28 in the Highway Capacity Manual<sup>1</sup> shows the effect of traffic volumes on speed distributions.

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<sup>1</sup>Highway Capacity Manual — 1965, Special Report 87, Highway Research Board, Washington, D. C., 1965.

## SPEED ENFORCEMENT

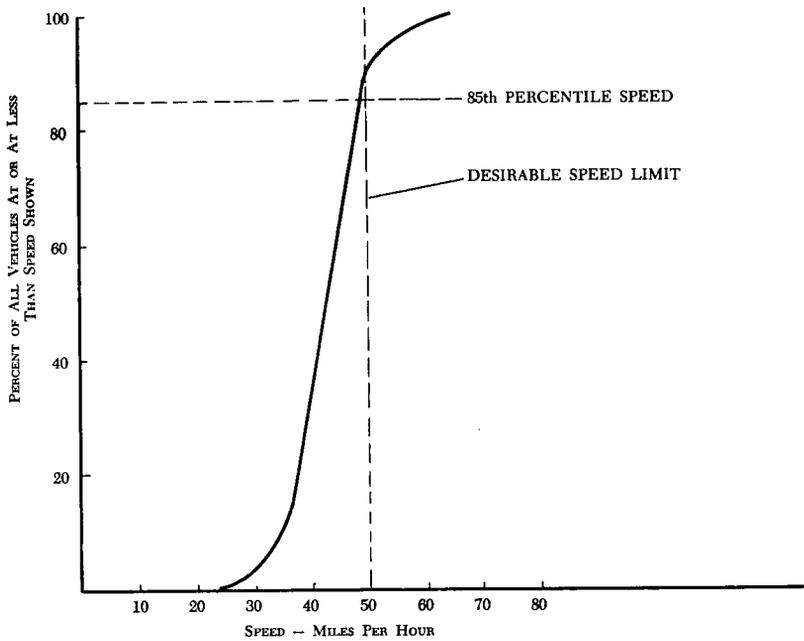


FIGURE VI-1. Typical Speed Distribution Curve

The 85th percentile speed varies from as low as 34 miles per hour to 67 miles per hour. Variations like these are important in considering not only speed limit establishment but also speed limit enforcement.

The speed distribution curve varies not only with traffic volume, but also with other factors influencing highway operations, such as weather, daylight or darkness, roadside development, and localized highway design characteristics. Any speed zone with one speed limit value may contain uphill or downhill sections, vertical and horizontal curves, as well as changes in adjacent roadside development. Variations from place to place within a zone, as well as from time to time, will make the posted limit reasonable or unreasonable, according to the immediate circumstances.

Extremes of variability for a given location are suggested by Figure VI-3, which shows the area within which all vehicle speed distributions occurring at different times and places in a zone would fall. The left-hand curve indicates the combination of the slowest speed condition in the slowest section of the speed zone

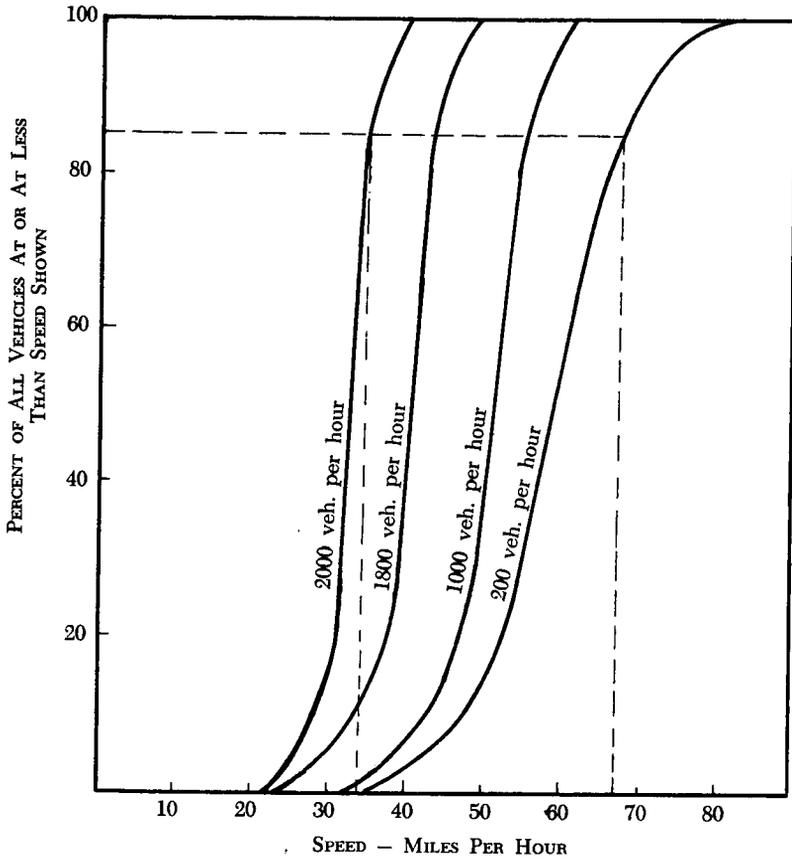


FIGURE VI-2. Changes in Speed Distribution With Volume Increase

(high volumes going up hill, for instance); the right-hand curve represents the combination of the fastest speed condition in the fastest section of the speed zone. The lines crossing within the "envelope" represent the speed limit (55 miles per hour in this instance) and the 85th percentile speed.

Taking first the vertical element of the cross inside the envelope, it is evident that at its top virtually no drivers are exceeding the speed limit. At the bottom, in the circumstance of highest speeds, 50 percent of the drivers are exceeding the limit. In either case, the speed limit value has little significance, because its enforcement is

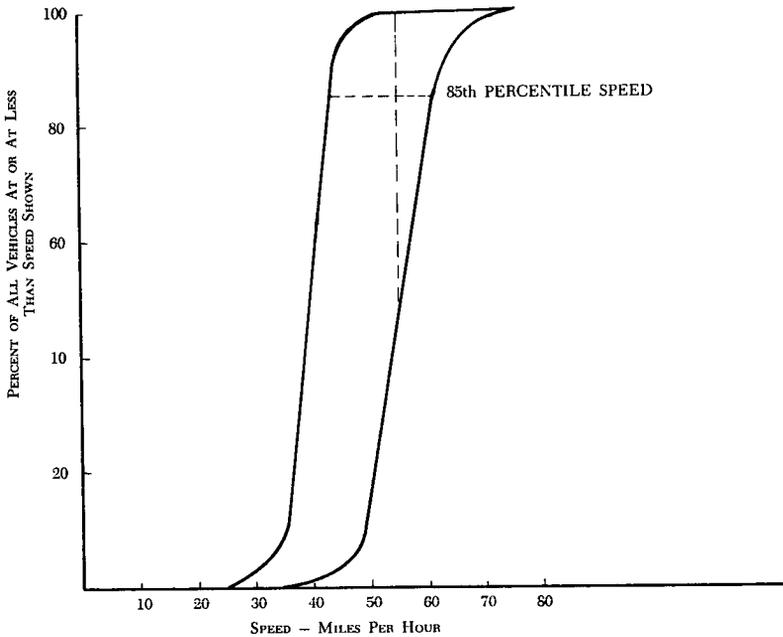


FIGURE VI-3. Envelope of Speed Distributions in a Typical Zone

either unnecessary or meaningless. Obviously, the type of speed limit law has little significance either. If a prima facie law, a violator would have good grounds for argument when half the drivers exceed the limit. If an absolute law, and if 50 percent of the drivers are exceeding the limit under certain conditions, the law is unenforceable in any practical sense. Local disregard of the law, which is thereby encouraged, probably leads to similar disregard elsewhere.

The horizontal line shows that the 85th percentile speed may range, depending on conditions within the zone, between 43 and 61 miles per hour. This is a very broad range for a criterion around which the speed limit is normally defined. If speeds can vary so much within a zone — due to volumes, make-up of traffic, time of day, season, weather and design conditions — it would seem unreasonable to carry out enforcement without explicitly recognizing these factors.

## Relating Traffic Engineering and Enforcement

### *Setting Speed Limits*

The directions being taken in some parts of the country offer hope for resolving some of the conflicts exposed as a result of this survey. Two developments, one the use of *both* absolute and prima facie limits, the other the transferring of minor infraction prosecutions from the courts to a different administrative agency, point the way.

An argument for using both types of maximum speed limits can be made on the following grounds. First, highways are designed for a certain maximum speed, which affects the design of vertical curves for sight distance, horizontal curves for sight distance and superelevation and side friction factors, acceleration and deceleration lanes and so on. Speeds in excess of such design speeds are thus inherently unsafe from a design viewpoint, as well as from considerations of vehicle condition and driver skills. Justification thereby exists for an absolute maximum limit set on design factors. For simplification, one areawide speed value might be designated based on the highest design speed. Obviously, it would also be possible to designate absolute limits by highway type or by type of area, although this would undoubtedly be cumbersome.

For highways with less than optimum design speeds and for locations affected by roadside conditions, density of development and traffic, prima facie speed zones could be designated using present principles. These, as Appendix D outlines, provide for basing the speed limit on the 85th percentile speed recorded for weekday, daytime off-peak traffic. At times, because of this form of posting, a speed in excess of the limit might not be unreasonable or imprudent, as long as it was less than the maximum design speed.

The two classes of violations, those of absolute limits and those of prima facie limits, might very well lend themselves to the two levels of judicial treatment being set up in New York City, for example. The more serious violations might be treated with harsher penalties at the Criminal Court level, while prima facie limit infractions might be disposed of by referees of the Motor Vehicle Department.

The need is clear enough. The public is either ignorant of or confused by the present variety of regulations, and existing

procedures for treating speeding violations are all too often likely to breed disrespect. Alternative solutions must be developed and tested.

### *Advisory Speed Signs*

The advisory speed sign has been widely used by highway organizations at hazardous locations to indicate a maximum safe speed for traversing the immediate area. It is, or should be, used only in conjunction with the typical black and yellow warning sign relating to hazards. As a result, the Uniform Manual on Traffic Control Devices has regarded the sign as a warning device and has specifically stated that it is not intended to be enforceable.

Yet the present survey has shown that more than half the cities and almost one-quarter of the states replied that the advisory speed was an enforceable limit. It seems entirely reasonable that it should be so construed, since speed in excess of the posted value could be considered a violation of the basic speed law. The condition is similar to that of *prima facie* regulatory limits in that speed greater than the posted limit, in the absence of further proof, is evidence that the basic speed law has been violated.

