U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
WASHINGTON, D.C. 20590

Dear Corvair Owner:

This letter is being sent to you by the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) to inform you of the results of our comprehensive investigation of the handling and stability characteristics of the 1960-63 model year Corvairs. We believe that you have a right, and a need, to know the results of our effort because of the controversy concerning this vehicle and the extensive publicity associated with it. We have concluded that the handling and stability of the 1960-63 Corvair does not result in an abnormal potential for loss of control or rollover and that the handling and stability performance is at least as good as the performance of some other contemporary vehicles both foreign and domestic.

This investigation began in September 1970. It commenced with the gathering, review and analysis of all documents, films and test data in the possession of General Motors relevant to the handling and stability question. This included the review of certain test films alleged by Mr. Ralph Nader to prove that the Corvair rolled over. Also included in the investigation was our analysis of a Ford Falcon - Corvair comparison test film made by the Ford Motor Company also alleged by Mr. Nader to prove the Corvair defective. In addition, we analyzed available accident data to determine whether the Corvair rolled over more frequently than other comparable vehicles.

After completion of our review and analysis of all available documents, test reports and test data, and statistical information, it was determined that NHTSA would undertake to objectively define the handling and stability characteristics of the Corvair through tests of its own. A concentrated program of Government testing of the Corvair and contemporary vehicles commenced during the Spring and Summer of 1971. The vehicles compared were the 1962 Falcon, 1962 Volkswagen, 1963 Corvair, 1963 Renault, 1960 Valiant, and a 1967 Corvair. The tests were designed to incorporate steering and braking maneuvers under increasingly severe conditions, including those conditions most likely to precipitate a rollover.

To evaluate the objectivity of NHTSA testing and analysis, a three-man advisory panel of recognized and independent professional engineers was retained: Ray W. Caldwell, B.S., M.B.A., President of Autodynamics Corporation; Edwin Resler, Jr., B.S., Ph.D., Director of Graduate School

of Aerospace Engineering, Cornell University; Paul H. Wright, B.S., M.S., Ph.D., Associate Professor of Civil Engineering, Georgia Institute of Technology. The panel was requested to review the scope and competence of the NHTSA investigation and specifically to identify any additional vehicle testing believed to be necessary.

From an evaluation of the extensive data obtained from General Motors and from other sources, from an analysis of the NHTSA comparative vehicle testing, and from the recommendations of the advisory panel, the following findings are called to your attention:

1. The available accident data indicates that the rollover rate of the 1960-63 Corvair is comparable to other light domestic cars.

2. The Corvair handling and stability compared favorably with the other contemporary vehicles used in the NHTSA testing programs. Vehicle rollover did not occur in any of the comparative tests for the Corvair, Falcon or Valiant. The Volkswagen and the Renault did rollover in some of the comparative tests.

3. The GM test films which Mr. Nader alleged showed Corvairs being rolled over at speeds from 28 to 30 mph in fact showed that these vehicles were being deliberately rolled over by experienced test drivers for experimental purposes, and that they were developmental tests not representative of the practical driving environment. Such drivers could turn over other cars under similar developmental testing.

4. The Ford Falcon - Corvair comparison test film is not an authentic evaluation of the Corvair's handling and stability characteristics and is repudiated by other Ford evidence as well as the evaluation undertaken by the NHTSA.

5. The 1960-63 Corvair will transition from understeer to oversteer at high levels of lateral acceleration, between 0.4g to 0.5g.

(The term understeer is illustrated by imagining someone driving rapidly around a curve to the right. If speed is increased and it is necessary to turn the steering wheel toward the right in order to stay in the lane, then the vehicle is understeering. If the steering requires no additional input, the vehicle is then in neutral steer. If the steering requires the driver to straighten the steering wheel or turn it toward the left, then the vehicle is oversteering. The 1960-63 Corvair will transition from understeer, through neutral steer, to moderate oversteer. Most drivers will not voluntarily operate their cars so as to encounter this transition because it occurs only during a turning or skidding movement which the normal driver would find very uncomfortable. This condition is technically known as high lateral (side) acceleration, and is expressed in g's, or gravity forces).

