

### Computer assists scientists in evaluating driver performance

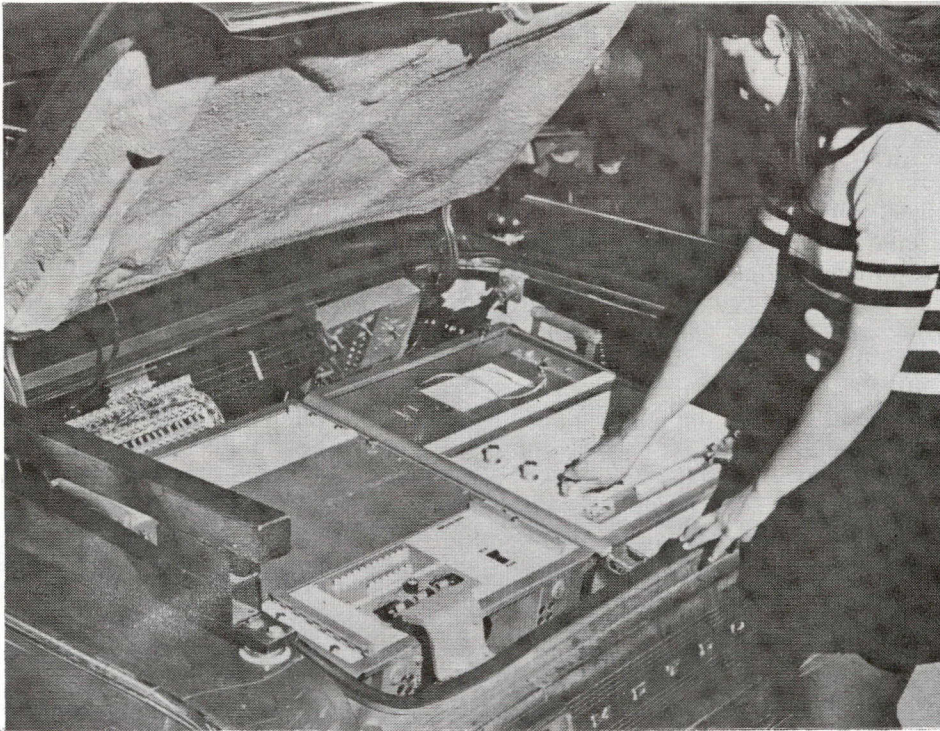
Each year in Canada over nine million people drive more than nine million passenger cars, commercial vehicles and motorcycles – almost one vehicle for every two people in Canada. They drive an estimated total of 80,000 million miles over half a million miles of road. And during this time they have almost 500,000 accidents – almost one accident for each mile – resulting in 120,000 injuries and over 4,000 fatalities.

Several aspects of motor-vehicle safety are currently under study in

performance under various road and traffic conditions.

“We want to evaluate just how effective a consistent driving pattern is as a criterion for driver performance. Our ultimate goal is to increase automobile safety through the objective and accurate measurement of driving behaviour and a sound understanding of the factors that affect driving behaviour,” says Alison Smiley, who is directing the work.

The NRC experiments involve making precise measurements of vehicle



Alison Smiley starts computer for data-collection in NRC test car. Studies are designed to appraise driver performance in highway traffic.

National Research Council of Canada laboratories. Investigations into the characteristics of automobile headlights and into safety barriers, their design and effect are included. One other facet of NRC research concerns the men and women at the wheel. It takes a statistical look at the oft-discussed question: What characterizes a good driver?

Research is concentrated on the interaction between driver and automobile in highway traffic. The aim is to shed light on how best to appraise driver

motions without affecting the driver's performance. This necessitates a vehicle equipped with instruments capable of automatically recording time, speed, distance travelled, steering-wheel position, accelerator position and several other parameters, with the driver being unaware of the equipment in the car (which looks entirely normal, with V-8 engine, power steering and brakes, radio and several other common options). The springs and shock absorbers have been altered to help offset any feeling that 500 pounds

of additional equipment, including a small computer are hidden in the trunk of the car.

The “instrumented” car is driven from the laboratory to a shopping centre a few miles away. Total driving distance, made up of eight sections, is ten miles each way and driving time is about 35 minutes. The route, chosen for its variety, involves two-lane, four-lane and four-lane divided roads and, to study the effects of various traffic densities, tests are conducted in the morning, afternoon and evening. In all, each of the 12 drivers being tested drives the complete route nine times.

At present, for each of the eight sections of the route, data are being recorded by the computer for the number of accelerator reversals (the number of times the accelerator is depressed and released) a minute and per mile at five levels (from one-tenth inch to one inch), for the same rates of steering-wheel reversals at eight levels, extending from about 1 to 28.7 degrees, for the number of times the brakes are applied, and for the average speed. An observer accompanies the driver to measure traffic densities and classify and count passing manoeuvres.

#### Driver patterns

“It already has been found that accelerator reversals appear to be much more correlated with traffic density and flow than are steering-wheel reversals,” Miss Smiley says. “Although our results are not yet complete, even from preliminary data each driver seems to have a particular driving pattern based on the parameters we have studied. In fact, with a little practice one could probably identify the driver at the wheel just from the data.

“As we proceed with the analysis of the results, the driver's individualized pattern shows up and from this perhaps an ‘ideal’ level of consistency within the driver's own individual pattern will emerge. Statistical understanding of this kind can provide a measuring tool that permits the car-driver combination to be used as a ‘probe’ for the evaluation of the parameters of the traffic-road system that influence driver performance. Such information would be of long-term benefit to everybody with the responsibility for road safety or for the creation of operational improvements in the total system.”