
A Study on Road Speed Limit Device, Regulatory, Types and Its Economic Importance

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Abstract - *Speed limits are selected to balance travel efficiency versus safety. It can be argued that a rational speed limit is one that is safe, that most people consider appropriate, that will protect the public, and can be enforced. Speed is an important transportation consideration because it relates to safety, time, comfort, convenience, and economics. Speed management is a very important tool for improving road safety. However, improving compliance with speed limits and reducing unsafe driving speeds are not easy tasks. This paper aimed at extricate facts on road speed limit device, regulatory, types and its economic importance in Nigeria.*

Keywords: Limit, Regulatory, Road, Safety, Speed

1.0 Introduction

Speed is an important transportation consideration because it relates to safety, time, comfort, convenience, and economics. Spot speed studies are used to determine the speed distribution of a traffic stream at a specific location. The data gathered in spot speed studies are used to determine vehicle speed percentiles, which are useful in making many speed-related decisions (Robertson, 2012). Speed limits are selected to balance travel efficiency versus safety. It can be argued that a rational speed limit is one that is safe, that most people consider appropriate, that will protect the public, and can

be enforced. Many practitioners also feel that better methods are needed to identify appropriate speed limits especially in urban roads having higher traffic volumes, a mix of road users, and more roadside activity. Many practitioners and researchers have argued that a knowledge-based expert system can provide assistance to the practitioner in setting the appropriate speed limit for specific conditions on a road section.

Many factors influence drivers and their perception of the safe speed at which to operate a vehicle. These factors should be considered as a whole because it is not practical to consider. The prime objective of this paper is to assist the user in indorsing an appropriate maximum speed limit for precise conditions on a road section among others. Setting of speed limits necessitates a rational and defensible procedure to maintain the confidence of the public and legal systems. By following an unvarying technique, agencies can establish speed limits that are uniform throughout the state and avoid influence from political pressure or emotional perceptions.

2.0 Regulatory and Advised Speeds

When an E&TS indicates the statutory or prima facie speed limits are not applicable for the existing conditions, the maximum speed limits should be adjusted according to the E&TS findings. Any changes to the statutory or prima facie speed limits will result in a speed zone posted with signs showing the speed that applies in that zone.

2.1 Types of Speed Zones

The types of speed zones are as follows:

- i. Regulatory
- ii. Advisory
- iii. Temporary Traffic Control Advisory and Regulatory Speeds (Construction Zones)
- iv. School
- v. Truck
- vi. Private Facilities
- vii. Special Weather Conditions
- viii. Variable

Each type of Zone is discussed below in this chapter.

2.1.1 Regulatory

Regulatory speed zones established by E&TS should be applied to locations and sections of highways where the statutory or prima facie speed limits are not appropriate for local conditions. Roadway safety is the primary consideration in establishing speed limits. Although not an exhaustive list, Signs for

regulatory speed zones shall be from the R2-1 series shown on Figure 1.



Figure 1. Speed limit sign

2.1.2 Advisory Speeds

Advisory speeds are recommended speeds for curves, intersections, or other locations where physical conditions of the roadway restrict operating speeds to less than the maximum legal speed or posted speed limit. The Figure 2 illustrates warning signs with advisory speeds.



Figure 2. Advisory signs

2.1.3 Temporary Traffic Control Advisory and Regulatory Speeds

Temporary Traffic Control (TTC) speed zones are temporary speed zones used in TTC zones while construction, utility work, traffic incident management or highway maintenance operations are underway (Abraham, 2001). TTC zones can be regulatory or advisory. Refer to CA MUTCD, Part 4 reduction of more than 10 mph in the speed limit may be justified when personnel and/or equipment are not separated from vehicle traffic by a concrete barrier, or when required by restrictive features in the TTC zone (Ferguson,

2005). Figure 3 shows the accepted MPH accepted in TTC zone.



Figure2. Temporary traffic control advisory

2.1.4 School Speed Zones

25 mph speed limits should be used for school zones when approaching or passing a school building or the grounds thereof, contiguous to a highway, and posted with a standard school warning sign (Figure 4). Reduced speed limits for school zones are in effect when children are present. Pedestrian crossing activity is the primary basis for reduced school speed zones. However, irregular traffic and other pedestrian movements when children are being dropped off and picked up from school must be considered (Berkowitz, 2012).

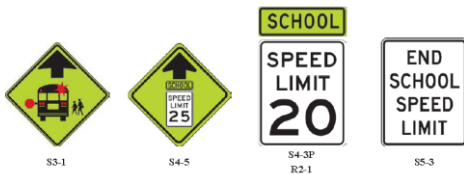


Figure3. Signs for school areas

2.1.5 Reduced Truck Speed Limit on Descending Grades

With lengthy descending grades with a recorded history or complaints of runaway larger vehicles may be a candidate location for posting truck speed limit signs for trucks travelling downhill. Avoid posting signs on descending grades of less

than 1 mile since the deceleration of vehicles due to braking action generally provides sufficient control on these short descending grades. Speed data for truck speed limits should be presented on the same form used for other speed surveys. The Figure 5 shows the speed limited accepted for Truck.



Figure4. Truck plaque with speed limit signs

2.1.6 Private Road

The CA MUTCD standard and Caltrans standards and specifications for traffic control devices shall not be applicable to privately owned and maintained roads or commercial establishments, unless the particular city or county enacts an ordinance or resolution to this effect (Fiske, Surabian, & Weigold, 2010). Private roads are roads separated from access by the general public by physical barriers and do not have to meet the speed zone criteria of this manual (Abraham, 2001).

