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## A New Plan for Traffic Laws

It is Stops, Not Speeds, that Matter.

(By H. W. SLAUSON, M.E.)

How large is a crowd? That depends upon where it is; fifty people might be a crowd in a small room, whereas five thousand would scarcely fill some auditoriums.

So the question of the safe speed at which to drive a car depends upon more than the rate of travel. This has been realized to a certain extent by our law makers who have specified in some instances that speeds of from thirty to thirty-five miles are permissible in the open country, and speeds of fifteen, twenty and twenty-five in cities, towns and villages.

But such laws, at best, are only a superficial attempt to remedy the evil of reckless driving. Speed in itself can no more be a criterion of carelessness, without taking attendant conditions into consideration, than can a uniform "living wage" be made to apply to all sections of the country and to all sizes of families. No one would attempt to specify, for example, that one thousand dollars is a sufficient annual sum with which to support a family, without taking into consideration whether such family is large or small or is to be raised in a rigorous climate where fuel and clothing are important items of expenditure or in the sunny south where such outlays are not necessary.

And yet, it is not just as illogical to say that speeds in excess of thirty miles per hour on an open country road represent presumptive evidence of carelessness, and not to take into consideration whether that road is slippery or dry, whether the car is equipped with good or bad brakes and whether the driver can obtain an unobstructed view for a sufficient distance in advance to permit such speed?

What we really intend to do when enacting speed laws is to insure that the driver will have the car under control at all times. Adequate control of the car means the ability to bring the vehicle to a dead stop within a short distance of the danger line. For example, a car may be considered to be driven with due care if it can be stopped within four or five hundred feet on an open country highway on which other vehicles, pedestrians or any obstruction can be seen at least one thousand feet ahead of the car. On the other hand, a car, traveling a school street, on which a child might dart into the roadway thirty feet ahead, should be

driven at such speed that it may be stopped within fifteen feet—and all of this regardless of the rate at which the speedometer may say that the car was traveling.

It will be noted that I have made the stopping distance equal to one-half of the distance between the car and the place of the danger. This is not only to give a "bridge builder's factor of safety" but also to provide for the inevitable lag which occurs during the mental processes necessary to observe the danger and to apply the brakes. Experiment has proved that at least two-fifths of a second is required to remove the foot from the accelerator pedal and apply it to the brake. The danger may not be mentally translated as such for another second, and the action of the foot might not be instantaneous and positive when a driver is under the stress of high-speed travel.

### Two Seconds Delay.

It is certainly not too much to assume, therefore, that two seconds may elapse between the appearance of the danger and the effective functioning of the brakes at the wheel. During these two seconds a car driven at fifty miles an hour will have traveled practically one hundred and fifty feet before it begins to slow down. Charts, which we see published frequently by a well known brake-lining manufacturer, indicate that two-wheel brakes, in good condition should serve to bring a car to a dead stop within two hundred and thirty-one feet when traveling at fifty miles an hour. This distance, added to the one hundred and fifty already mentioned, amounts to nearly four hundred feet, which may be taken as the distance required to bring a car to a stop under average conditions and when traveling at fifty miles an hour. Almost instantaneous brain and muscular functioning and the use of highly efficient brakes might cut this distance in half under the best of conditions. But the higher figure represents the day-in and day-out average of the majority of cars. It is this with which we must deal.

The action of brakes is merely to absorb the momentum of a heavy moving mass, as represented by the car. Momentum, in a horizontal direction, depends upon two factors; weight and speed. For ordinary purposes mass may be considered the same as weight.

Accordingly, the momentum of a car varies directly as the car's weight and as the square of the speed. The mathematical formula is:

$$I \text{ equals } MV \text{ squared}$$

In which I equals the momentum, M equals the mass (or weight) of the car and V equals the speed.

Since it is momentum which tends to keep the car going and which must be absorbed, by the brakes or otherwise, before the car can be stopped, it will be seen that, given the same retarding effect, a car weighing four thousand pounds will require double the braking effect to be brought to a stop as that necessary for a car weighing but two thousand pounds.

By the same formula, we observe that if we double our speed, we increase the stopping distance required, not by twice, but by four times. And if we are traveling, for example, at thirty miles an hour, we will need nine times the distance in which to stop that would be necessary if we were traveling at only ten miles an hour.

Now, although it is very evident from the above that speed exerts a tremendous influence on the effort required to stop a moving automobile, the factors of brake condition, driving ability and nature of the road surface are equally important. However, except insofar as some motor vehicle laws require periodic brake inspection, safety and care in driving are almost entirely translated, in the public mind and in the law, into miles per hour. There is no other reference to the really vital factor of "how quickly can the car be stopped."

Not only that, but, in order to avoid the possibility of unfair persecution of the automobilist, the laws of many states make the wise provision that evidence must be presented to indicate that the offending motorist exceeded the speed limit for a sustained distance of one-eighth of a mile in the city or one-quarter of a mile in the open country. Of course, one of the purposes of this provision is to enable the motorist to overtake a slow lumbering vehicle ahead of him by means of a short burst of speed which will keep him on the wrong side of the road for a minimum period of time.

