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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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Forwarded to:

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President
National Safety Council
444 N. Michigan Ave.
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SAFETY RECOMMENDATION(S)

H-85-30

Motor vehicles are equipped with lights for seeing, but also for being seen. During hours of darkness, it is illegal in every State to operate a vehicle with the lights unilluminated. During the daytime, lights also can help to make vehicles more readily visible. Daytime illumination can enable other motorists, as well as pedestrians and cyclists, to perceive hazards earlier, take evasive action sooner, and thus possibly avoid a collision.

When ambient illumination is low, in conditions such as dawn, dusk, rain, and overcast, conspicuity may be significantly improved by the use of lights. They also can be valuable when there is little contrast between the color of a vehicle and that of its background, i.e., a light car against snow, or a green car against foliage. Small cars are harder to see at a distance than large ones, and so, as average vehicle size decreases, it becomes increasingly important to enhance vehicle conspicuity.

It has been demonstrated that improved conspicuity can help prevent a variety of accidents. Among these are head-on collisions and sideswipes with the vehicles traveling in opposite directions, as well as collisions with pedestrians and cyclists. In 1983 there were 156,144 injuries and 10,531 deaths in such accidents. ^{1/}

Vehicle conspicuity is one of the factors in highway accidents involving older motorists and pedestrians. As a person ages, he or she needs more light than before to see properly. According to one expert optometrist, those illumination requirements double for each 13 years of a person's age. ^{2/} He recommends that cars be driven with lights on

^{1/} Analysis of data from Department of Transportation's National Accident Sampling System and Fatal Accident Reporting System.

^{2/} Merrill J. Allen, "Older Drivers and Pedestrians: Vehicle/Highway Design and Driver Testing," Workshop on the Highway Mobility and Safety of Older Drivers and Pedestrians, Automotive Safety Foundation, Washington, D.C., June 11-12, 1985.

during the day to improve safety for this growing portion of the population. Today 22 percent of U.S. drivers are age 55 or over, but by the year 2000 that proportion is expected to grow to 28 percent, and to 39 percent by 2050. 3/ In 1984, 35.7 percent of the U.S. pedestrians killed by motor vehicles during the hours of daylight, dusk, and dawn were age 55 or older. 4/

There already have been numerous instances of vehicles operated with daytime running lights. 5/ For the last 25 years, Greyhound bus drivers have been instructed to use headlights both day and night. In the early 1960s, a campaign entitled "Drive Lighted and Live" urged Texas drivers to use their headlights during major holidays. In 1972, the Private Truck Council called for round-the-clock headlight use by its member fleets. In the same year, AT&T's Long Lines Division began a two-year program for its fleet to use headlights at all times.

In Finland, motorists driving outside urban areas are required by law to have lights on at all times. A law in Sweden requiring daytime use of lights applies to motorists using all public roads. The requirement can be met in both countries with low-beam headlights or with special running lights described in the regulations. And in countries such as Norway, the Soviet Union, and the United Kingdom, light use is required at times when visibility is low. Most States in the U.S. have similar requirements, but the level of compliance is not known.

Questions of concern to authorities promoting the use of daytime running lights, as well as those contemplating such action, include: Are the lights effective in reducing accident losses? If so, to what degree? And which type of light is best?

Numerous studies have been conducted on the subject, and each has produced the same answer to the first question: Running lights definitely are a means to help reduce the toll in lives and property from highway accidents. However, there is no consensus as to which type of light is best suited to the task, and data are not yet available to predict the degree to which lights will reduce accidents in a given region.

In Finland, the use of daytime lights was studied over a six-year period: two years before there was any government involvement concerning daytime running lights (July 1968 through June 1970), two years in which their use was recommended (July 1970 through June 1972), and then two years in which it was required (July 1972 through June 1974). In the first period, before government action, at least 40 percent, and perhaps as many as 75 percent of the country's motorists already were using daytime running lights. When the practice was a recommended one, the rate was 84 percent, and when light use became mandatory in rural areas during winter, the percentage rose to 97. 6/

3/ Forward by James L. Malfetti, Editor, "Needs and Problems of Older Drivers: Survey Results and Recommendations--Proceedings of the Older Driver Colloquium, Orlando, Florida," AAA Foundation for Traffic Safety, February 4-7, 1985.

