

REPORT BY THE
Comptroller General
OF THE UNITED STATES

**Department Of Transportation's
Investigation Of Rear Brake
Lockup Problems In 1980 X-Body
Cars Should Have Been More Timely**

In November 1979 the Department of Transportation, National Highway Traffic Safety Administration, initiated an investigation of an alleged rear brake lockup problem with 1980 General Motors X-body cars. On August 5, 1981, General Motors agreed to recall 47,371 manual transmission vehicles. At that time the Safety Administration had information which questioned the adequacy of the remedy to correct the vehicles' rear brake lockup problem.

GAO found that the Safety Administration's investigation included long periods of time with no activity and was not conducted in accordance with applicable guidelines. In addition, the existence of test data was not made known to the public. GAO's review could not determine the precise reasons for these actions.

In January 1983, 37 months after starting its investigation, the Safety Administration made an initial determination that a safety-related defect existed in 240,000 1980 X-body cars, and in February 1983, General Motors agreed to recall these cars to fix the problem. However, on August 3, 1983, the Government filed suit to have General Motors recall all 1.1 million 1980 X-body cars.

GAO makes several recommendations to improve future safety defect investigations.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-206637

The Honorable Timothy E. Wirth, Chairman
Subcommittee on Telecommunications,
Consumer Protection, and Finance
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

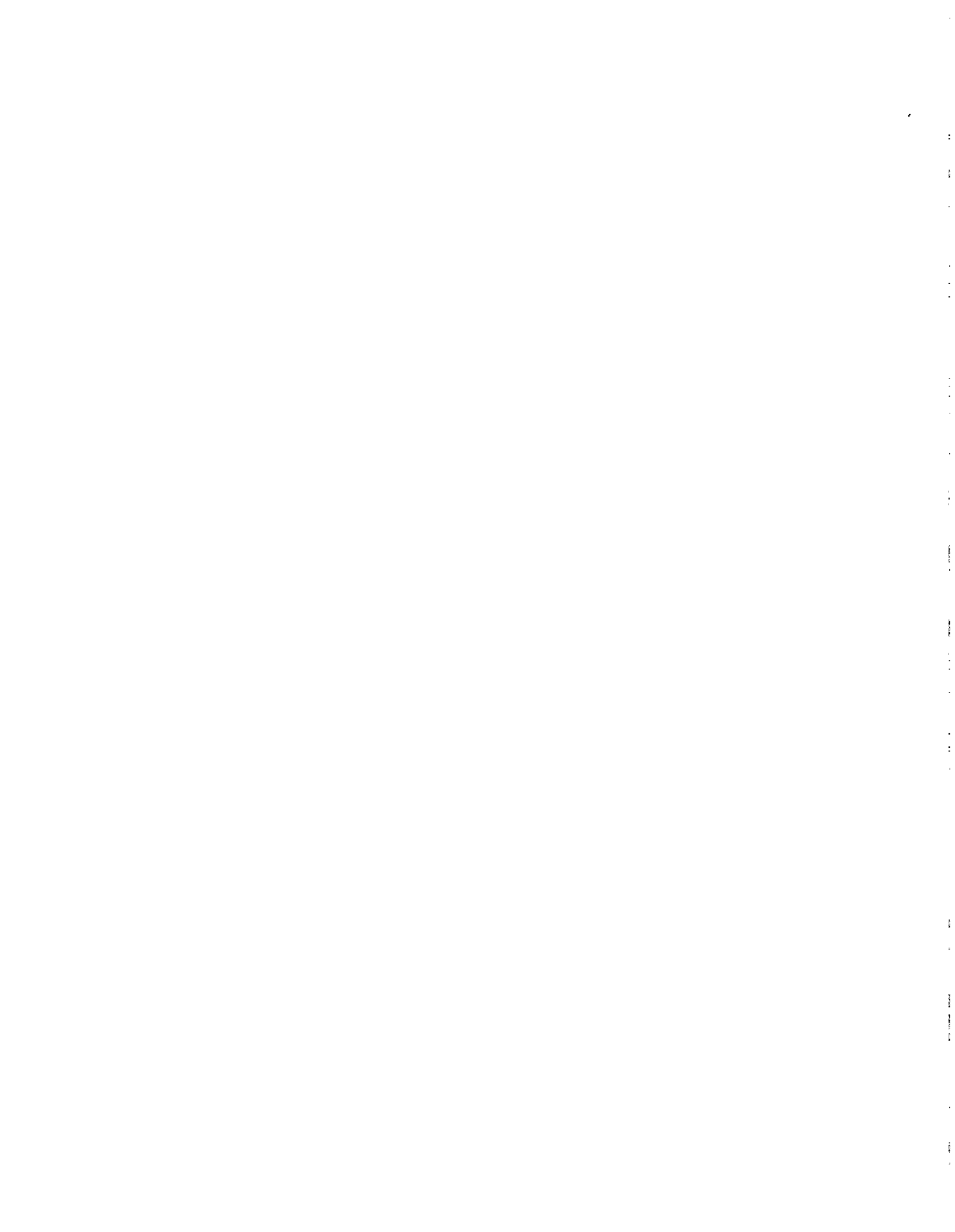
As requested by your January 5, 1983, letter, this report summarizes the results of our review of the Department of Transportation's National Highway Traffic Safety Administration investigation of alleged rear brake lockup in General Motors 1980 X-body cars. The report discusses the Safety Administration's actions from November 1979, when it first opened a case on the problem, through the February 1983 recall of 240,000 cars to fix the rear brake lockup problem.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 10 days from the date of the report. At that time we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,

