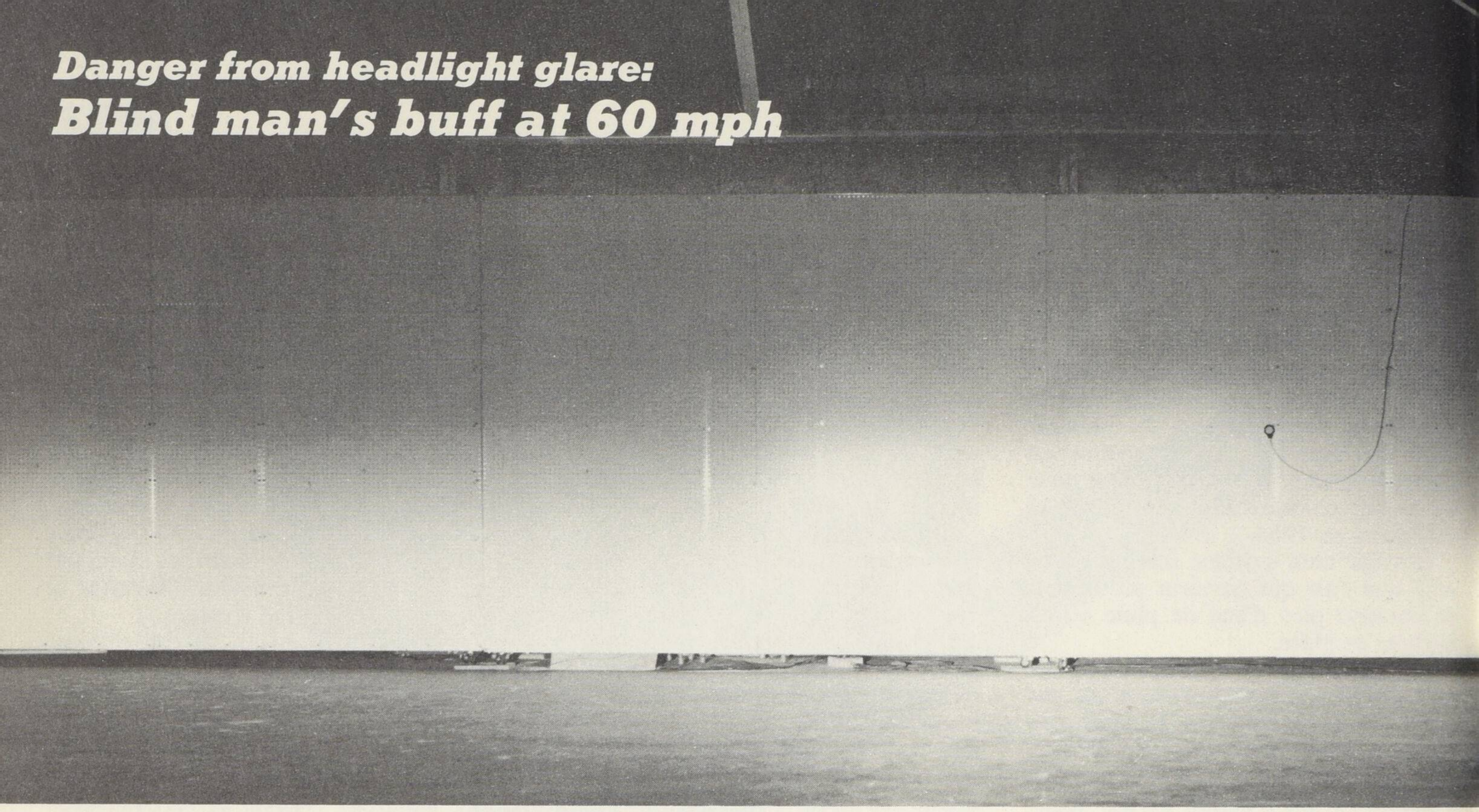
Danger from headlight glare:
Blind man's buff at 60 mph



Photograph of light distribution of an SAE standard headlight in the passing mode. Note lack of definition on left hand side.

Photographie de la répartition de la lumière émise par un feu de croisement nord américain. A noter, à gauche, les contours flous de la lumière.

"COULDN'T STOP IN TIME."

Nightly, on crowded city streets, on monotonous stretches of highway, these words are repeated over and over. Words uttered in anger, in surprise, in fear, in shock, in grief. Words repeated endlessly, now over crumpled fenders, now over mangled metallic hulks.

"COULDN'T STOP IN TIME."

What do these words really mean? Statistics show that competent motorists driving on good roads are involved in more than 80 percent of all accidents. What these words most often mean, then, is this. "An automobile accident has happened to a competent driver on a good road, because his seeing distance was less than his vehicle's stopping distance."

For every "couldn't stop in time" accident which occurs during the day, at least two take place at night. Why? Blame headlight glare.

The veiling glare from approaching vehicles wears the driver down and subjects him to bothersome eyestrain. But, what is worse, the incessantly looming beams are capable of causing temporary blindness. This paves the way for misjudging distance, for overdriving (the term for driving such that the stopping distance exceeds the seeing distance) and, in too many cases, for the fateful clash of metal against metal.

The National Research Council of Canada, in collaboration with the Department of Transport, is currently involved in a long-range program to investigate and improve headlights, hitting hard at the core of night driving accidents. This project is part of an extensive NRC program covering many aspects of road safety.

There is a basic paradox at the root of the headlight problem. Engineers and designers are often intent on combatting it by striving to alleviate glare, the attribute of headlights which most etches itself in the viewer's consciousness. But many are "blinded" by this aspect and overlook the fundamental requirement that headlights must provide seeing distances over and above stopping distances for normal driving conditions.

Most methods of cutting down glare also cut the visibility in front of a motor vehicle. This paradox is such that for even the most modern sealed beam headlights, the legal speed limit on freeways and autoroutes often encourages overdriving.

"The NRC program on headlights will comprise three phases of investigation," says R. G. Brown of the Structures and Materials Laboratory of NRC's National Aeronautical Establishment. Mr. Brown, together with P. M. Huculak, G. F. McCaffrey and A. H. Hall, Head of the Laboratory, are conducting these experiments.

The first project involves laboratory tests on various types of headlamps in order to characterize their performance. For example, by determining the distribution of their light intensity, the NRC scientists obtain a "map" showing contours of the same luminous intensity at a given distance. These maps, called isocandela diagrams, are not unlike the meteorologist's weather maps which mark out equal-pressure regions.

In a new Photometric Laboratory at NRC's Uplands complex in Ottawa, the NRC team is investigating headlamps mounted on cars or on a goniometer, an angle-measuring instrument to hold and accurately aim the lamps.

"We measure the light at regulation distance, point by point, using a delicate photometer sensing probe which is moved on a portable 30 by eight foot matte-white screen," Mr. Brown says. "This distance is 60 feet for North American headlight systems, following Society of Automotive Engineers (SAE) standards, and 25 metres or 82 feet for those on European cars measuring up to Economic Commission for Europe standards. To ensure that no extraneous light enters, the 108-by 32-foot laboratory is provided with shuttered windows covered with black drapes. In addition, a special flat (non-