4/ Analysis of data from Fatal Accident Reporting System.

5/ "Daytime running lights" are any vehicle lights illuminated during the day to make that vehicle more readily visible.

6/ Kjell Andersson, Goran Nilsson and Markku Salusjarvi, "The Effect of Recommended and Compulsory Use of Vehicle Lighting on Road Accidents in Finland," Swedish National Road and Traffic Research Institute, Report No. 102, 1976.

Researchers found that the increased percentage of use resulting from the new law prompted a measurable decline in a broad range of accidents. The winter daylight accidents in which more than a single vehicle was involved (including collisions with pedestrians, animals, and other vehicles) dropped as much as 21 percent from the first test period to the third, according to several accounts of the results in Finland. 7/ A 28-percent reduction was reported in collisions involving vehicles traveling toward each other. 8/ These crash reductions were achieved despite increasing traffic volume during the six-year period. With the law initially applying only in winter, the reductions appeared only during those months and not during summer months.

In Sweden, the daytime running light legislation raised the use level from about 50 percent to more than 95 percent. The estimates of resulting crash reductions vary from 6 to 13 percent, for accidents involving more than a single vehicle. 9/

In both Finland and Sweden, the safety benefits were particularly significant for nonmotorists. Daylight winter accidents involving pedestrians declined 24 percent in the Finnish study. 10/ In Sweden, the decline was 17 percent, and accidents in which motor vehicles struck "cycles or mopeds" dropped 21 percent. 11/

These studies, both conducted in the 1970s, were particularly valuable because they dealt with entire populations. Since Sweden and Finland are the only countries in which daytime running light use is nearly 100 percent, all types of vehicles and all types of drivers in each country were represented. Other studies have been limited to specific fleets, and the results of using such limited test samples may not be extrapolated reliably to the full population.

But the very reasons that prompted these Nordic countries to lead the way in daytime running light use also limit the applicability of their research to the United States. The light conditions are very different. During the long winter in high northern latitudes, ambient light is low throughout most of the day, with lengthy periods of twilight. And with the sun frequently low in the sky, glare is common. These are the kinds of conditions in which daytime running lights are thought to be most effective, but such conditions are not found with comparable frequency throughout the United States.

7/ Ibid. Also, Charles H. Kaehn, "A Cost/Benefit Study of a Potential Automotive Safety Program on Daylight Running Lights," National Highway Traffic Safety Administration, April 1981; and Michael Perel, "Daytime Running Lights: A Review of the Literature and Recommendations for Research," NHTSA, June 1980.

8/ Andersson et al., op. cit., cited in Kaehn, op. cit.

9/ Kjell Andersson and Goran Nilsson, "The Effects on Accidents of Compulsory Use of Running Lights during Daylight in Sweden," Swedish National Road and Traffic Research Institute, S-581 01, Linkoping, Sweden (no date). Also, crash reductions of 5 to 15 percent were reported by Kare Rumar, "Daylight Running Lights in Sweden--Pre-Studies and Experiences," Society of Automotive Engineers Technical Paper Series, 810191, presented at SAE International Congress and Exposition, February 23-27, 1981.

10/ Kaehn, op. cit., and Perel, op. cit.

11/ Andersson and Nilsson, op. cit. Crash reductions of 27 percent for pedestrians and 25 percent for cyclists were reported in built-up areas in Sweden during summer by David B. Richardson, "Daytime Running Lights--A Concept Whose Time Has Come," Institute of Traffic Engineers Journal, October 1984.

There are differences as well in climate and road conditions. However, there have been studies in this country that suggest that daytime running lights would be effective, to some extent, in cutting the toll from highway accidents.

One of the earliest studies was conducted by the New York Port Authority. ^{12/} About 200 vehicles operated by the Port Authority were modified so the parking lights and taillights were illuminated automatically when the ignition switch was turned on. The vehicles, some painted black and others yellow, were predominantly sedans and station wagons, with some light trucks and a few heavy trucks. For a year, beginning in July 1967, accidents involving these vehicles were monitored, along with those of a control group of about 400 unmodified vehicles.