A handwritten signature in cursive script that reads "Charles A. Bowsher".

Comptroller General
of the United States



COMPTRROLLER GENERAL'S REPORT DEPARTMENT OF TRANSPORTATION'S
INVESTIGATION OF REAR BRAKE
LOCKUP PROBLEMS IN 1980 X-BODY
CARS SHOULD HAVE BEEN MORE TIMELY

D I G E S T

Motor vehicles with safety defects subject the public to unreasonable risks of traffic accidents, injuries, or deaths. The National Traffic and Motor Vehicle Safety Act requires manufacturers to promptly correct safety defects in affected motor vehicles. Under that act, if the Secretary of Transportation or a manufacturer discovers such a defect, the manufacturer must recall the defective vehicles and correct the defect free of charge.

The Department of Transportation's National Highway Traffic Safety Administration is responsible for making safety defect investigations. It began such an investigation in late November 1979 to look into the alleged rear brake lockup problem that some owners were experiencing with the General Motors Corporation's (GM's) 1980 X-body cars--Chevrolet Citation, Buick Skylark, Oldsmobile Omega, and Pontiac Phoenix. It opened this investigation as a result of vehicle owner complaints and concern expressed in magazine and newspaper articles. The first owner complaint was received in July 1979, 3 months after the X-body cars were introduced.

GAO reviewed the Safety Administration's investigation into the potential braking defect of the GM 1980 X-body cars at the request of the Chairman, Subcommittee on Telecommunications, Consumer Protection, and Finance, House Committee on Energy and Commerce. The Chairman expressed concern about the length of time taken by the Safety Administration to investigate the defect and seek a recall.

GAO found that:

- The Safety Administration did not follow its established procedures for conducting safety defect investigations.
- Although the Safety Administration had information that indicated that General Motors' remedy for the braking defect might

not be adequate, the Safety Administration did not formally advise GM of its concern when GM proposed a remedy, aggressively pursue testing affected cars, or initiate an audit of the recall's effectiveness as soon as possible.

--By delaying or not taking these and related required actions, the Safety Administration delayed the recall of cars with potential safety defects. Decisions regarding most of these actions were made by a single Safety Administration official, with no apparent review by top agency officials.