2.1.7 Variable Speed Limits

On occasion, the establishment of variable speed limits may facilitate the safe and orderly movement of traffic on a freeway segment. Caltrans determines, based upon an E&TS, whether to implement variable speed limits. By CVC 22355, Caltrans may erect, regulate, and

control signs upon the state highway designed to permit display of different speeds at various times of the day or night. These signs need not conform to Standard Plans and Specifications but shall be of sufficient size and clarity to give sufficient notice to drivers of applicable speed limit(s) (Fiske, Surabian, & Weigold, 2010).

3.0 The Study

Several source of information: Internet, Journals, textbooks, General Intuition and other Previous Work were employed in this study. A road speed limiter (RSL) means a device whose primary function is to control the fuel feed to the engine, in order to limit the vehicle speed to a preset value, Figure 6.



Figure 6. Description of the function of RSL (Speed, 2013)

3.1 The Device Schematics

To under the function and implementation of road speed limiter(RSL) we need to study the circuit diagram of RSL. Figure 7 shows the circuit diagram of RSL and its interconnections

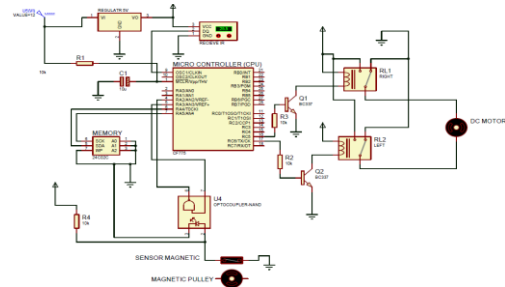


Figure 7. Circuit Diagram of RSL

3.2 Types of Road Speed Limiter (RSL)

There are many types of speed limiters. These types may be classified according to either the technique of applying the speed control or the functionality of the speed limiter. The types of RSL are classified based on control technique.

- i) Accelerator Control
- ii) Direct Fuel Control
- iii) Electronic Pedal Control

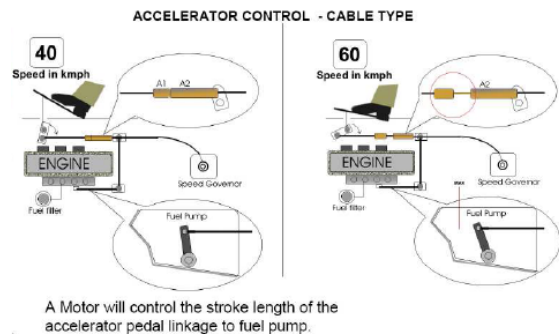


Figure 8. Description of the accelerator control (Speed, 2013)

Figure 8. shows the idea of cable type which is implemented in the present typical type of accelerator control.

4.0 The Operation of the System

Testing is a vital process in the development and realization of any design, be it hardware based,

software based or both. The various components and their circuitry have to be tested to ensure that all the components on board are certified okay and in good working condition. The components that did not give the required output specification were isolated and troubleshooted to determine the nature and cause of the component failure through careful analysis, that is examination of the working principles of the components (Paine, 2009). Figure 9 shows a typical wired RSL, the device is connected to the engine and that is how it allows the free flow of fuel through the engine so as to increase and decrease the speed of the device.



Figure 9. Road Speed Limiter Device and Power Cable

The figure 4.1 shows the RSL device and power cable which is used to control the speed of vehicle, as shown on the figure the Red Cable is used for the power source. Black cable is used for earthing. Light Blue cable is used for shutdown once the speed limit is exceeded, Orange cable is used for the ignition, and Deep Blue is connected to the green of relay whereas the Green cable is connected to the



relay for switching. The Pink Cable is used for fuel sender.

Figure 10. Road Speed Limiter Calibrator

Figure 9 demonstrates the RSL calibrator which is used to set the preset speed of the device to any expected speed in Kilometer, it has Menu, and Delete button. The functionality of the system depends to some extent on the correctness of the exact signal(s) being produced by different modules.

When the vehicle attains a speed of 60 km/hr, the speed set for economical running, the accelerator fulcrum lever which is attached to the accelerator linkage will be stopped by the arrestor. This prevents further acceleration of the vehicle and limits the speed of the vehicle (Ewing, 2012). In situations where more torque is required, like going up a steep hill, the vehicle speed comes down and the gear has to be shifted from 3rd to 2nd. As the engine, at this juncture, needs to run in high rpm, more acceleration has to be provided by ensuring the linkage movement freely to pump more fuel to the engine. The limit switch provided at the extreme end of the 2nd gear lever will be activated. When shifted to 2nd gear, the

switch actually activates the solenoid and electromagnetic force thus developed, which is more than the spring force which constantly holds the axle in the guidance, will withdraw the axle, which gives free movement to the accelerator linkage (Paine, 2009). This extra movement will push the rack of the fuel pump, thereby, excess fuel required will be pumped to get the torque required to move the vehicle. The new system will help to overcome all the hurdles of the existing cable linkage arrangement system, as the existing cable system which is not a fool proof arrangement.

4.1 Economic Importance

The major importance of Road Speed Limiter (RSL) device are:

- i* Extremely small size – thousand times smaller than discrete circuits, which is because fabrication of various circuit elements in a single chip of semiconductor material (Sasmita, 2015).
- ii* Portability - based on the size of the components, the device can be easily moved from one place to another.
- iii* Reliability - the device is more reliable because of elimination of soldered joints and need for fewer interconnections.
- iv* Life Saving device – the device saves life and reduces the rate of accident on major roads in the country (Sasmita, 2015).

The device is applicable to any automobiles such as Vehicle, Truck, and Motorcycle.

5.0 Conclusion

By using this system the speed of the vehicle is limited according to the speed limit given by the highway authorities, by this over speed driving can be avoided hence inhibit cases for fatal accidents occurrence. The device is very important; it saves life and lessens the rate of accident. It is recommended the RSL devices should be given urgent and speedy enactment on all automobile users.

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