

Car fan research may lead to savings in energy.

The private automobile, which was invented in a more fortunate era of seemingly unlimited supplies of energy, remains North America's favourite means of transportation. Until fairly recently, gasoline was cheap and plentiful and car manufacturers had little incentive to look for fuel economy.

But now the party's over. From now on car manufacturers will be forced by the steeply increasing cost of gasoline (if not by law), to produce cars that can achieve better gas mileage than the gas-guzzling behemoths of today.

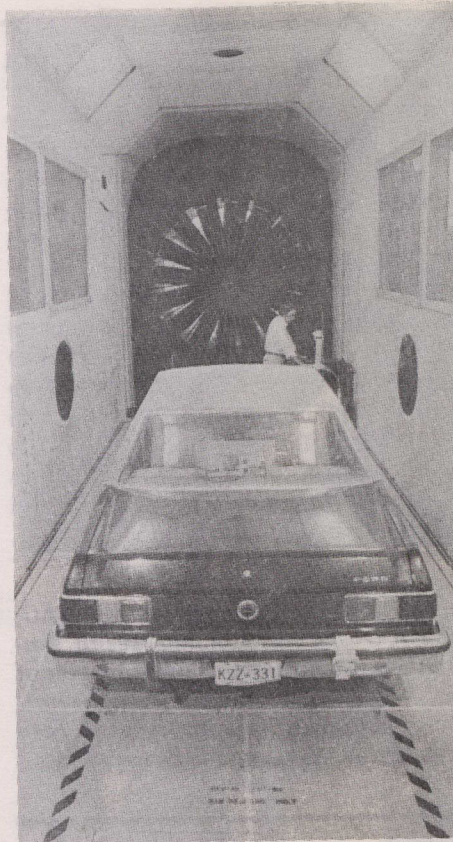
One area where gas might be saved is in the cooling systems. Up to 10 per cent of the useful energy available from the engine is now used to move cooling air through the heat exchangers. Dr. U.W. Schaub of the National Research Council's Division of Mechanical Engineering, says:

"In the automotive industry, stylists first design a good-looking car and then give it to the engineers to put an engine into it. Invariably, there is very little space left under the hood for anything else, and engine temperatures can be very high. As production deadlines rush in, the car manufacturer turns to a cooling-fan manufacturer and says to him: 'Here is the car; give us a suitable fan.' With a few days, or at the most a few weeks to do the job, the fan manufacturer selects a fan that will perform reasonably well in most driving conditions without necessarily being the most efficient from a fuel-saving point of view."

Importance of wind tunnel

Car fan manufacturing is an important Canadian industry; Canadian Fram Ltd. of Chatham, Ontario, is believed to be one of the largest manufacturers of cooling fans in the world. The company makes 40 per cent of all the automobile cooling fans in North America and, aided by an NRC grant, the firm began a study of the acoustics and aerodynamics of car-cooling fans to improve design methods. There was, however, a hitch: they did not have access to a large wind tunnel, an essential part of the study. Because a car's front-end design greatly influences the operation of the air-cooling system, the whole vehicle had to be examined.

"We really came into the picture be-



Bruce Kane, NRC

In co-operation with Canadian Fram Ltd., a Chatham, Ontario, manufacturer of cooling fans, NRC tests automobile fans for energy efficiency by placing a car in a wind tunnel (above) under carefully controlled test conditions.

cause of this," says Dr. Schaub. "Our Division has a very good 10-foot by 20-foot propulsion wind tunnel, big enough to accommodate an entire automobile, and capable of operating with live engines."

Air-conditioned test car

Canadian Fram's contribution to the NRC study included the test vehicle, a 1976 Ford Granada equipped with air conditioning, much of the instrumentation and test equipment, and road-testing know-how.

"Using an air-conditioned car might raise some eyebrows in Canada since it adds approximately 10 per cent to the energy consumption," says Dr. Schaub. "However, about 90 per cent of the continental car market covered by the Canada-U.S. auto pact is in the U.S., where air conditioning is very popular. Since Canadian Fram's major market is in the U.S., it was natural for us to do our tests on a vehicle that is typical of this broader market."

Because of the possibility that experimental data would be subject to large, unknown tunnel interference problems, the scientists needed details about the approach of air flow near the front end of the car under actual operating conditions. The NRC scientists therefore carried out a series of road tests on an instrumented car.

"Road tests were performed at 100 kilometres an hour — the current speed limit on many Canadian highways — and at 50 kilometres an hour, the speed that imposes the greatest load on the car-cooling system, especially when climbing a steep grade with the accessories on and the air conditioning operating," said Dr. Schaub.

"We are now examining these variables in our wind tunnel in an attempt to generate cooling air flows inside the car's engine bay that are similar to those it experiences on the road. It will then be possible to study the ram air effects on cooling-fan performance while the fan is in its normal congested surroundings. Though some of these tests could be performed on the road, uncontrollable variables such as cross-winds complicate the procedure. The wind tunnel is much more under the experimentalist's control."

Fly by night; it's cheaper in summer

Air Canada is introducing experimental, low-cost, "nighthawk" flights to certain Canadian cities, from June 12 to September 13. The program, subject to Canadian Transport Commission (CTC) approval, requires no advance bookings.

Toronto-Calgary-Vancouver, Edmonton-Toronto-Halifax, Toronto-Winnipeg, Montreal-Calgary, and Toronto-St. John's routes will have seats available on a first-come, first-served basis on 248 flights. Passengers must be away a minimum of six days and a maximum of 30 days. Return fares will vary for mid-week and weekend departures. For example, the Toronto-Calgary, Toronto-Edmonton fare will be \$168 in mid-week and \$188 on weekends.

With the Nighthawk plan, the ABC's and charter fares, Air Canada will have more than 600,000 bargain seats for travel within Canada this summer.

CP Air has received CTC approval for 8,000 seats on 40 charters within Canada with reductions of up to 40 per cent on regular return fares.