REAR BRAKE LOCKUP INVESTIGATION WAS DELAYED

The Safety Administration's review of the rear brake lockup on X-body cars was conducted in two phases--engineering analysis and formal investigation. GAO found that although the Safety Administration's goal is to generally complete the engineering analysis within 6 months, this phase took 19 months from November 26, 1979, to July 1, 1981.

Essentially the only action the Safety Administration took during the first 13 months of the engineering analysis was to send a letter to GM requesting basic information for investigating the brake problem. This letter was sent 6 months after the engineering analysis began. Safety Administration guidelines state that such letters should be sent to the manufacturer within 2 weeks of starting an engineering analysis. Safety Administration officials agreed that the investigation should have been more aggressively pursued during the 13-month period November 1979 through December 1980. (See p. 8.)

The formal investigation phase was from July 1981 to January 1983. From July 1981 through October 1982, numerous actions called for under Safety Administration guidelines were not taken or were delayed. These included the following:

--A press release, which is normal practice, was not issued when the formal investigation was opened. Press releases are issued to notify the public of the potential safety problem and to obtain public information to help the Safety Administration determine the magnitude of the problem. (See p. 11.)

- The information request letter to the manufacturer to solicit information needed to help assess the scope and nature of an alleged defect was not sent until December 17, 1982, almost 18 months after the formal investigation was opened on July 2, 1981. This letter is usually sent soon after a formal investigation begins. (See p. 13.)
- A contract to obtain information from consumers directly affected by the defect problem (i.e., those with knowledge of accidents, injuries, or deaths resulting from such accidents) was not awarded until March 22, 1983, nearly 21 months after the formal investigation was opened. This contract is usually awarded to a private contractor early in the investigation. (See p. 15.)
- An audit of GM's August 1981 recall of 47,371 cars to determine, among other things, the adequacy of the remedy to correct the rear brake lockup problem was delayed about 5 months from when it was originally proposed. The audit should have been planned and implemented earlier because the Safety Administration had information that questioned the adequacy of the remedy. (See p. 16.)

Although the Safety Administration tested 1980 GM X-body cars in July and November 1981 to identify the conditions under which rear brake lockup occurred and the causes of such lockups, it did not indicate in the public record until January 1983 that these tests were conducted. Normal practice is to disclose that such tests were conducted soon after their completion. These tests indicated that the most significant cause of the rear brake lockup problem was the "aggressive" brake linings used in the production of all manual transmission and certain automatic transmission 1980 X-body cars. Aggressive linings have greater friction per square inch than other brake linings. (See p. 19.)

The July 1981 tests, service instruction letters sent by GM's four divisions to their dealers, and the Safety Administration's engineering analysis report indicated that GM's remedy, which consisted of replacing the

proportioning valves on the 47,371 vehicles that it agreed to recall in August 1981, might not correct the rear brake problem. Even though it had this information, the Safety Administration did not aggressively pursue detailed vehicle testing and the recall audit nor did it formally advise GM that it had reservations about the remedy. (See p. 26.)

DETERMINATION OF SAFETY DEFECT
IN X-BODY CARS AND INVESTIGATION'S
CURRENT STATUS

Beginning in November 1982, the formal investigation concerning GM's 1980 X-body cars received increased attention when the management of the defect investigation program changed. Instructions were then given that the investigation should be updated and processed in accordance with applicable guidelines.

On January 14, 1983, 18 months after it opened its formal investigation, the Safety Administration announced that it had made an initial determination that a safety-related defect existed in approximately 320,000 (later reduced to 240,000) 1980 GM X-body cars because their rear brakes tended to lock up as a result of moderate-to-hard braking. On February 9, 1983, GM announced its intention to recall the 240,000 cars for modifications to the braking system to improve its braking characteristics. On March 30, 1983, the Safety Administration stated that it would continue to monitor the performance of other 1980 and later X-body vehicles, specifically about 276,000 1980 model year vehicles equipped with automatic transmissions and the brake system proportioning valves used in all X-body cars produced before August 27-29, 1979.