Under such circumstances, it would be appropriate to define and to establish a uniform interpretation of the advisory speed sign for both enforcement and highway agencies. Use of the sign should recognize the enforceability, and consequently advisory speed values should be carefully selected to conform to the conditions of application. Enforcement officials, on the other hand, in recognizing the enforceability should also recognize that the physical limits of the advisory speed zone are determined by the conditions prompting its application. No matter how the conflicting interpretations are resolved, some adjustment in the thinking of many highway and police organizations will be necessary.

## CHAPTER VII

### SUMMARY AND CONCLUSIONS

The significant findings of the surveys are summarized here, and their implications are discussed in the conclusions that follow. Also reviewed are the changes evident in regulations, methods and policies since 1947. In closing, further suggestions related to speed enforcement are offered.

#### Summary of Findings

##### *Trends from 1947 to 1968*

The most significant difference in speed regulations is a reversal of the 60-40 ratio of states with prima facie and those with absolute limits. The Uniform Vehicle Code now recommends, and a majority of jurisdictions have adopted, absolute speed limits. Other changes include increases in maximum speed limits and more standardization in values of rural speed limits between different states. More states now provide different speed limits for day and night driving, in conformance with the Uniform Vehicle Code. More states now provide different speed limits for automobiles and commercial vehicles, a subject not treated by the Code. And more states now have provisions for minimum speed limits, although these are frequently restricted to certain types of highways. Today, traffic engineering investigations almost invariably precede the establishment of local speed zones. But fewer cities now appear to be authorized by state legislation either to raise or to lower speed limits on major streets.

The changes in speed enforcement technology are much less pronounced. Radar was just beginning to appear in 1947 as a speed measuring technique. Another new technique, based on time and distance calculations, is emerging now and eventually may have a comparable impact on speed enforcement. Pacing is still the most universal practice, but radar accounts today for nearly half the total speed enforcement cases.

Use of most other methods has declined. In 1947, less than 20 percent of the departments used mechanical devices of any kind. Except for VASCAR, time-distance methods appear to be used even less than previously. Motorcycle usage for speed enforcement has also declined, except in the largest cities. Probably the most important shift in attitudes and policies concerns the relative use of open and concealed methods of enforcement. The number of states and cities reporting wholly open enforcement (i.e., with clearly marked police vehicles in plain view) has declined. Most departments evidently prefer to mix open and concealed methods, both as a more effective general deterrent to speeding and as a more effective means of dealing with problem situations.

Another change in policy accompanying the use of more diversified methods is greater diversity in apprehension practices. More departments now report the use of "tolerance" than previously. Instead of using fixed values, departments generally establish guidelines to aid the judgment of officers in the field. Two-thirds of the cities and three-quarters of the states issue warnings to speeding violators. Although this change is insignificant at the state level, it represents a threefold increase in the number of cities using warnings. Less dramatic, but still significant is the increase in the number of cities using citations and arrests for speeding violations. Some cities still report that there is no right of arrest for a speeding violation.

#### *Present Status of Regulations*

The types of speed limits in effect among the states are highly variable: three-fifths have absolute limits, one-fifth have prima facie, and one-fifth have a combination of both absolute and prima facie limits. A comparable variability exists among the cities. Sample returns from cities indicated that prima facie limits held a slight majority over absolute limits, and only 14 percent reported both types. Even though the Model Traffic Ordinance recommends that state speed laws shall be applicable upon all streets, several cities in states with absolute limits reported prima facie regulations, and vice versa. Usually, however, the city speed limit type conforms to that of the state.

Maximum speed limits typically exceed the recommendations of the Uniform Vehicle Code. On rural freeways, 27 out of 29 report-

ed state limits exceed 60 miles per hour; on multilane rural highways, 19 out of 30 states reported limits of more than 60 miles per hour; and on two-lane rural highways, 15 out of 30 reported limits over 60 miles per hour. Minimum speed limits can be posted in two-thirds of the states reporting and predominant values are 40 and 45 miles per hour. In some cases, the gap between posted maximum and minimum speed limits may be only 10 miles per hour. The type of highway on which minimum limits are authorized is frequently specified by legislation. Minimum speed limit use by cities declines with decreasing city size, probably because the presence of freeways is less likely in smaller cities.

Speed limits varying by vehicle type, though specified in the Uniform Vehicle Code only for unusual vehicle classes, apply to commercial vehicles in at least two-thirds of the states. The most common differential between automobile and truck speeds is 10 miles per hour, but three states reported differences as great as 20 miles per hour on rural freeways. On two-lane rural highways, the difference was 10 miles per hour or more in 20 of 22 instances reported.

The Uniform Vehicle Code recommends that nighttime speeds should be reduced by five miles per hour from daytime limits. About one-half the states comply with the reduction, but half of these reduce nighttime speeds by 10 miles per hour or more. While less common on rural freeways than a 5 miles per hour reduction, the 10 mile per hour reduction is found just as frequently on multilane rural highways and more frequently on two-lane rural highways.

Authorization to establish speed zones varies considerably among the states and cities. Authority is provided sometimes to reduce speed limits, sometimes to raise or lower limits, but is occasionally denied altogether to cities. Some cities are permitted to change speed limits on all but state highway extensions, while others may change speed limits on state highways only with state approval. Others only may reduce speed limits on state highways. Despite such differences, the requirement of traffic investigations before establishing city speed zones was almost universally reported, even though not required by legislation in 14 states.

School zones are a special case of speed zoning. Two-thirds of the states responding have established numerical speed limits for

school zones. The remainder either do not have school zone limits or failed to specify their nature. A value of 15 miles per hour is most frequently specified in state legislation, yet city returns frequently reported 20 and 25 miles per hour. The effective time period is either posted or conveyed to drivers through flashing signals or other devices in less than half the cities. Slightly over 40 percent of the cities specify the time by ordinance (sometimes in terms like "when children present") but fail to advise motorists directly. Between 12 and 17 percent of the cities, from large to small respectively, indicated that effective times are not defined.

### *Enforcement Methods*

While there are many methods of carrying out speed enforcement operations, two account for most of the effort. Pacing has always been the most widely used method and accounts for slightly more than half the national effort. Radar is used by nearly 90 percent of all cities, where it accounts for approximately half the enforcement effort. Time-distance methods are used by approximately 10 percent of the cities, but account for less than one-third of the effort in these cities. A new time-distance device has been introduced and is being employed or tested by many states. It accounts largely for the 41 percent of states reporting the use of time-distance methods. In these states, nevertheless, time-distance methods account for only about 13 percent of total speed enforcement.

Differences between departments on the use of open and concealed methods are very apparent. For example, 59 percent of the states use unmarked as well as distinctively marked cars in pacing speed violators. Only 30 percent of the cities use both types of vehicles in pacing. Most states make use of both marked and unmarked vehicles in radar enforcement, and only 14 percent use unmarked cars exclusively. But, 39 percent of the largest cities and over 20 percent of all others reported using unmarked cars exclusively. Cities are less likely than states to mix the use of marked and unmarked vehicles in radar enforcement, tending to use either one or the other.

Overall measures of open and concealed enforcement were obtained. One-quarter of the states, and 58 percent of the cities reported all enforcement to be exclusively open. While more states likely use concealed methods, the concealed enforcement amounts

to less than 20 percent of the total effort in those states. Cities using both open and concealed methods are in the minority, but concealed enforcement in these cities averages 40 percent of the total effort. Those that most use radar, on average, tend also to carry out the greatest proportions of concealed enforcement. In contrast to the reported majority of cities practicing entirely open enforcement, a majority of cities responding to the second questionnaire expressed a preference for using a combination of open and concealed methods.

Treatment of speed violators appears to be somewhat more uniform than many of the characteristics examined so far. First, almost all jurisdictions reported that tolerances are granted; i.e., certain increments of speed above the limit are allowed before enforcement actions are taken. Three-quarters of the states and nearly 90 percent of the cities disclosed that officers are given guidelines to aid their judgment of appropriate actions against violators. Cities are more liberal than states, as a rule, and small cities are more liberal than large cities. The reasons for allowing tolerances are: primarily, vehicle speedometer or measuring device error; secondarily, goodwill and court requirements; least important, unreasonable speed limits.

Nearly all states, and three-quarters of the cities, issue warnings for speed violations. Virtually all use citations, but more than 20 percent of the cities reportedly do not make arrests for speeding violations. Some explicitly stated so, others failed to indicate a response. About two-thirds of all cities make use of all three kinds of enforcement actions.

The relationship of speed enforcement to all traffic law enforcement may be indicated in two ways, by the proportion of total enforcement effort devoted to speeding, and by the proportion of speeding violations to all other hazardous moving violations. Using the first measure, a range from 10 to 70 percent of total enforcement devoted to speeding was reported. More than half the replies, however, were between 10 and 30 percent, with an average very close to 25 percent regardless of the city size grouping. The variability in the proportion of speeding to all other hazardous moving violations was even more extreme, ranging from 30 to 90 percent among the states, and from 0 to 100 percent in cities. State police agencies reported a highest mean value of 61 percent. The average

increased from 36 percent in the largest cities, to 50 percent in the smallest cities. Thus, while speed enforcement occupies roughly one-quarter of the time spent on traffic law enforcement, it accounts for nearly twice that proportion of the total violations.

Regional differences in methods are quite pronounced. Some of these are occasioned by legislation; for example, the requirement of open enforcement in West Coast states is responsible for many of the differences observed. Other differences may be a result of policy developments within regions. If methods of enforcement by region are compared, pacing is used most and radar least in West Coast communities. Out-of-town or out-of-state drivers are less likely to receive different treatment on the West Coast than elsewhere, but if the treatment is different, it is likely to be more lenient than elsewhere. Radar use is greatest in communities of the Mountains and Plains states. The practice of accepting bonds (usually driver's licenses) is most prevalent in the Midwest, and is unlikely elsewhere. The Southeastern region evidently makes the least use of warnings.

#### *Enforcement Policies and Attitudes*

The tendency for speed laws to be changed to absolute from prima facie limits is indicative of police preferences. Obviously, it is easier to obtain a court conviction by merely demonstrating that a speed was measured in excess of a given limit than by arguing that driving at the same speed constituted an unreasonable or imprudent act. Furthermore, with an absolute limit, it is easier to establish tolerance guidelines that can be applied regardless of conditions at the time of enforcement. A desire for consistency in enforcement was shown by the response to a question on enforceability of speed limits under very low volume conditions. Two-thirds of the replies suggested that a speed limit should be enforced regardless of conditions. If speed limits appeared sometimes unreasonable, this alone seemed inadequate as a significant reason for tolerances.