Overall, the group of modified vehicles was involved in 18 percent fewer accidents than those without the change. In addition, the modified group had accidents that were less severe. A "severity index" was calculated, based on a graduated scale of damage and injury, and the modified vehicles scored 66 percent better than the control group. When passenger vehicles only were considered, the modification lowered the accident rate 23 percent, and the severity index improved 41 percent.

Experiments were conducted with other fleets. The daytime running lights program of AT&T's Long Lines Division produced a 32 percent reduction in that fleet's accident rate. ^{13/} Greyhound Lines reported a 12 percent drop. ^{14/} When a group of Checker cabs drove with lights on during the day, and a group of Yellow cabs did not, the Checker cabs had 7.2 percent fewer collisions, according to a 1979 report. ^{15/} A 1965 survey of 181 U.S. companies with lights-on policies found accident reductions up to 38 percent. ^{16/}

In 1974, the Society of Automotive Engineers (SAE) conducted tests in Arizona to determine the effect of daytime running lights on the distance at which drivers were able to detect oncoming vehicles. Without lights, the average detection distance was 2,074 feet; with lights, the average distance increased to 4,720 feet. ^{17/}

The Insurance Institute for Highway Safety (IIHS) recently completed a study using more than 2,000 cars, vans, and light trucks operated by three corporate fleets. Half the vehicles were equipped with increased-intensity parking lights that were turned on

^{12/} Edmund J. Cantilli, "Daylight 'Running Lights' Reduce Accidents," Traffic Engineering, February 1969.

^{13/} Editorial, "What Happened to All the Lights?" Diesel Equipment Superintendent Journal, November 1973.

^{14/} Dennis A. Attwood, "The Potential of Daytime Running Lights as a Vehicle Collision Countermeasure," Society of Automotive Engineers Technical Paper 810190 (1981).

^{15/} Merrill J. Allen, "The Current Status of Automobile Running Lights," Journal of American Optometry Association, Vol. 50, No. 2, 1979, cited in Attwood, op. cit., and Kaehn, op. cit.

^{16/} Merrill J. Allen, "Running Light Questionnaire," American Journal of Optometry, Vol. 42, No. 3, March 1965, cited in Attwood, op. cit.

^{17/} R.W. Oyler, Executive Engineer, General Motors (personal communication to Kare Rumar, March 28, 1977).

automatically with the ignition switch; no changes were made in the other half. The modified vehicles experienced 7 percent fewer daytime multiple-vehicle crashes than did the unmodified ones. 18/

The running light studies so far have varied widely in results and test procedures. Their sample sizes often have been too small to provide statistical confidence in the specific results of each individual study. However, all the studies that have been reviewed suggest that the use of running lights during the day will indeed result in a decrease in accidents. The issue now is to determine the level of crash reductions and how this would vary by accident type.

A study conducted by the National Highway Traffic Safety Administration (NHTSA) in 1981 produced inconclusive results about the relative benefits and costs of daytime running lights. To help clarify the issue, NHTSA is sponsoring a field study involving approximately 10,000 vehicles throughout the United States. As in the IIHS study, some of the vehicles will be modified so that lights come on automatically with the ignition; others will serve as a control group. The modified vehicles probably will have lamp intensities of various levels. Accident data will be collected on the vehicles for at least a year, starting in late 1985. There also will be an attempt to compare maintenance and repair costs.

NHTSA is unlikely to consider regulatory efforts until this large-scale fleet study is completed. It is expected to give the clearest picture so far of the likely decreases in accidents, deaths, and injuries from a daytime running lights program.

If a Federal standard were issued to require that vehicles be equipped with ignition-activated daytime running lights, it would have to specify whether low beams, high beams, parking lights, or turn signal lamps should be used, or whether a special running light should be added. If a light were to be added, the size, shape, location, lamp color, and lighting would have to be established. The standard also would have to specify the required light intensity. The NHTSA study should help provide a basis for determining these specifications.

It will take many years before the NHTSA study is evaluated, an acceptable Federal standard is developed, and running lights are incorporated into the U.S. fleet in substantial numbers. Those are years in which a measure already recognized as a means to improve safety would continue to be largely unused on U.S. highways.