The Safety Administration was investigating whether GM had furnished all information pertinent to the rear brake lockup problem and whether all 1980 X-body cars that may be reasonably expected to experience rear brake lockup have been recalled. On August 3, 1983, the Department of Justice filed in the United States District Court for the District of Columbia a complaint on behalf of the Department of Transportation and the Safety Administration against GM seeking the recall of about

1.1 million 1980 X-body cars due to faulty brake systems and asking for civil penalties of \$4,027,000. (See p. 30.)

CONCLUSIONS

GAO found serious problems in the Safety Administration's handling of GM's 1980 X-body cars' rear brake lockup safety defect investigation. GAO documented the inactivity during the engineering analysis phase and the deviation from the Safety Administration's established investigation guidelines and the failure to take appropriate action regarding questions on the 1981 recall remedy. Although GAO could not determine the precise reasons for these actions, the problems evident in this case were significant enough to warrant its recommending actions to improve the defect investigation program.

Although the Safety Administration had written guidelines for conducting the engineering analysis and the formal investigation phases, GAO noted several instances where problems developed with the 1980 X-body car rear brake lockup case because the guidelines either made no provision or were not clear with respect to taking certain actions. For example, there were no written policies on when the existence of test reports should be made known to the public and when the test results may be made known to the manufacturer and others. (See p. 34.)

GAO's review was conducted at the Department of Transportation and focuses on the Safety Administration's handling of the rear brake lockup case on X-body cars. While GAO did address certain factual information originated by GM, it was limited to information obtained from Department files. Consequently, GAO does not draw any conclusions regarding GM's actions in the case.

RECOMMENDATIONS

GAO recommends that the Secretary of Transportation instruct the Administrator, National Highway Traffic Safety Administration, to:

- Reaffirm the need for compliance with the policies and procedures for conducting defect investigations. Specifically, the Administrator should stress that the actions

called for by the policies and procedures be performed in a timely manner.

- Clarify the defect investigation policies and procedures. Specifically, the Administrator should clarify when defect investigation test reports should be entered in the case files and what test information should be provided to a manufacturer and when and by whom. Also, any exception to issuing a press release when opening a formal investigation should be justified and made a part of the public record.

- Require top-level officials to participate in the defect investigation process. Specifically, a representative from the Administrator's or Deputy Administrator's staff should attend key defect investigation decision meetings, such as the defect review panel meetings, when a decision is made to open a formal defects investigation case, close out the investigation, or seek more information on the alleged problem.

Department of Transportation comments were not obtained on this report. However, on July 13, 1983, GAO provided the Safety Administration with a detailed briefing on the results of its review. The Acting Administrator stated that because of the Safety Administration's concern over the handling of the X-body brake investigation, it was (1) requiring a representative from the Deputy Administrator's office to attend all panel meetings involving defect investigations and (2) updating all policies and procedures pertaining to the defects investigation recall program. GAO believes these planned actions, if implemented, should improve the defects investigation program. (See p. 35.)

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The Chairman asked GAO for information on the Safety Administration's decision not to award a February 1982 research proposal to obtain front wheel drive vehicle braking and handling performance data. This information is presented on page 30.