The objective of speed enforcement, according to most police departments, is to reduce accidents. High accident locations are universally the preferred location for speed enforcement, which supports the direct and indirect replies to the question on objectives. Few departments reported that the principal objective was to apprehend dangerous or reckless drivers, and only one city went so far as to suggest that speeding fines were "more than a passing

interest" in terms of revenue produced.

Only one in seven city respondents thought that the present level of speed enforcement was overemphasized. To the contrary, a majority of departments felt that speeding and all other traffic law enforcement activity should be increased. The proportion in favor of increased speed enforcement was not as high, however, as that in favor of enhanced efforts against drunken driving and improper passing.

A continuation of present policies on use of warnings, citations and arrests coupled with more intensive enforcement activity was the preferred response from both city and state agencies. Nearly half the states, but less than a quarter of the cities, would choose tougher citation and arrest policies. A few cities (8 to 15 percent of the total, depending on size) would make "greater use of warnings and reserve summonses and arrests only for most extreme cases."

Few city respondents felt that increased compliance might result from reducing the stigma of criminality in speeding violations. Nationwide, only one out of six cities supported such a change; regionally, the support varied from one-third of the cities in the East to none at all in the West. One city reported that there was no criminal stigma associated with speeding citations, but this view was not shared by many others. For example, one reply noted: "At the rate accidents are increasing, stiffer criminal action should be taken."

Several other characteristics bearing on public relations and enforcement policies were revealed. For example, many departments prefer open enforcement (presumably to act as a deterrent) and regard concealed enforcement principally as a means of apprehending "habitual violators." Public goodwill is cited as the next most significant justification for tolerance after allowing for speedometer, or measuring equipment errors. Many departments give consideration to nonresident violators, and issue warnings, if anything, on grounds of unfamiliarity, goodwill, and so on.

Speed enforcement activities seem generally to be well publicized. More than 80 percent of all departments, state or city, publicize the techniques in use. Newspaper accounts are the principal outlet, but radio and television are also used by states and major cities. Highway signs are employed by two-thirds of all cities. The times and locations of speed enforcement activity are made known to the

public in only about one-quarter to one-third of the cities, and the survey did not ascertain to what extent these might be prior or subsequent announcements.

### Conclusions

It is probably appropriate at this point to stress again the viewpoint from which this whole study was made. First, the objective was to survey the present situation in speed enforcement with a view to comparing it with a prior study and to developing a comprehensive review of existing practices. Insofar as the enforcement and court viewpoints are not fully represented, this study may be less valuable than it might otherwise be to police officials. But, insofar as the layman's and traffic engineer's viewpoints are represented, this study perhaps provides insights into speed enforcement that may be all too often overlooked by those closest to the problem. Regardless of the viewpoint, the conclusions appear to have universal validity as comments on present speed enforcement practices.

### *Regulations*

One aspect of the findings in this study was once commented on by author John Steinbeck:

"I wish any two states could get together on a speed limit. Just about the time you get used to fifty miles an hour you cross a state line and it's sixty-five. I wonder why they can't settle down and agree."<sup>1</sup>

Speed limit differences on highways of the same design and environmental conditions must surely seem absurd to all drivers with exposure to travel in different states. With today's volumes of business and recreational travel, the condition becomes increasingly obvious to more and more drivers. Disregard for regulations and contempt for the authorities that promulgate them seem an inevitable outgrowth.

More serious than speed limit differences for the same operating conditions is the difference in speed limit types. Drivers do not have the same rights in different cities and states. Even without arguing the point of whether *prima facie* or absolute limits are more appro-

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<sup>1</sup> John Steinbeck, "TRAVELS WITH CHARLEY In Search of America," The Viking Press, Inc., New York, 1962, p. 39.

appropriate, the fact that different speed laws exist in different communities seems clearly unreasonable. A driver who need not be convicted of a violation in one community may be automatically convicted in the next for the same act. The hazards of speeding are related to the circumstances under which it takes place, not to the happenstance of political boundaries. Penalties should be similarly related.

Some compensation for the legal differences between absolute and prima facie limits might be accomplished if absolute limits were set higher than prima facie limits, as this might tend to equalize the probabilities of receiving warnings or citations under either law. This was found to be the case in 1947 and is noted as a factor in setting speed limits in Appendix D. However, returns in the present survey showed that states with absolute limits averaged slightly lower rather than higher maximum speed limits.

The trend toward changing prima facie laws to absolute speed limit laws runs counter to other developments in America's highway-oriented society. For instance, the Institute of Traffic Engineers adopted a position in 1968 that "prima facie laws rather than absolute limits are considered more logical and equitable because blanket limits, and to a lesser extent speed zones, are of necessity based on conditions of traffic density and composition, weather and visibility which are continuously varying." Furthermore, to change from prima facie to absolute limits implies that the privilege of judging what is unreasonable and imprudent passes from the individual driver to the enforcing officer. Doubtless there are cases in which this is wise, but if the evidence of reduced accident rates can be believed, the total population of drivers is probably better qualified today than it has ever been to make such judgments. There can be no doubt that enforcement problems are simplified by absolute limits, but the protection and benefit of society as a whole should be the principal objective of speed regulation.

Diversity in speed regulations concerning day/night differences further compounds the possibility of public disrespect. The objective of lower night speed limits is presumably to lower speeds because of reduced visibility, and to reduce the higher accident rates. Yet the significance of reduced visibility is contingent in large measure on highway conditions: the problem on an Interstate System freeway is likely to be different from that on a two-lane secondary highway. While there are many intuitive reasons suggesting the value of

reduced nighttime limits, to what degree have these been subjected to serious evaluation and testing?

Varying speed limits for different vehicle types are predicated largely on the braking ability of heavy vehicles. Intuitively considering the occasional need for rapid deceleration, the practice appears justifiable. On the other hand, deliberately encouraging nonuniformity in traffic flow sets up frictions that are potential causes of accidents. Two-thirds of the states have such regulations, and the one-third that do not are interspersed among the others all over the nation. If the practice is justified in one state, it is surely justified in the next. Here again, the values and drawbacks would seem to merit evaluation. Movement in the direction of national uniformity could then proceed on a factual basis of demonstrated needs.

Contrasted with the preceding findings are two that are encouraging. First, virtually all local jurisdictions now require a traffic engineering investigation before speed zones are established. Obviously, any survey of conditions, no matter how limited, is likely to produce more realistic speed limits than legislative fiat. Although the investigation requirement is not part of all state laws, it is generally required by local ordinances. The second encouraging sign is that a greater degree of standardization in speed regulations is probably resulting from the evidently growing control of states over local authorities in speed limit establishment.

#### *Enforcement Methods and Practices*

The expressed primary objective of speed enforcement is to improve traffic safety; many officials commented to the effect that enforcement of speed limits leads to a reduction in accidents through a reduction in speeding. While it is probably true that a reduction in average travel speeds would reduce the severity if not the number of accidents, it is probably a reduction in the number of extremely fast or slow drivers that contributes to overall accident reduction. To the extent that speed enforcement encourages speed uniformity, then, it is probably accomplishing its primary purpose.

The mere diversity of methods now being used for speed enforcement suggests at least three benefits. First, there is more reliance on accurate speed measuring devices, which may also tend to increase the objectivity and reduce subjectivity in an enforcing officer's judgment, for example. Second, the "chronic" speeding violators

probably have less opportunity to remain undetected because of the flexibility of present day enforcement methods. Third, it seems likely that modern methods may permit more effective enforcement to be conducted with the same or fewer personnel.

Using both concealed and open methods would also seem to offer the best hope for effective speed enforcement. Open methods serve as reminders or deterrents to the majority of drivers. Concealed methods are most effective for intentional violators, and for critical high-accident locations, i.e., for selective enforcement activities. Most departments evidently feel that a combination of both methods is the best approach to speed enforcement.

Another encouraging sign is the broader use of officer judgment in taking action against violators. There is less likelihood of arbitrary action based on an arbitrary increment of speed over and above an arbitrarily established speed limit. Greater use of warnings, citations and arrests also provides enforcing officers with a greater range of actions against violators. Potentially, at least, procedures can be matched more appropriately to the severity of the violation.

Nearly two-thirds of the cities and states responding indicated that nonresident drivers were given different treatment from residents. Practices varied depending on location, but more than half indicated that out-of-town violators posted bond. Less than one-third reported that this class of violators would be immediately arraigned or fined. The practice of bonding plainly suggests different qualities of justice for the same offense. In a few cases, violators are not punished at all. But for all practical purposes in other situations, posting bond is the equivalent of an automatic fine. Greater uniformity in laws will best obviate the need for different levels of treatment, by reducing the possibilities of driver unfamiliarity with local regulations.

### *Policies*

Questions on the emphasis given to speed enforcement and the effect of a "criminal stigma" associated with it drew a considerable response. The feeling that greater emphasis should be given to speed enforcement is stronger at the city than at the state level. Most cities do not devote as much effort to traffic law enforcement as they would choose to, often because of manpower shortages. The response indicated that increases in speed enforcement were not as

much needed as increases in activity against improper passing and drunken driving. The state patrol responses favored a continuation of present enforcement levels with a more severe schedule of penalties, while most cities favored no increase in the severity of penalties.

The fact that 25 percent of the traffic enforcement effort accounts for perhaps double that proportion of recorded violations may not be significant. Yet, if the number of citations is used as a measure of effective enforcement, speed enforcement seems to attract a disproportionate effort compared, for example, with spot-checking vehicles for faulty equipment. Since no one has conclusively demonstrated the positive value of speed enforcement in accident reduction, it may be that (contrary to survey opinions) decrease in speed enforcement and an increase in more productive activities is warranted.

A division of opinion resulted from the question whether traffic violations should be removed from the police-courtroom atmosphere and treated through agencies such as a Motor Vehicle Department or licensing bureau. Some departments would choose to separate traffic enforcement from other police functions, but others stated strongly that traffic law enforcement is and should remain a police function. The principal fears over removing the criminal aura appeared to be that the value of encouraging voluntary compliance would be lost and that driver recognition of violations as potentially hazardous acts would be reduced. Whether the support for a change in approach stems from an awareness of oversevere treatment for minor violations or from an interest in alleviating police workloads cannot be guessed. It is significant that a number of police departments are interested in changing present procedures for treating minor traffic violations, and that New York City has prepared for such a change.

