Safety Mechanism Helps Keep Drivers Awake!

by WILLEM S. FREDERIK, M.D.

Traffic fatalities rank sixth among all causes of death. Last year, at least 100,000 households were affected in a major way by traffic accidents. Chance plays a role in them but the many forms of human error—indecision, intoxication, sleepiness—contribute heavily to the toll of more than 38,000 deaths.

The inattentive, fatigued and sleepy motorist is becoming an increasingly dangerous menace on the public highways. In any accident situation where quick judgment and reflexes are required, he is a threat to the safety of his family as well as to other motorists. Dozing off at the wheel of his car, the company vehicle or truck, he becomes more of a threat each year as new super highways and toll roads allow for long stretches of uninterrupted, but monotonous driving.

Divided highways—with the traffic lanes separated by guard-rails, chain-link fences or grassy and wooded areas—have eliminated many of the hazards of frictional traffic. At the same time, however, they have introduced a false sense of security and sameness of scenery that induces sleepiness and inattentiveness. At high speeds, common on such highways, a few quick winks can prove fatal.

The myriad problems of preventing automobile accidents due to over-fatigue, inattention, or sleepiness of the driver can be approached many ways. Two methods are:

1. Limit the number of hours, similar to regulations imposed upon airline pilots, that drivers are allowed to operate their car daily.

2. Develop methods and means to indicate or predict sleepiness and driven inattention. Such means must include a warning device—either audible or visual or a combination of the two—which will force the driver to attention or stop his vehicle before it is too late.

Since there is no agency which can dictate regulations nor enforce a restriction upon the motoring public as in the first method, the solution must rely upon science and the development of a simple and effective method or device that will curtail and, better yet, prevent highway accidents due to sleepiness, inattention, or driver fatigue.

Electro-mechanical device

The Alert-O-Matic, an electro-mechanical device perfected by safety engineers of the Liberty Mutual Insurance Company’s Research Center in Hopkinton, Mass., represents a simple solution to this serious accident problem. The device, as its name implies, alerts the sleepy driver. It is a light and compact unit, weighing only three pounds, which can be wired into the electrical circuit of any pleasure car or truck by an automotive mechanic.

In operation, it produces a series of three alerting signals of increasing intensity and severity in progressive stages. Its design is based upon the following concepts:

1. Check the alertness of the driver to light signal stimuli at predetermined time intervals. Allow the driver enough time to handle and thereby control his automobile or truck under adverse conditions before the instrument decides that the driver does not respond to the stimulus. If the driver is alerted by the light, he can turn it off by tapping lightly on the horn ring which is wired into the Alert-O-Matic circuit.

2. When the driver ignores the first stimulus or fails to notice the light for an elapsed period of five seconds, he will receive an audible stimulus; his car’s horn will blow. This usually rouses the dozing driver. The blowing horn also serves as a warning signal to others that something is wrong with the driver.

3. After another brief three-second period of no response to the blowing of the horn, the Alert-O-Matic sets off the third signal. Automatically, a series of severe jolts to the vehicle, caused by the ignition being turned on and off in rapid succession for a period of five seconds, is induced to alert the driver. The ignition of the car is first interrupted and then shut-off automatically. Consequently, the car will be allowed to come to a slow stop.

4. The alert driver will, usually, react promptly to the first light-signal stimuli, in which case the second and third steps of the cycle need not take place.

5. The driver can, by depressing and releasing the horn button at any moment during these three events, terminate the cycle and thereby turn off the light signal, stop the blowing horn, start the car’s engine, etc. Cycles are re-activated at 60-second intervals. They can, however, be lengthened or shortened depending on conditions and safety requirements.

Here is how the cycle of operation works. An aluminum program disk is mounted on the drive shaft of a 12-volt d.c. gear-reduction motor. It is

Please turn page
rotated at 1 r.p.m. in a clockwise direction. The disk, as noted in the wiring diagram, is represented as three separate units—D, F, and H—in order to facilitate the description of different positions and connections during the complete operating cycle.

Contact disk D, having one small projection, closes Contact C for only a brief moment at every full revolution. Closing of contact C completes the circuit for relay coil A. Parallel to relay A is light B. Light B is mounted on the car's instrument dashboard and is visible to the driver.

Energizing of relay A results in the closing of the four contacts K, L, M, and N and opens contact P. Contact K is parallel to contact C. Therefore, relay A will remain energized after contact C opens.

**Contact normally closed**

Contact R is normally closed. De-energizing of relay A takes place by opening contact R. The opening of contact R, terminating the stimulus period, is performed by the driver while depressing the horn-ring.

The horn-ring contact J makes a ground connection with solenoid T through the closed contact arm 4 and contact N. The solenoid plunger S compresses a spring within the solenoid when energized. Release of the horn-ring will result in de-energizing solenoid T.

Plunger S jumps up because of the coil spring and hits the extended arm of contact R. Plunger S falls back to its "rest" position, as shown in the diagram, and allows contact R to close again.

This brief opening of contact R de-energizes relay A, resulting in opening of contacts K, L, M, and N and closing of contact P. Closing of contact P does not result in re-energizing of relay A. The only method of activating relay A is by closing contact C; opening of contact R (briefly) is the only way of de-activating relay A, (under the condition that contact C is open).

**Cycle may be interrupted**

If relay A is not energized, the horn-ring J is connected via contact spring IV and contact P to the horn-relay Q (this is normal in almost any car). As soon as the cycle starts (light signal goes on), the horn-ring J is disconnected from the horn relay Q and connected with solenoid T.

The cycle may be interrupted at any time by the driver. This is performed as follows: After noticing the light signal, the driver depresses the horn-ring and releases it. The solenoid arrangement is made to prevent the horn from blowing when the operator uses the horn-ring to determine the cycle.

Only the release of the horn-ring deactivates relay A and, consequently, brings the horn-ring contact in connection with the horn relay. The horn will not blow as a result of using the horn-ring to terminate the cycle.

If the operator must utilize his horn while the light signal is on, he should touch the horn-ring twice; once to de-activate relay A and a second time to blow the horn in the normal manner.

If the driver does not react to the light signal within a certain period of time, the Alert-O-Matic produces stronger stimuli in a fixed sequence.

Contact disk F contains the program for the aural stimulus that will follow in case of no reaction to the light. Contact E is first closed intermittently, followed by constant closing. This procedure will put contact spring II of relay A to ground.

If relay A is energized and, consequently, contact L is closed, (no operator's reaction to the light signal), the horn relay will be grounded through contact L, resulting in blowing of the horn.

Somewhat later, contact ring H will intermittently close contact G and finally close this contact for the larger portion of the cycle.

Under the condition that relay A is closed, (no reaction to light signal, and repeated and constant horn blowing), the ignition coil is grounded. This will eliminate the distributor and, consequently, the ignition.

The interruption of this circuit will be felt as "backing" of the vehicle. In the latter portion of the cycle, the engine will be stopped as a result of grounding of the coil.

Depressing and releasing the horn-ring at any time during these fixed events will terminate the cycle; turn off the light signal, stop blowing of the horn and start the engine.

Liberty's Alert-O-Matic safety device has been field-tested for many thousands of miles in city driving and the open highway. It is now being utilized, as one of the 24 new safety features, in their revolutionary "Survival Car II."

Similar units have been provided for three additional Survival Cars which are now touring the country. Reports from the field indicate the practicability of the instrument.