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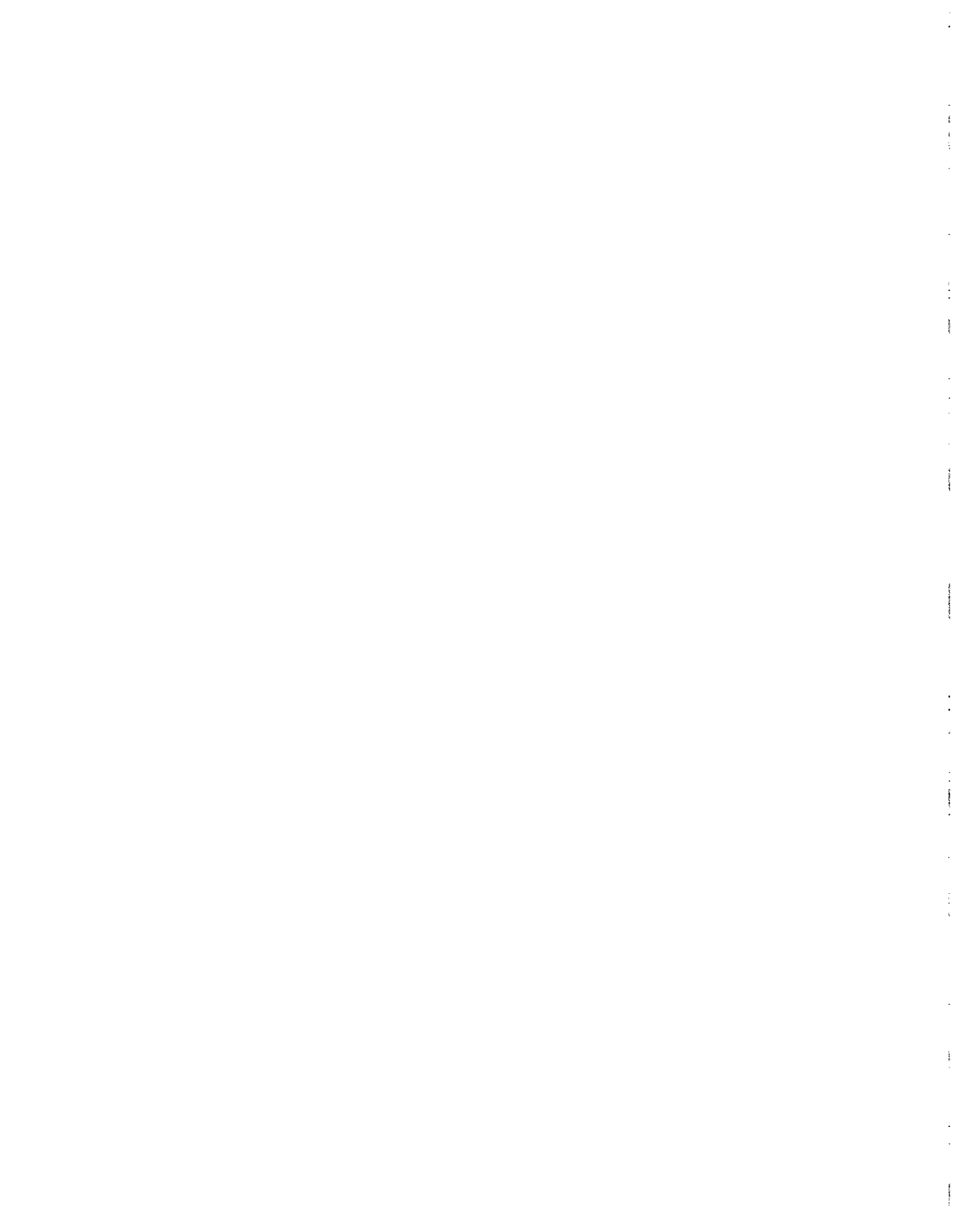
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ABBREVIATIONS

DOT	Department of Transportation
FWD	Front wheel drive
GAO	General Accounting Office
GM	General Motors Corporation
NHTSA	National Highway Traffic Safety Administration
ODI	Office of Defects Investigation
OVSC	Office of Vehicle Safety Compliance
R&D	Research and development
TSC	Transportation Systems Center
VIN	Vehicle identification number



CHAPTER 1

INTRODUCTION

In a January 5, 1983, letter, the Chairman, Subcommittee on Telecommunications, Consumer Protection, and Finance, House Committee on Energy and Commerce, requested that we review the Department of Transportation's (DOT's) National Highway Traffic Safety Administration's (NHTSA's) investigation of the alleged rear brake defects in the 1980 General Motors Corporation (GM) X-body cars (Chevrolet Citation, Buick Skylark, Oldsmobile Omega, and Pontiac Phoenix). The Chairman expressed concern that NHTSA's delay in determining whether there was a defect or ordering a recall of these cars could have grave and serious repercussions for the driving public.