#### *Some Further Thoughts*

No other society in the world is as dependent upon or as conscious of the values inherent in highway transportation as that of the United States. Nor is any other society as highly advanced in the art of designing vehicles and highway systems, or in solving the problems arising from the usually disparate growth rates of vehicle registrations and adequate highway mileage. At the same time,

American vehicle operators are faced with a probably more bewildering array of regulations than citizens of any other nation. It is abundantly clear that nonstandardization is the prevailing characteristic.

There is plainly a need for greater effort in achieving uniformity in speed laws — not just to clear up confusions arising from unnecessary differences, but also to alleviate the cynicism and disrespect for laws, law-enforcement agencies and courts that must inevitably follow. There is a need for studies to demonstrate the appropriate types of laws. For example, is there really a justification for different day and night speed limits, or for lower speed limits applying to certain vehicle classes? Is there really a need for absolute or *prima facie* limits in addition to the basic speed law? Obviously, studies should examine conflicting statutes of different states and determine the appropriate solutions before any progress can be made toward uniformity.

Contrasting with the diversity of legislation is the widespread unanimity of police officials on the point that voluntary compliance is a primary goal of speed enforcement. Yet the tendency toward absolute limits seems to thwart this objective. "Perhaps it is time to face up to the fact that drivers respond better to advice than to regulation. This suggests that speed limits, as opposed to advisory speeds, may be outmoded."<sup>2</sup> In a society that increasingly demands individual rights and self-determination, the trend to transfer judgment of what is "reasonable and prudent" from the individual driver to the enforcement agency appears paradoxical. Yet this is implicit in the tendency to change from *prima facie* limits to absolute limits.

Finally, it seems necessary to examine the concept of criminality as applied to traffic violations. If no criminal relationship is currently attached to treatment of traffic violations, there may be good reason for shifting responsibilities from the courts to administrative agencies. Where there is an aspect of criminality associated with traffic violations, it should be reviewed. The presumed benefit, creating driver awareness of the serious nature of traffic violations, must be weighed against the evident risks, creating disrespect

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<sup>2</sup> Charles W. Prisk, "Improved Engineering — The Route to Highway Safety," 1965 Proceedings, Institute of Traffic Engineers, Boston, 1965.

because of inadequacies and inequities of present procedures.

Speed enforcement conditions have, for the most part, improved over the past twenty years. But the need for further changes in law, policy, practice, and attitude still exists.

## APPENDIX A

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APPENDIX B

QUESTIONNAIRE #1

SPEED ENFORCEMENT POLICIES

The following questionnaire is being sent to police officials of all states and principal cities to assemble information on current speed enforcement practices. Your cooperation in completing the form by checking and filling in the blanks, or by providing supplementary information where needed, will be most appreciated. Where the question is not applicable to your jurisdiction, please so indicate.

TITLE OF POLICE AGENCY \_\_\_\_\_

CITY OR STATE OF \_\_\_\_\_

I. LAWS AND REGULATIONS

A. Maximum Speed Limits (where different, please post truck limits in parentheses)

	Freeway or Controlled Access	Multilane without Access Control	Two-Lane without Access Control
1. By Area – Urban	_____( )	_____( )	_____( )
Suburban	_____( )	_____( )	_____( )
Rural	_____( )	_____( )	_____( )

2. Please note whether above are prima facie ( ) or absolute ( ).

What are values of absolute limit, if specified and if not shown above? \_\_\_\_\_

3. If "reasonable and proper" etc., please quote statute \_\_\_\_\_

4. Please indicate day/night differences if they exist. \_\_\_\_\_

B. Minimum Speed Limits (where different, please post truck limits in parentheses)

	Freeway or Controlled Access	Multilane without Access Control	Two-Lane without Access Control
By Area – Urban	_____( )	_____( )	_____( )
Suburban	_____( )	_____( )	_____( )
Rural	_____( )	_____( )	_____( )

If only general regulation (i.e. "not to impede"), please quote or attach statute \_\_\_\_\_

C. School Zone Speed Limits

Time periods when in effect

By Area – Urban	_____( )	_____
Suburban	_____( )	_____
Rural	_____( )	_____

Are zone locations posted with permanent warning signs?\_\_\_\_\_

Are speed limits indicated by portable signs ( ), permanent signs ( ), or both ( )?

Do signs indicate time period when limits are in effect?\_\_\_\_\_

**D. Other Speed Zones**

1. What agency is empowered to designate speed zones and limits within them?

State only\_\_\_\_\_ Local only\_\_\_\_\_ Both\_\_\_\_\_

Local with state approval\_\_\_\_\_ Other (please indicate)\_\_\_\_\_

2. Is an engineering investigation required before a speed zone is authorized?\_\_\_\_\_

3. Speed limits in zones may be lower ( ), higher ( ), or both higher or lower ( ) than speeds above.

**E. Advisory Speed Signs**

1. Are black-on-yellow advisory speed signs posted at hazardous locations?\_\_\_\_\_

2. Are locations and advisory speeds determined by a traffic engineering study?\_\_\_\_\_

3. Are the posted advisory speeds regarded as enforceable limits?\_\_\_\_\_

**II. ENFORCEMENT (Methods Employed)**

**A. Car following ( )**

1. Using distinctively identified car ( ) Using ordinary speedometer ( )

2. Using car with seal or emblem ( ) Using calibrated speedometer ( )

3. Using unmarked car ( ) How frequently are

4. Using motorcycle ( ) speedometers calibrated?\_\_\_\_\_

What is minimum following distance: in urban conditions ( ), suburban ( ), rural ( ), not specified ( )?

**B. Time-Distance Measurements ( )**

1. Stopwatch and road markings ( )

2. Mirror box or Enoscope ( )

3. Electrical timer and road tubes ( )

4. Aerial Surveillance and road markings ( )

5. Other (such as TV or VASCAR - explain)\_\_\_\_\_

**C. Radar ( )**

1. On marked vehicle ( ) In concealed position ( )

2. On unmarked vehicle ( ) Open to view ( )

3. Permanent installation ( )

**D. Other Techniques ( )** Please describe\_\_\_\_\_

**E. What is percent of enforcement effort by:**

1. Car-following ( %)

3. Radar ( %)

2. Time-distance ( %)

4. Other ( %)

**F. What is approximate percent of enforcement by:**

1. Concealed device or unmarked vehicle methods (   %)
2. Highly visible vehicle or open-to-view methods (   %)

**G. Is the public advised about**

1. Techniques in use (   )
2. Time periods of enforcement (   )
3. Particular locations under surveillance (   )

**H. How is the public advised of enforcement practices**

1. By radio or TV spot announcements (   )
2. By permanent highway signs (   )
3. Occasional newspaper reports of activity (   )
4. Not at all (   )

**III. APPREHENSION PRACTICES****A. Are tolerances above speed limit generally granted?\_\_\_\_\_**

Do they vary according to:

1. Numerical value of limit (   )
2. Type of area (   )
3. Judgment of officer (   )

**B. What additional speed above posted limit may be tolerated before:**

(Truck values in parentheses if different)

	Urban	Suburban	Rural
--	-------	----------	-------

- |                                       |               |               |               |
|---------------------------------------|---------------|---------------|---------------|
| 1. Violators are stopped and warned   | ___(   ) mph. | ___(   ) mph. | ___(   ) mph. |
| 2. Violators are given summons        | ___(   )      | ___(   )      | ___(   )      |
| 3. Violators are arrested on the spot | ___(   )      | ___(   )      | ___(   )      |

Please comment if other policies are in effect\_\_\_\_\_

**C. Why is tolerance allowed? Please rank 1, 2, 3, etc. in order of importance.**

- |                                             |                                           |
|---------------------------------------------|-------------------------------------------|
| 1. For violator speedometer errors_____     | 4. Court requirements for conviction_____ |
| 2. For speed-measurement device errors_____ | 5. Unreasonable speed limit_____          |
| 3. To create public goodwill_____           | 6. Other (Please explain)_____            |

**D. Arresting Officer Procedure**

1. Please check whether officer is empowered to give oral or written warning (   ), to give written summons (   ), to arrest (   ), to accept bond (   ).
2. Does procedure vary depending on whether violator is out-of-town or out-of-state resident?\_\_\_\_\_ Please explain if "yes"\_\_\_\_\_

**E. Approximately what percentages of all summonses are given in your jurisdiction for:**

1. Speeding (   %)
2. Other moving violations (   %)
3. Non-moving violations (   %)

**IV. TIME ALLOCATION OF PATROL ACTIVITIES**

Please indicate how vehicle patrol time is generally distributed — as percent of total:

- a. Nontraffic-related functions ( %)
- b. Accident investigation ( %)
- c. Providing assistance to disabled vehicles ( %)
- d. Speed regulation enforcement ( %)
- e. Spot-checking licenses, registrations, and vehicle conditions ( %)
- f. Patrolling or parking conspicuously to encourage voluntary driver compliance ( %)
- g. Observing high-accident or high-violation locations for other than speeding violations ( %)
- h. Other traffic related work such as traffic control ( %)

**QUESTIONNAIRE #2****SPEED ENFORCEMENT POLICY**

The following questionnaire is being sent to selected police officials in state, county, and city organizations to ascertain the present outlook and attitudes regarding traffic speed enforcement policies. Please feel free to comment where more comprehensive answers seem appropriate.

NAME OF RESPONDENT \_\_\_\_\_

AGENCY \_\_\_\_\_

(All answers will be treated in strictest confidence. No individual or organization will be identified without permission. We ask for your name only because we may need to contact you at some future time.)

1. Do you think that the present activity in your organization on speed enforcement:
  - a. Is adequate but overemphasized compared with enforcement against other moving violations?
  - b. Is not adequate compared with enforcement against other moving violations?
  - c. Needs to be increased along with all other traffic enforcement activities?
  - d. Should be reduced to free personnel for other activities?
  - e. Is about right at present level?

Comments: \_\_\_\_\_

2. Without changing the total manpower and time spent on traffic enforcement, do you think a change in emphasis by type of violation might contribute more to highway safety in your jurisdiction?