The usual means for enforcing the speed laws is the "motorcycle cop." The motorcycle is a two-wheel vehicle. As such it is not as steady on its legs as its four-wheel prey. This means that during wet and snowy weather, when speeding becomes most dangerous, the motorcycle enforcement officer must suspend activities. In consequence, during certain summer weather when driving is safest because stopping conditions are best, arrests for minor violations of the speed ordinance are most numerous. On the other hand, in wet or freezing weather, when even speeds well under the allowable limit are most dangerous, there are but few arrests or summons for careless driving.

### Twenty-Five Miles—Twenty-Five Dollars.

Now a law which employs speed as the sole criterion of careless driving and which makes no differentiation between good and bad brakes, between smooth, or non-skid tires, and between dry or wet or icy pavements, evidently fails in its purpose of promoting maximum safety of driving. If the cure were impossible or were worse than the disease, we would have no criticism to make, but the remedy is so simple and can take into consideration so easily and automatically the various conditions which we have mentioned as affecting the safety of car operation, that we marvel that seventeen million cars are still governed in their activities by such antiquated laws as to permit, "Twenty-five miles an hour, Your Honor," "twenty-five dollars fine, Mr. Defendant," to be the stereotyped sound "resounding from thousands of court rooms."

So long as it is the inability to stop in time which is the cause of most accidents and the reason for all speed laws, let us go directly to the source of the trouble. Let us require that every car shall be driven only at such a rate that it may be brought to a complete standstill within specified distances; these distances varying with country and city driving conditions much as do the variable speed rates now permitted. We would stipulate, for example, two hundred feet as the required stopping distance on an open country road; fifty feet in some sections of the city; even fifteen or twenty feet in the more congested portions. We could mark all school streets as "ten foot zones" indicating that on such streets the motorist must have his car under such control at all times that it can be brought to an absolute stop within ten feet after the danger has been noted or after a prescribed signal has been given.

One of the principal values of such a system is that it would take into consideration, absolutely and automatically, all conditions then prevailing which would affect the stopping ability of the car or of the driver in question. On a slippery road and without chains, the driver would need to exercise much greater care and would dare drive, possibly, at only a quarter of the speed that would permit stopping within the same distance under good conditions on dry roads. The design and condition of the braking mechanism would represent, also, a vital factor in determining the speed at which the car might be operated

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without danger of violating the stopping provision. The operating machinery for such a method of speed regulation would be much simpler and more effective than that employed at present. Quibbling over the inspection and accuracy of speedometers and disputes as to the distance over which the speed-limit had been exceeded would be avoided. All that might be necessary for proof of careless driving would be a tape line and possibly a piece of chalk. No expensive motorcycles or high-speed cars are needed, nor any highly trained body of "motorcycle cops." Every patrolman could produce the necessary evidence of careless driving.

Suppose, for example, that a patrolman, roundsman or other ordinary police officer on foot is walking on what is known as a "twenty-foot street"—this meaning that any vehicle driven on that street must be operated at such a speed that it can be brought to a dead stop within twenty feet. The pavement is wet. The policeman sees a car approaching at what he considers to be a dangerous speed. He need only step to the curb, raise his hand and blow his whistle. If the motorist is able to bring his car to a complete stop within twenty feet from the point at which the prescribed signal was given, he has demonstrated that he was driving care-

fully within the meaning of the law. It is inconsequential whether his speed was ten or twenty miles an hour, whether he used chains or non-skid tires or whether his car was provided with two or four-wheel brakes. Those matters are entirely his own business. He has passed the test.

A Slide Convicts of Carelessness. If, on the other hand, when the motorist hears or sees the signal to stop and applies his brakes, he finds that his car slides for thirty feet, it is obvious that he was driving "carelessly" in that his speed was too high, his tires too smooth or his brakes insufficiently effective to bring the car to a stop within the prescribed distance. Whatever the cause, he should suffer the consequence.

Such a system would not necessarily dispense entirely with the services of the motorcycle enforcement officer. It would, in fact, add to his efficiency in apprehending the careless driver. High-speed motorcycles may be used to overtake those who ignore the signal to bring their cars to a stop. Furthermore, no motorist will dare deliberately to break the speed law through his present trust in the effectiveness of his rear-view mirror. As long as the motorist can obtain a clear view of the road ahead and as

long as he knows that he must be chased by a duly constituted officer with a properly inspected speedometer for a distance in some instances of at least one-quarter of a mile, many a driver who should be apprehended is never "caught in the act."

As long as we have automobiles, we will have the eternal discussion of what constitutes a safe driving speed. There is but little room for argument, however, as to what constitutes a safe stopping distance. This stopping distance represents the entire basis on which safety depends. Why not adopt the plan of using this stopping distance, not a speed limit, as the sole method of judging the carelessness of car operation?

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