Motor vehicles with safety defects are likely to cause traffic accidents, injuries, or deaths. A safety defect is any defect in the performance, construction, components, or material of a motor vehicle or related replacement item which subjects the public to unreasonable risks of accident, injury, or death. Each year the motor vehicle industry and the Federal Government spend millions of dollars on efforts to identify cars with safety defects so that traffic-related accidents can be reduced.

NATIONAL TRAFFIC AND MOTOR VEHICLE SAFETY ACT REQUIREMENTS CONCERNING THE RECALL AND CORRECTION OF CARS WITH SAFETY DEFECTS

Before 1966, the Federal Government had no legislation requiring the motor vehicle industry to do anything about safety defects. Basically, when safety defects were discovered, manufacturers could voluntarily and confidentially notify their dealers of the problem. The dealers, in turn, could pass on this information to any known owners. The manufacturers decided whether or not to correct the defects.

The voluntary method of identifying, recalling, and correcting safety defects did not always work. To improve this situation, the Congress enacted the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1381) on September 9, 1966, requiring manufacturers to correct safety defects in affected motor vehicles.

The act authorizes the Secretary of Transportation to test and inspect any motor vehicle or related replacement item to determine whether it contains any defects relating to motor vehicle safety. The Secretary also has the authority to conduct investigations and do research on motor vehicles with possible safety defects. If the Secretary (or a manufacturer) discovers such a defect, the manufacturer must recall the defective item. In doing so, the manufacturer must notify the owners of the

affected vehicles of the existence of the defect. The notification must contain, among other things, a clear description of the defect, the safety risk related to the defect, and steps to be taken to obtain remedy of the defect.

The act requires manufacturers to correct safety defects free of charge. That requirement is limited to cars and related replacement items not more than 8 years old and tires not more than 3 years old.

The Administrator, NHTSA, carries out the Secretary's responsibilities under the 1974 act. The Office of Defects Investigation (ODI), under NHTSA's Associate Administrator for Enforcement, investigates safety defects which account for the majority of cars recalled. ODI provides testing, inspection, and investigation necessary for the identification and correction of safety-related defects disclosed in foreign and domestic motor vehicles and appurtenant equipment, including investigations to determine odometer fraud.

The act also authorizes the Secretary to establish uniform Federal safety standards with which all motor vehicles and replacement equipment must comply. The Office of Vehicle Safety Compliance (OVSC), also under NHTSA's Associate Administrator for Enforcement, is responsible for assuring that manufacturers comply with those standards. OVSC provides the testing, inspection, and investigation necessary to assure compliance by foreign and domestic motor vehicle and equipment manufacturers with the Federal motor vehicle safety standards and regulations, recommendations to the Associate Administrator's notification to manufacturers of noncompliance with the standards, and the necessary investigations regarding bumper damageability, compliance with manufacturer fuel economy standards, and gas mileage guide regulations.

MILLIONS OF DEFECTIVE CARS AND
RELATED ITEMS HAVE BEEN RECALLED

From the date the motor vehicle recall program began in 1966 through April 1983, manufacturers initiated 3,982 recalls affecting nearly 133 million motor vehicles (foreign and domestic), tires and equipment as follows:

Summary of Safety Defect Recalls
September 9, 1966, through April 30, 1983

<u>Category</u>	<u>Number of recalls</u>	<u>Number of vehicles/components</u>
Domestic motor vehicles	2,769	84,040,767
Foreign motor vehicles	680	17,323,683
Tires a/	298	24,635,264
Equipment	235	6,895,242
Total	<u>3,982</u>	<u>132,894,956</u>

a/For the period January 1, 1971, through April 30, 1983.