Enforcement activity should:  
 Decrease    Not Change    Increase

**Types of Moving Violations**

Drunken driving	_____	_____	_____
Operating a defective vehicle	_____	_____	_____
Disregarding a stop sign or signal	_____	_____	_____
Speeding	_____	_____	_____
Improper passing, turns, or following	_____	_____	_____
Other (Driving with suspended license, etc.)	_____	_____	_____

Comments: \_\_\_\_\_

3. Which do you feel is the most desirable procedure for speed enforcement?
  - a. Unmarked cars, concealed radar, aerial observation, etc.
  - b. Plainly marked cars, and conspicuous operations that drivers are aware of
  - c. A mixture, depending on time and place

Comments: \_\_\_\_\_

4. Choosing only one, would you say that speed enforcement in your jurisdiction is governed mainly by the objective of:
  - a. Increasing obedience to existing traffic regulations?
  - b. Apprehending dangerous or reckless drivers?
  - c. Encouraging safer driving?

Comments: \_\_\_\_\_

5. If speed limits are determined from vehicle speeds under average conditions, is it reasonable to enforce these limits under very low volume conditions (e.g. Sunday mornings or at 3:00 A.M.)?
  - a. No
  - b. Yes, but only if highway or other conditions are below average
  - c. Yes, regardless of traffic volumes or other conditions.

Comments: \_\_\_\_\_

6. Please rank the following in order of their importance in determining the locations where speed enforcement measures are carried out:

- a. Heavily traveled streets and highways \_\_\_\_\_
- b. High-accident locations \_\_\_\_\_
- c. Locations with history of many speed violations \_\_\_\_\_
- d. Complaints from residents, businesses, schools, etc. \_\_\_\_\_
- e. Other (Please note) \_\_\_\_\_

Comments: \_\_\_\_\_

7. What tendency in speed enforcement do you feel might lead to greater driver compliance with reasonable regulations?
  - a. Less emphasis on speed limit enforcement, in terms of manpower expended and summonses issued
  - b. More intensive enforcement at more locations and at all hours, maintaining present policy on warnings, summonses, and arrests
  - c. More intensive enforcement at more locations at all hours, with less tolerance and more severe penalties

- d. More intensive enforcement, but with greater use of warnings, and reserving summonses or arrests for only most extreme cases

Comments \_\_\_\_\_

8. Is there any feedback between speed enforcement activities and the authorities establishing speed limits, so that locations with excessive violation rates (or those with unreasonably high speed limits and no violations) are identified and studied for possible speed limit changes?

Comments \_\_\_\_\_

9. Do you think that greater compliance with reasonable regulations might result if speed enforcement were separated from "criminal stigma" of present police and court functions, and were administered instead, for example, by Motor Vehicle Departments?

Comments \_\_\_\_\_

10. Do you feel that traffic law enforcement training in your department
- a. Requires more emphasis within framework of existing training programs
  - b. Should receive more emphasis along with expansion in all training areas
  - c. Receives the proper emphasis at present
  - d. Is presently overemphasized at the expense of other training needs

Comments \_\_\_\_\_

## APPENDIX C

### EXCERPTS FROM UNIFORM VEHICLE CODE

#### ARTICLE VIII – SPEED RESTRICTIONS

##### § 11-801 – Basic rule

No person shall drive a vehicle at a speed greater than is reasonable and prudent under the conditions and having regard to the actual and potential hazards then existing. Consistent with the foregoing, every person shall drive at a safe and appropriate speed when approaching and crossing an intersection or railroad grade crossing, when approaching and going around a curve, when approaching a hill crest, when traveling upon any narrow or winding roadway, and when special hazards exist with respect to pedestrians or other traffic or by reason of weather or highway conditions. (Revised, 1968.)

##### § 11-801.1 – Maximum limits

Except when a special hazard exists that requires lower speed for compliance with § 11-801, the limits hereinafter specified or established as hereinafter authorized shall be maximum lawful speeds, and no person shall drive a vehicle at a speed in excess of such maximum limits. (Revised, 1968.)

1. Thirty miles per hour in any urban district;
2. Sixty miles per hour in other locations during the daytime;
3. Fifty-five miles per hour in such other locations during the nighttime.

Daytime means from a half hour before sunrise to a half hour after sunset. Nighttime means at any other hour.

The maximum speed limits set forth in this section may be altered as authorized in §§ 11-802 and 11-803. (Revised, 1956; repositioned, 1968.)

##### § 11-802 – Establishment of State speed zones

Whenever the (State highway commission) shall determine upon the basis of an engineering and traffic investigation that any maximum speed hereinbefore set forth is greater or less than is reasonable or safe under the conditions found to exist at any intersection or other place or upon any part of the State highway system, said (commission) may determine and declare a reasonable and safe maximum limit thereat, which shall be effective when appropriate signs giving notice thereof are erected. Such a maximum speed limit may be declared to be effective at all times or at such times as are indicated upon the said signs; and differing limits may be established for different times of day, different types of vehicles, varying weather conditions, and other factors bearing on safe speeds, which shall be effective when posted upon appropriate fixed or variable signs. (Revised, 1962.)

**§ 11-803 – When local authorities may and shall alter maximum limits**

(a) Whenever local authorities in their respective jurisdictions determine on the basis of an engineering and traffic investigation that the maximum speed permitted under this article is greater or less than is reasonable and safe under the conditions found to exist upon a highway or part of a highway, the local authority may determine and declare a reasonable and safe maximum limit thereon which:

1. Decreases the limit at intersections; or
2. Increases the limit within an urban district but not to more than 60 miles per hour during daytime or 55 miles per hour during nighttime; or
3. Decreases the limit outside an urban district, but not to less than 35 miles per hour.

(b) Local authorities in their respective jurisdictions shall determine by an engineering and traffic investigation the proper maximum speed for all arterial streets and shall declare a reasonable and safe maximum limit thereon which may be greater or less than the maximum speed permitted under this act for an urban district.

(c) Any altered limit established as hereinabove authorized shall be effective at all times or during hours of darkness or at other times as may be determined when appropriate signs giving notice thereof are erected upon such street or highway.

(d) Any alteration of maximum limits on State highways or extensions thereof in a municipality by local authorities shall not be effective until such alteration has been approved by the (State highway commission).

(e) Not more than six such alterations as hereinabove authorized shall be made per mile along a street or highway, except in the case of reduced limits at intersections, and the difference between adjacent limits shall not be more than 10 miles per hour. (Section revised, 1956.)

**§ 11-804 – Minimum speed regulation**

(a) No person shall drive a motor vehicle at such a slow speed as to impede the normal and reasonable movement of traffic except when reduced speed is necessary for safe operation or in compliance with law.

(b) Whenever the (State highway commission) or local authorities within their respective jurisdictions determine on the basis of an engineering and traffic investigation that slow speeds on any part of a highway consistently impede the normal and reasonable movement of traffic, the (commission) or such local authority may determine and declare a minimum speed limit below which no person shall drive a vehicle except when necessary for safe operation or in compliance with law. (Section revised, 1954.)

## APPENDIX D

### AN INFORMATIONAL REPORT ON SPEED ZONING

*This report was approved by the Technical Council of the Institute of Traffic Engineers on April 28, 1961, for publication as an informational report. It was developed over a period of years by Technical Committee 3-C of the Institute, under successive chairmanships of J. E. P. Darrell, Harold G. Eckhardt and William L. Carson, with further revisions by the Technical Council.*

*It is the belief of the Technical Council that this report presents a valid statement of speed zoning principles and of the factors to be recognized in their application. While the degree of validity attached to all of the items mentioned in the report has not been established through use, speed zoning experience to date indicates that each of the individual checks suggested is just and proper. Additional research through controlled application of these checks is needed in urban, rural and intermediate areas to determine more fully their validity and usefulness.*

#### Why Control Speed?

The operation of any motor vehicle involves the element of speed. For a given road or street a speed that is proper at one time may be grossly improper at another time because of changed conditions. The maximum safe speed at any location will vary as traffic, road, weather, light and other significant conditions change. Speed excessive for prevailing conditions, rather than high speed per se, is thus the principal factor to be considered in controlling maximum speeds of vehicles for improved traffic safety. An unsafe speed can actually be a very low one in terms of miles per hour, while relatively high speeds can be safe under favorable circumstances. Although accidents involving high vehicle speeds tend to be serious ones, some of the lowest fatal and nonfatal traffic accident rates are found on highways carrying traffic at high average speeds.

Scientific control of speed is important to both the safety and efficiency of traffic movements. It is advisable, therefore, that the authority and responsibility for speed zoning be delegated to traffic engineers and that determinations of speed control measures be on the basis of an engineering study and investigation. Although its effect is difficult to determine exactly, proper speed zoning can improve both the overall safety and efficiency of traffic flow — intrinsic elements of traffic engineering.

As is true in other aspects of traffic control, it is highly desirable that there be uniformity in the fundamentals followed in speed regulation. The meaning of speed limits, the principles and practices followed in their application and the requirements placed upon drivers who must observe them, should be consistent among various jurisdictions. This does not prevent adapting specific speed limits to conditions existing at the locations involved.

Interest in the improvement and standardization of speed zoning practices and in the development of warrants for zoning extends over a number of years. Various committees in a number of organizations have attempted to collect, analyze and summarize information from available sources with the hope of developing effective zoning techniques and of providing persons responsible for speed control measures with some helpful guides and basic rules. Notwithstanding this general interest and endeavor, there is still no generally accepted standard, and practices in states and cities continue to vary.

### *Speed Control Laws*

While there is considerable variance among states and municipalities as to the extent and nature of their speed regulations, there are three principal types of speed control laws:

1. *Basic Speed Rule.* Every state has a statute covering what is known as the "basic speed rule." The substance of such laws is that a driver shall always operate his vehicle at a speed that is reasonable and prudent under existing conditions, taking due account of all actual and potential hazards. In a few states this is the only general speed law governing daytime passenger car travel on rural highways.

2. *Prima Facie Speed Limits.* The basic speed rule is supplemented in almost one-half of the states by laws establishing, and/or providing for the establishment of, prima facie speed limits. This type of speed control law provides that any vehicle speed in excess of the established numerical limit is prima facie evidence that the driver is not operating his vehicle at a reasonable and prudent speed. Such laws give a person arrested for violating a speed limit the right to prove that the speed at which he was driving was not improper under existing conditions. Thus, prima facie limits allow for the fact that no particular rate of speed is necessarily safe or unsafe at all times. Principal disadvantages of this type of speed limit are that its meaning often is not understood, and enforcement is comparatively difficult.

3. *Absolute Speed Limits.* In just over half the states the basic speed rule is supplemented by laws establishing, and/or providing for the establishment of absolute (or fixed) speed limits. It is illegal to exceed speed limits of this type under any condition at any time. No determination is left to police or judicial officials as to whether or not the driver was proceeding at a safe speed when he exceeded the speed limit.