Canada is facing a similar problem. As in the U.S., the Canadian government has been studying the crash-reduction potential of daytime running lights. In 1984, the Canadian Minister of Transport said that widespread use of daytime running lights could save 200 lives a year, which is about 5 percent of the total highway deaths each year in Canada. In addition, he said highway injuries could be cut by 2,500 and property losses by \$200 million. 19/

18/ Howard Stein, "Fleet Experience with Daytime Running Lights in the United States," Insurance Institute for Highway Safety, May 1985.

19/ Statement by Lloyd Axworthy, Minister of Transport, Press Release, Transport Canada, May 31, 1984.

An official notice has been drafted describing a proposed regulation that would require ignition-activated daytime running lights on new automobiles. The choice of the type and intensity of the light to be used would be left to the manufacturers, as long as the lights met certain specifications. 20/

Staff of Transport Canada say the earliest such a regulation could be in effect would be for model year 1988 or 1989. After that, it would be 8 to 10 years before the nation's fleet would be converted substantially to the automatic daytime running light system. Because of this likely delay, programs have been undertaken in at least two Canadian provinces that encourage motorists immediately to start driving during the day with their lights on.

Saskatchewan Government Insurance, which provides mandatory insurance to all motorists in that province, has mounted a major public education campaign. Called "Lights On For Life," this program employs a variety of means to encourage motorists to drive with low-beam headlights on. In print and broadcast media, there are public service announcements, as well as paid advertising. Four vans tour the province, promoting the message. Signs at border crossings say, "In Saskatchewan we drive with our lights on." 21/

The Premier of Saskatchewan has ordered that all vehicles of the provincial government be driven with their lights on during the day, and family members of government workers are encouraged to do the same in their private vehicles. Corporate fleets have followed suit. The message is being promoted as well by trucking associations, car rental companies, tourist information agencies and many other groups and companies. As a result, with the program in operation only about a year, daytime light use has increased in the province from 8.2 to 24.7 percent. 22/

The Insurance Corporation of British Columbia (ICBC) required drivers of its own fleet of 300 vehicles to use low-beam headlights during the day, and strongly recommended that staff members and their families follow the same practice in their private vehicles. ICBC subsequently urged the operators of 140,000 fleet vehicles insured by the corporation to use lights in the daytime. The insurance company plans to monitor the damage claims filed by fleets using daytime running lights, and to use the expected crash-reduction results to convince more fleets, as well as the general public, to take up the practice. 23/

CKIQ, a radio station in Kelowna, British Columbia, has taken the lead in a campaign to promote daytime use of running lights in the province, and the station reports endorsements and participation by groups such as B.C. Telephone, B.C. Transit Co., and

20/ Winson Ng, Transport Canada (personal communication to NTSB staff, July 5, 1985).

21/ Suzzane Hart, Program Director, "Lights On For Life," Saskatchewan Government Insurance (personal communication to NTSB staff, July 8, 1985).

22/ Ibid.

23/ "ICBC Backs Use of Daytime Headlights," Press Release, Insurance Corporation of British Columbia, June 4, 1984; and "Support Growing for Daytime Driving Lights," ICBC People, no date.

the Canadian Armed Forces. 24/ Canadian military vehicles are required to be driven with lights on not just in British Columbia, but in many operations throughout the country. 25/

The organizers of all these efforts stress that the programs are short-term, designed to enable the Canadian public to start realizing the benefits of daytime running lights immediately--while work continues toward adoption of a Federal standard.

The National Transportation Safety Board believes that a similar approach could be undertaken in the United States. As in Canada, this would be an interim step in anticipation of a Federal standard. Motorists would be urged to keep their low-beam headlights on when driving during the day.

Therefore, the National Transportation Safety Board recommends that the National Safety Council:

Develop and conduct a program to encourage motorists to drive with their low-beam headlights on during the day. (Class II, Priority Action)
(H-85-30)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in this recommendation.

By: *Patricia A. Goldman*
Jim Burnett
Chairman

24/ Dave Daniels and Yvonne Svensson, "Headlights for Life," Public Education Fact Sheet, CKIQ Radio, Kelowna, British Columbia, no date.

25/ Hart, op. cit.

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