6. The advisory panel concluded that the NHTSA investigation was adequate in scope and depth, basically sound in design, and professional in its performance. It also concluded that the 1960-63 Corvairs quantitatively meet or exceed the standards set by contemporary cars in stability tests, cornering tests, and rollover tests. The panel concluded that the Corvair is not more unstable or more likely to rollover than contemporary automobiles. Although the panel agreed with the NHTSA engineers that the characteristic transition from understeer to oversteer occurs at lateral accelerations seldom encountered by average drivers, it was concerned about driver response to the transition in emergency situations of high lateral acceleration. The panel recommended, therefore, that Corvair owners be advised that, in its opinion, in emergency situations of hard cornering, such as when the vehicle is not being operated normally and prudently and is exceeding safe speed limits on a curve or expressway exit ramp, it may exhibit unusual handling characteristics. The panel also recommended that Corvair owners be advised to maintain the tire pressures recommended by the vehicle's manufacturer.

The NHTSA engineers concluded that many vehicles may exhibit unusual handling characteristics in emergency situations. The typical conventional passenger car is basically an understeering vehicle. However under various load, speed, and tire pressure conditions, some vehicles, both foreign and domestic, also transition from understeer to oversteer. In the extreme emergency situation, the typical driver makes a brake application, resulting in wheel lock up. In this situation both understeering and oversteering vehicles are uncontrollable. The NHTSA engineers also noted that in extreme emergency situations when wheel lock up does not occur, only a MODERATE AMOUNT of steering movement in the 1960-63 Corvair is required. Drivers will normally correct the steering wheel angle to follow driving direction without having any awareness of having made the correction.

Thus, Corvair drivers should realize that hard braking in a turn or skid:

(a) can lock the wheels and eliminate steering, and
(b) aggravates oversteer.

While not enough can be said about being alert and avoiding conditions that can cause skidding movements, if these conditions are encountered Corvair drivers should remember: 200

(a) that <u>moderate</u> steering motions will normally be sufficient for corrective action, and
(b) that rapid jabbing applications of the foot brake is superior to a hard constant application that will lock the wheels.

Accordingly, drivers are encouraged to avoid the pitfall of wheel lock up and are advised to follow their natural reactions to the steering wheel angle, even in emergency situations. Finally, NHTSA engineers are of the opinion that the transition from understeer to oversteer in the Corvair does not result in an unusual risk of loss of vehicle control.

CONCLUSIONS:

A. The NHTSA concluded that the handling and stability performance of the 1960-63 Corvair does not result in an abnormal potential for the loss of control or rollover, and that its handling and stability performance is at least as good as the performance of some contemporary vehicles both foreign and domestic.

B. Based upon its analysis of all available data, its own comparative vehicle testing, and the recommendations of its advisory panel, the NHTSA concluded that no safety-related defect exists with respect to the handling and stability characteristics of the 1960-63 Corvair.

FUMES:

In addition to the foregoing, we would like to again remind those of you who have 1961-63 Corvairs of another matter. This agency has previously concluded that the Corvair direct air heater system in these models does create an unreasonable risk of accident and injury to persons in that engine fumes are transferred from the engine compartment into the passenger compartment, and such engine fumes do in some cases contain carbon monoxide in sufficient concentrations to harm or endanger the occupants of the vehicle. If you have not already responded to the instructions of General Motors in the two letters previously sent requesting that you have your vehicle exhaust-heater system inspected, we strongly urge you to (a) follow the instructions in those letters (if you suspect fume intrusion problems leave your window open) and (b) have the inspection undertaken as soon as possible.

Sincerely,

Douglas Toms

Douglas W. Toms
Administrator