Advantages of absolute speed limits include their definiteness of meaning and the comparative ease with which the conviction of violators may be secured. Absolute speed limits tend to be set somewhat higher than prima facie limits as a result of their nature and requirements.

The nature and provisions of speed laws vary widely among states. Predominant speed limits are 60-65 miles per hour for daytime passenger car travel on rural roads, 25-30 miles per hour in residential districts, and 20-25 miles per hour in business districts. Over thirty states have established lower daytime speed limits on rural roads for trucks, while almost twenty states have reduced speed limits for nighttime travel. About half of the states now

have laws providing for the establishment of minimum speed limits, and this type of speed control is being utilized on certain roads and streets in about one-fourth of the states.

Although all states and the municipalities of all but a few states have some type of speed zoning authority, extensive differences exist in the degree and character of such authority. This is particularly true with regard to the respective responsibilities of states and municipalities in the establishment of speed limits on state highways in urban areas.

It is evident that no common pattern for speed regulation exists on the basis of current laws. It should be noted, however, that an increasing number of states and municipalities are adopting speed control laws with provisions that are consistent with those set forth in the Uniform Vehicle Code (Article VIII) and the Model Traffic Ordinance (Article V).\*

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\* (The preceding discussion describes conditions in 1961.)

### Speed Zoning

The speed laws set forth in the previous section cannot possibly cover every condition to be found on all the streets and highways of a state or city. Therefore, it becomes necessary in many instances to modify the speed limits set forth in the statutes.

*As used in this report, speed zoning will be defined as the process of determining whether or not the statutory limit is appropriate for a section of roadway and, if not, what the appropriate maximum speed limit should be. Only maximum speed limits will be discussed — minimum speed limits are considered to be a related but separate topic.*

#### Basic Principles

The following basic principles relative to speed control and zoning have been evolved from speed zoning programs and studies:

1. Speed control is an important element in traffic movement and regulation.
2. Not all streets and roads need to be zoned for speed. The average driver will not submit voluntarily to needless speed restriction. Over-emphasis in the application of speed zoning will decrease the degree of observance of speed regulations in the same manner that excessive or unwarranted applications of other types of control measures tend to decrease the quality of observance.
3. Speed zoning always should be on the basis of a traffic engineering study. No one is qualified to arbitrarily establish a proper speed limit without the benefit of engineering information and data. The utilization of engineering principles and procedures in vehicle speed control will improve traffic operation, encourage better and more uniform driving practices, and increase the safety of traffic movement. Speed zoning should never be applied merely for restrictive purposes.

4. The number and type of factors that must be taken into account in speed zoning will depend to some extent upon the facility and location involved. The factors deserving close attention in the establishment of speed limits on conventional city streets, for example, may not be the same as those to be considered in determining speed limits on rural expressways.

5. The maximum safe speed at any location will vary as traffic, weather, light, pavement surface, and other conditions and factors change.

6. Speed limits must be reasonable if their potential value is to be realized. An unrealistic limit is usually worse than no limit. Unrealistic speed limits often cause an increase in intervehicular collisions or induce other problems. In some cases where careful before and after studies have been made it has been shown that traffic accident rates have been reduced by raising or lowering a speed limit to a realistic level.

7. Speed limits are of little value unless observed. Rarely can they be enforced if established below what the majority of drivers consider to be a reasonable limit. The preponderant majority of drivers travel at a reasonable and safe speed. Their speed selections established the speed pattern and give an unmistakable indication of the desirable and enforceable speed limit for the section of highway involved.

8. The posting of the appropriate regulatory signs is important to the effectiveness of speed zoning. The design, use, and placement of such signs should be uniform and in conformity to the provisions of the Manual on Uniform Traffic Control Devices.

### *Factors to be Considered*

There are certain factors that should be reviewed in any study to ascertain the advisability of establishing a speed zone and the maximum speed limit to be applied therein or modify the speed limit in an existing speed zone. While the relative importance of these factors and the degree to which some of them should be investigated will vary from one location to another, each needs to be considered if the study is to provide a sound basis for speed regulation.

#### 1. Prevailing Vehicle Speeds

As previously noted, speed limits must be generally consistent with speeds that drivers feel are safe and proper if speed zoning is to prove effective. The prevailing speeds of traffic on the section of highway involved are the most important, though not necessarily the determinative, factor in speed zoning. To a considerable extent, driver-selected speeds reflect the other factors involved in speed zoning. Since they are so-influenced, actual vehicle speeds constitute an index of most of the elements to be considered in a specific speed zoning project. Unless the accident experience, or some other circumstance unknown or not evident to most drivers is critical, prevailing speeds can be used reliably as the principal basis in speed limit determinations. The speed zoning procedure should, however, include an analysis of the various elements affecting safe speeds and a judgment as to whether or not they require a speed limit different from that based on prevailing vehicle speeds.

Three measures of actual speeds are:

a. 85 Percentile Speed<sup>1</sup>

The criterion most generally used and preferred in determining the specific maximum speed limit from speed studies is the 85 percentile speed—the speed at or below which 85% of the vehicles travel—determined from spot studies. Numerous and extensive “before-and-after” studies have substantiated the general propriety and value of this criterion, and it is being utilized increasingly in the speed zoning programs of states and municipalities.

b. Pace<sup>1</sup>

Another criterion that has been used successfully in selecting a proper maximum speed limit, usually in conjunction with the 85 percentile speed, is the “pace.” The pace is that range of speed, generally a 10 miles-per-hour range, in which more vehicles travel than in any other like range of speed. It also can be determined from spot speed studies.

c. Average Test Run Speed<sup>2</sup>

Unlike the two previous studies which determine motor vehicle speeds at selected locations, a test run can be used to determine speeds along an entire route. Such information is useful as a check on the spot speeds and in determining the break points for changes in speed limits.

## 2. Physical Features

The physical features of the section of highway should be considered in determining whether or not a speed zone is desirable, and if so what the numerical limits should be.

These features group themselves in several categories as follows:

a. Design Speed

The design speed of a highway is that speed at which vehicles can travel during times when the design of the highway is the controlling factor. If at all possible, this speed should be determined for the section of highway being studied.

When a new highway is built, the design speed will determine the values used for the following features: (1) Widths of roadways, lanes and shoulders; (2) Degree and superelevation of curves; (3) Length and steepness of grades; (4) Sight distance required for safe stopping and passing.

A study of these factors on the plans from which a highway was built may reveal the design speed used. On the other hand, plans for many old highways are no longer available or were built to standards now obsolete. If this is the case, the measurable physical features described below offer a guide to the appropriate maximum speed which should be allowed.

1. For information on how to make studies to determine “85 Percentile Speed” and “Pace” see the *TRAFFIC ENGINEERING HANDBOOK* and/or the *MANUAL OF TRAFFIC ENGINEERING STUDIES*.

2. The average test run speed is most simply determined by using a passenger car with a calibrated speedometer from which the speed is recorded at 0.1 mile intervals over the length of the highway being studied. Runs are made under light traffic conditions to insure that the conditions of the road and its environment govern the driver's speed rather than traffic conditions. Two runs in each direction are generally sufficient.

### b. Measurable Physical Features

The features outlined below may be measured in the field. An evaluation of these will provide an indication of whether or not the speed limit determined under "1" is acceptable for the section of highway being studied.

#### 1) Maximum comfortable speed on curves.

This speed is determined by use of a ball bank indicator.<sup>3</sup>

On roads with many curves the speeds determined in this manner may determine the speed limit. For isolated sharp curves Advisory Speed Signs which are *not* speed limits will generally be used.

#### 2) Spacing of Intersections

Roadways with many intersections require lower speed limits because of the increased number of potential conflicts. The relationship of these to the appropriate speed limit is indicated on the "Check Sheet for Speed Zones". Public roads intersecting the roadway being studied are considered to be intersections.

#### 3) Number of Roadside Businesses per Mile

Business establishments with access increase the roadside friction encountered by traffic using a highway. (Residential driveways do so also but to a much lesser degree.) The relationship of these to the appropriate speed is indicated on the "Check Sheet for Speed Zones."

### c. Roadway Surface Characteristics and Conditions

The maximum safe speed for a particular highway or street will be affected by the surface conditions of the roadway. It is not possible at the present time to specify how much a speed limit should be lowered when one or more of the factors listed below are adverse. Also some of these factors are subject to change depending on weather conditions or time of year. Nevertheless, the following factors should be reviewed when a judgment is made on whether or not a proposed maximum speed limit is appropriate:

1) Slipperiness of pavement; 2) Roughness of pavement; 3) Presence of transverse dips and bumps; 4) Presence and condition of shoulders; 5) Presence and width of median.

Particular care should be taken to see whether or not these factors are reflected in the speed studies made.

## 3. Accident Experience

Accidents are a primary generator of public demands to establish or lower speed limits. Common assumptions among lay persons are that the lowering of the speed limit will reduce vehicle speeds and that slower vehicle speeds will result in fewer accidents. There is much evidence that neither of these beliefs necessarily holds true. On the other hand, collision frequencies and accident rates have been reduced by raising speed limits to realistic levels.

Despite the present inability to foretell the exact effect a particular speed limit will have on accidents, the accident record of the section of road being

<sup>3</sup> The maximum speed at which a curve may be traveled comfortably is indicated by a reading of 10° on a ball bank indicator. The speed at which the ball bank indicator reads 10° is determined by several passes in each direction with a test car.

considered should be reviewed. The review should encompass a check of the frequency, severity type and cause of accidents occurring on the section of highway involved — *with particular attention to those accidents in which unreasonable speeds appear to have been a causative or severity factor.* Where adequate data are available, insight into the overall operation of traffic can be gained from such a study. Furthermore, an opportunity is provided for before and after study of the influence of a realistic speed limit on the accident picture.

#### 4. Traffic Characteristics and Control

Account should be taken of any traffic characteristics, conditions, or controls that are present on the section of roadway being studied. Again it is not possible at present to determine the exact effect of these factors. However, the following factors should be considered when determining the appropriateness of a proposed speed limit.

- a. Traffic volumes, both off-peak and peak, as related to highway capacity, density and headways. Speed differentials may not be objectionable on low volume highways, but they become more hazardous as volumes increase.
- b. Parking, loading and other vehicle operations adjacent to travel lanes.
- c. Commercial vehicles in traffic stream.
- d. Turn movements and controls.
- e. Traffic signals and other control devices or systems that may importantly affect or be affected by vehicle speeds.
- f. The extent and frequency of vehicle-pedestrian conflicts considering pedestrian movements alongside the pavement as well as to those made across the highway.

In regard to pedestrians, speed restrictions which are otherwise unwarranted should not be established for pedestrian protection if vehicle-pedestrian interferences can be treated successfully by physical separation or by other types of control measures. Speed limits alone seldom can improve a pedestrian safety problem.

#### *Area Speed Limits*

It is frequently advisable to establish speed limits on an area basis rather than on an individual highway basis. Many jurisdictions have laws setting forth specific speed limits on all roads and streets in areas or districts of a particular class. Localities where speed zoning of this nature often is desirable include: 1) Business and commercial districts; 2) Residential districts; 3) Industrial areas; 4) Large school and other public institution areas; 5) Park and recreational areas; 6) Public assembly areas; 7) Areas of much more intense development than surrounding or adjacent districts.

Drivers will expect and accept greater speed restrictions in the above areas. The factors to be considered in speed zoning on an area basis are identical to those used in speed zoning along individual highways. However,

the elements and conditions involved will naturally vary within the area, and more judgment will be required in order to determine a speed limit that is proper for the area as a whole. Such speed limits should not preclude the establishment of higher or lower speed limits on individual streets within the area as warranted. The presence of a school, health institution, series of roadside establishments, etc., may be factors which will merit individual consideration.

When speed limit selections are affected by the type of locality or place involved, it is advisable to consider whether or not the speed restrictions need to be in effect at all times or only during certain seasons or times.

### Evaluation of Need For a Speed Zone

Locations where there is a need for a speed zone will probably become apparent to the engineer initially because one of the following conditions exist.

1. A road or street has design standards considerably higher or lower than those of most other highways in the state or community involved.
2. The roadway is a transitional stretch of highway between sparsely developed and highly-built-up areas.
3. The roadway has sections on which unusual conditions exist or other factors are present which make it advisable to establish speed limits different from those applicable under general laws.

The above listed items are mainly intuitive on the part of the engineer — being in large measure a molding together in his mind of all the principles and factors previously discussed. Most of these factors cannot be isolated and measured individually. However, study has revealed that several of the factors which are measurable reflect the need for a speed zone.

It is impractical to change posted speed limits at intervals of less than 1,000 feet. This element is reflected in the minimum length of a speed zone which is permitted with the length increasing as speed increases (Part I of "Check Sheet").

The first part of the "Check Sheet" which follows will help the engineer to make an evaluation of the measurable conditions along the highway being considered for speed zoning. If three or more of the stated conditions are met, a speed zone which has a maximum limit as indicated may be appropriate. The value of the maximum limit thus determined is *only a preliminary estimate*. The actual speed pattern must be measured in the field and the conditions set forth on the second part of the "Check Sheet" must be met.

#### *Value of the Speed Limit*

Measurement of the actual vehicular speeds is a necessary part of the determination of the speed limit which is to be set. Spot speed studies are made to determine the "85 percentile speed" and the "pace." Then as a check on the speed values thus determined, the "average test run speed" should be found.

Both the "85 percentile speed" and the "pace" are fundamental criteria

in determining the proper numerical value of maximum speed limits. Maximum speed limits based on these criteria are usually reasonable by any standard, relatively easy to enforce, normally successful in obtaining a high degree of voluntary observance by motorists, effective in limiting the excessively fast drivers without placing unnecessary restrictions on others, and conducive to smoother traffic flow — mainly through reductions in passing maneuvers.

The upper limit of the "pace" usually approximates the "85" percentile speed" and is seldom above or much below it. The establishment of a maximum speed limit lower than the "pace," or substantially below the "85 percentile speed," frequently has resulted in a reduction in the percentage of vehicles traveling within the "pace." For this reason, the maximum speed limit selected should not be more than 3 miles per hour below the upper limit of the 10 m.p.h. "pace" or the "85 percentile speed" whichever is the lower, unless some compelling circumstance exists.

When the above values have been determined a more accurate estimate of the speed limit to be set can be found by entering the second part of the "Check Sheet." The speed limit which satisfies two or more of the conditions mentioned is the limit which should be set for the speed zone.

Only under the most extenuating of circumstances should a speed limit be set lower than the one determined above. Any alteration of the limit should be based on the professional judgment of the engineer who fully understands the interrelation and interaction of the many as yet unmeasurable factors involved in speed zoning. In most instances, however, the maximum limits determined by making the studies listed on the "Check Sheet" are practicable and present a sound basis for speed zoning.

### Conclusion

Vehicle speed control is an important factor in the safety and efficiency of traffic movements and should, therefore, be of professional concern to traffic engineers. An engineering approach, utilizing proven speed zoning practices, is needed in determining reasonable and proper speed limits for roads and streets. Periodic reevaluation of speed limits and their property is advisable, particularly when there are major changes in the factors affecting safe vehicle speeds.

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SPEED ZONING

Check Sheet for Speed Zones

(PART I)

<i>Highway Conditions (3 or more must be satisfied)</i>				<i>Preliminary Estimate of Maximum Speed Limit</i>
<i>Design Speed</i>	<i>Minimum length of proposed zone equals or exceeds*</i>	<i>Average distance between intersections equals or exceeds</i>	<i>Number of roadside businesses (with access) does not exceed</i>	
<i>MPH</i>	<i>MILES</i>	<i>FEET</i>	<i>PER MILE</i>	
20	0.2	No Minimum	No Maximum	20
30	0.2	No Minimum	No Maximum	30
40	0.3	125	8	40
50	0.5	250	6	50
60	0.5	500	4	60
70	—	1000	1	70

\* Consideration is to be given to the number of isolated sharp curves which require posting with Advisory Speed signs. If sharp curves occur at intervals of less than these figures, the speed limit may be determined by the curves.

(PART II)

<i>Speed Pattern (2 or more must be satisfied)</i>			<i>Maximum Proposed Speed Limit</i>
<i>"85 percentile speed" between</i>	<i>Both limits of "Pace" between</i>	<i>Average test run speed equals or exceeds</i>	
<i>MPH</i>	<i>MPH</i>	<i>MPH</i>	
under 22.5	under 25	17.5	20
22.5 - 27.5	11 - 29	22.5	25
27.5 - 32.5	16 - 34	27.5	30
32.5 - 37.5	21 - 39	32.5	35
37.5 - 42.5	26 - 44	37.5	40
42.5 - 47.5	31 - 49	42.5	45
47.5 - 52.5	36 - 54	47.5	50
52.5 - 57.5	41 - 59	52.5	55
57.5 - 62.5	46 - 64	57.5	60
62.5 - 67.5	51 - 66	62.5	65
67.5 - or over	over 55	67.5	70

## REPORT ON SPEED ENFORCEMENT METHOD

### *VASCAR Device Seen as Speeders' Nemesis; Now Used by N. Carolina State Police*

For many involved in the promotion of highway safety, a major concern has been the enforcement of speed laws. The most common enforcement techniques used in the past have been the electric speed watch, radar, and speedometer tracking. Late last year the North Carolina Highway Patrol began using Visual Average Speed Computer and Recorder (VASCAR), a new device designed to calculate the speed of a moving vehicle.

The VASCAR unit is mounted in the patrolman's car and consists of a distance recorder, a timing mechanism, and an indicator arm. By measuring the distance between two fixed markers on the highway and recording the time taken by a vehicle to traverse the distance, the VASCAR unit mechanically computes the speed of the target car, which can be read easily from a dial on the unit. Accurate measurements depends on skilled choice of reference points, which can be pavement markings, shadows, or objects on the roadside.

When the target car passes a particular reference point, e.g., a bridge, sign post, tree, or prominent mark in the pavement, the VASCAR operator turns on the time switch. When the target car passes a second reference point, the time switch is turned off. The clocking car obtains a distance measure by operating the distance switch as it passes the same reference points. (See figure.) If the clocking car is stationary, then it is necessary that the distance measurement be predetermined and locked into the machine before the time measurement is taken.

Once both the distance measurement and the time measurement have been recorded by the machine, the unit automatically translates them into a measure of speed on the dial of the VASCAR unit.

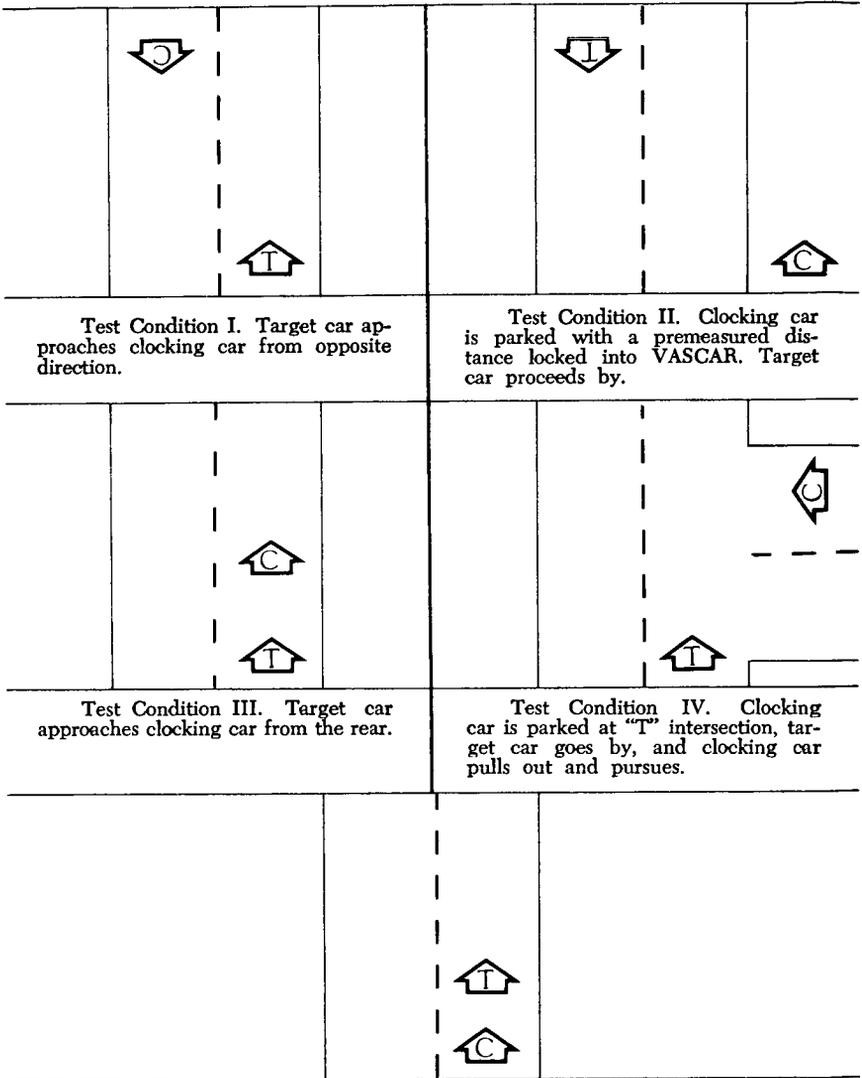
The University of North Carolina Safety Research Center (HSRC) observed the testing of five North Carolina Highway Patrol troopers, the first group in the state to receive certification allowing them to use VASCAR as a basis for arrests for speed violations. In addition, HSRC ran tests of its own under the same conditions. The certification test requires a trooper to measure the speed of a moving vehicle for five trials in each of five basic maneuvers; in none of the 25 trials may his error exceed 2 mph. HSRC's operator performed ten trials in each of the five maneuvers; his performance nearly equaled the excellent performance of the state troopers. The average error for all the operators over all the conditions (175 trials in all) was 0.65 mph.

While errors in reaction time or depth perception could cause difficulty in the use of VASCAR, the high degree of accuracy displayed by the six men who were tested indicates that with proper training and careful certification VASCAR can be used effectively to measure speed.

For further information about the VASCAR device, write the University of North Carolina Highway Safety Research Center, Chapel Hill, North Carolina.

Source: Highway Research News, Number 31, Spring 1968,  
Highway Research Board, Washington, D. C., pp. 5-7.

SPEED ENFORCEMENT



Test Condition V.  
Clocking car follows target car.

## SURVEY DATA SUMMARIES

TABLE I  
 MAXIMUM SPEED LIMITS REPORTED BY STATES  
 BY HIGHWAY TYPE AND LOCATION

<i>Speed Limit</i>	<i>FREEWAY</i>			<i>MULTILANE</i>			<i>TWO-LANE</i>		
	<i>Urban</i>	<i>Sub-urban</i>	<i>Rural</i>	<i>Urban</i>	<i>Sub-urban</i>	<i>Rural</i>	<i>Urban</i>	<i>Sub-urban</i>	<i>Rural</i>
<i>PRIMA FACIE</i>									
20	---	---	---	---	---	---	---	---	---
25	---	---	---	2	2	---	2	2	---
30	1	1	---	3	1	---	3	1	---
35	---	---	---	1	---	---	1	---	---
40	---	---	---	---	---	---	---	---	---
45	1	1	---	1	1	---	2	1	---
50	1	---	---	1	1	---	---	1	---
55	2	1	---	---	---	1	---	1	1
60	1	2	1	1	1	3	2	2	5
65	1	1	---	---	1	4	---	---	5
70	3	3	8	1	1	3	---	---	1
75	---	1	2	---	---	1	---	---	---
<i>ABSOLUTE</i>									
20	---	---	---	1	---	---	1	---	---
25	---	---	---	3	1	---	3	1	---
30	1	---	---	3	2	---	3	3	---
35	---	---	---	2	4	---	2	4	---
40	---	---	---	---	---	---	---	---	---
45	1	---	---	---	1	---	---	1	---
50	2	1	---	---	---	---	---	---	2
55	---	---	---	---	---	1	1	1	3
60	1	3	1	1	2	6	---	1	4
65	5	6	6	1	2	5	1	1	6
70	---	1	8	---	---	6	---	---	3
75	---	---	3	---	---	---	---	---	---

TABLE II - A

SUMMARY OF CITY SPEED LIMIT VALUES BY HIGHWAY TYPE AND CITY SIZE

	CITIES OVER 100M									CITIES 50-100M									CITIES 25-50M									ALL CITIES																				
	Freeway			Multilane			Two-lane			Freeway			Multilane			Two-lane			Freeway			Multilane			Two-lane			Freeway			Multilane			Two-lane														
	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R						
20						1						1			2																																	
25				10	4		18	5		3			12	3	1	25	4	2	1			6			11	5	1	4			28	7	1	54	14		3											
30	3			7	3	2	24	13	3	2			6	4		17	12		2			3	2		5	3	1	7			16	9	2	46	28		4											
35				16	3	1	6	6	2	4	4		21	8	1	14	14		3	1		5	6		7	4	1	7	5		42	17	2	27	24		3											
40	2	2		6	4	1	3	1	4	3	2		5	5	2	1	4	4		1		2	1	1	1			5	5		13	10	4	5	5	8												
45	2			5	7	3	1	3		3			1	3	11	3	3	5		1		1	4	2		2	2	5	1	1	9	22	8	4	8	7												
50	9	1		4	4	4	1	2	2	6	2		6	3	2	1	1	2	1	2	1	2	1	1				16	5	1	12	8	7	2	3	4												
55	8	4	2	1	3	1		1	1	5	3			3			3			1			1					13	7	3	1	4	4															
60	9	7	2	1		2		3	2	5	2	1	4		1	4	2	2	2	1		1				13	14	6	3	7	1	1	7															
65	12	11	10	1	3	13	1	3	13	13	10	10	2	2	5	3	2	3	1	2				2				2	26	23	20	3	5	20	4	5	18											
70	6	7	10	2	3	4	1	1	1	5	3	10	1	1	2				1	2	2	3						13	12	23	3	4	6	1	1	2												
75	1	1	2							1	1	1																2	2	3																		
	52	33	26	53	34	31	56	35	29	47	30	24	57	37	23	65	41	24	12	11	7	20	15	7	26	14	7	111	74	57	130	86	61	147	90	60												

TABLE II - B

ABSOLUTE SPEED LIMIT BY HIGHWAY TYPE BY SIZE OF CITY

	CITIES OVER 100M									CITIES 50-100M									CITIES 25-50M									ALL CITIES																				
	Freeway			Multilane			Two-lane			Freeway			Multilane			Two-lane			Freeway			Multilane			Two-lane			Freeway			Multilane			Two-lane														
	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R	U	S	R						
20						1																																										
25				1			6	1					3			4				1		2			3	2		1			6						13	3										
30	1			5	1	1	11	5	1	1			3	2		7	4			1		1			1	1		3			9	3	1	19	10	1												
35				6	1			3		1	1		2	1		3	3		1	1			3		2	2		2	2		8	5		5	8													
40	1	1		2	2			2	1				2	3	1	1	2	2		1			1	1		1		2	2		5	6	1	1	2	4												
45	1			3	6	1	1	3		1			2	2		2	1	2				1						2			5	9	1	3	5	2												
50	3			1		1	1	1	1				3	1	2		1		1	1	1		1	1				4	2	1	5	1	3	1	2													
55	2			1	2	1		1	1	2	1			3			2			1			1					4	1	1	1	3	4		1	3												
60	3	2		1		1		2	2	3	1	1		1		1	1						1					5	5	1	3	2		1	3													
65	4	5	4	1	2	7	1	2	7	6	4	5	1	1	2					1				2				2	10	10	9	2	2	10	3	2	9											
70	3	5	7	1	2	3	1	1	1	3	1	3		1	1				1	1	1							7	7	11	1	3	4	1	1	1												
75	1	1	1							1																		1	2	1																		
	19	14	12	22	16	15	22	16	15	18	12	9	17	10	9	19	11	8	4	5	3	6	6	2	8	6	2	41	31	24	45	32	26	49	33	25												





TABLE III  
 MINIMUM SPEED LIMITS  
 BY ROUTE TYPE AND AREA

(Number Reporting Indicated Limit)

Speed Limit (mph)	FREEWAY			MULTILANE			TWO-LANE		
	Urban	Sub-urban	Rural	Urban	Sub-urban	Rural	Urban	Sub-urban	Rural
30	---	---	1	---	---	1	---	---	1
35	---	---	---	---	---	---	---	---	---
40	5	6	7	1	1	1	1	1	1
45	5	5	5	---	---	---	---	---	---
50	---	---	---	---	---	---	---	---	---
55	---	1	1	9	---	---	---	---	---
General	9	9	9	13	13	13	13	13	13

Source: State Code excerpts returned with questionnaires

## APPENDIX F

TABLE IV - A  
WARNING TOLERANCES

*Percent Granting Indicated Tolerance*

<i>Group</i>	<i>Tolerance Permitted</i>	<i>Urban Conditions</i>	<i>Suburban Conditions</i>	<i>Rural Conditions</i>
States	None	0	0	0
	1-5 mph	100	100	83
	6-10	0	0	17
	11-15	0	0	0
Cities Over 100M	None	3	0	0
	1-5	77	69	71
	6-10	20	31	29
	11-15	0	0	0
Cities 50-100M	None	2	0	0
	1-5	71	70	67
	6-10	27	30	33
	11-15	0	0	0
Cities 25-50M	None	0	10	0
	1-5	63	70	0
	6-10	26	0	100
	11-15	11	20	0

TABLE IV - B  
SUMMONS TOLERANCES

*Percent Granting Indicated Tolerance*

<i>Group</i>	<i>Tolerance Permitted</i>	<i>Urban Conditions</i>	<i>Suburban Conditions</i>	<i>Rural Conditions</i>
States	5 mph	50	43	37
	6-10	50	57	63
	11-15	0	0	0
Cities Over 100M	5	28	29	36
	6-10	62	58	64
	11-15	10	13	0
Cities 50-100M	5	25	16	18
	6-10	63	72	55
	11-15	12	12	27
Cities 25-50M	5	18	27	0
	6-10	59	46	75
	11-15	23	27	25

TABLE IV - C  
ARREST TOLERANCES

*Percent Granting Indicated Tolerance*

<i>Group</i>	<i>Tolerance Permitted</i>	<i>Urban Conditions</i>	<i>Suburban Conditions</i>	<i>Rural Conditions</i>
States	5 mph	67	67	67
	6-10	0	0	0
	11-15	0	0	0
	16-20	0	0	0
	21-25	33	33	33
Cities Over 100M	5	12	20	0
	6-10	38	20	34
	11-15	13	20	0
	16-20	18	20	33
	21-25	6	20	33
	Other	13	0	0
Cities 50-100M	5	6	0	0
	6-10	29	17	0
	11-15	12	17	50
	16-20	12	32	50
	21-25	35	17	0
	Other	6	17	0
Cities 25-50M	5	0	0	0
	6-10	0	0	0
	11-15	0	0	0
	16-20	67	50	100
	21-25	0	50	0
	Other	33	0	0