About 17 percent of the recalls affecting domestic and foreign vehicles have been influenced by NHTSA's involvement. The remaining recalls have been initiated solely by the manufacturers. However, the NHTSA-involved recalls accounted for about 51 percent of the total motor vehicles recalled, indicating that NHTSA has generally considered the larger volume safety defect problems.

OBJECTIVES, SCOPE, AND METHODOLOGY

The Chairman stated in his letter that he had received reports that NHTSA was unnecessarily delaying its determination of the possible brake defects in GM's X-body cars and, most importantly, might be covering up the existence of very serious defects. The Chairman asked that we provide the Congress with answers to the following questions:

- If NHTSA has known about the possibility of a defect since 1979, why has the agency taken so long to order a recall of the X-body car or, alternatively, to close the defect investigation?
- What further information is needed to reach a conclusion regarding the presence of a safety defect or lack thereof?
- Why did NHTSA allow GM to recall only a small number of X-body cars--those with manual transmissions produced before July 1979--and not recall other 1980 X-body cars with both manual and automatic transmissions?
- In those cars that were recalled, is the remedy chosen adequate or does NHTSA have information which indicates that more should be done to ensure public safety?

We were also requested to determine the relationship of the X-body rear brake investigation to NHTSA's withdrawal of a February 1982 request for a proposal concerning a front wheel drive (FWD) vehicle braking and handling research project.

On January 14, 1983, NHTSA announced that it had made an initial determination that a safety-related defect existed in approximately 320,000 (later reduced to 240,000) 1980 GM X-body cars because their rear brakes tended to lock up as a result of moderate-to-hard braking. GM announced on February 9, 1983, that it was going to recall 240,000 cars. In its March 30, 1983, announcement of GM's proposed remedy, NHTSA stated that it would continue monitoring the performance of other 1980 and later X-body cars, including about 276,000 1980 model-year cars equipped with automatic transmissions and with the brake system proportioning valves found in all X-body cars built prior to August 29, 1979. During our review, there was also some uncertainty as to the preciseness of the 276,000 figure, and NHTSA was seeking to verify it.

These recent actions by NHTSA and GM essentially answered the questions on (1) what further information NHTSA needed to decide whether or not there was a safety defect and (2) whether the remedy chosen for the 47,371 cars recalled in August 1981 was adequate.

All the information contained in this report, including information concerning GM, was obtained from NHTSA documents and documents in their files as well as through interviews with current and former NHTSA employees. We did not review files at GM, and, therefore, we make no conclusions regarding GM's actions in this case.

We assessed the timeliness of NHTSA's actions on the GM X-body car rear brake lockup case and its allowing GM to initially recall a small number of 1980 X-body cars. We examined ODI's guidelines, policies, and procedures for conducting defect investigations. We compared ODI's actions in investigating the X-body alleged rear brake problem with the guidelines, policies, and procedures. We also reviewed legislation and regulations which describe NHTSA's and the manufacturers' responsibilities for recalling cars having safety defects. We recognize that this review encompassed a single defect investigation; however, the problems evident in this case were significant enough to warrant our commenting on NHTSA's policies and procedures for managing defect investigations.

Concerning ODI's handling of the GM X-body car investigation, we interviewed, at NHTSA headquarters, the former Associate Administrator for Enforcement; the former and present Directors, ODI; the Chiefs of the Engineering Analysis and Defects Evaluation Divisions, ODI; engineers in ODI and OVSC; the former Director and others in the Office of Public and Consumer Affairs; and the Director and a former technician at NHTSA's Vehicle and Research Test Center, Office of Research and Development, East Liberty, Ohio.

We reviewed NHTSA planning and the results of tests performed to identify (1) the conditions under which rear brake lockup occurred on these cars and (2) the components and/or

design characteristics that were responsible for or contributed to the problem. We did not attempt to evaluate the technical soundness of the tests' scopes and methodologies. Also, we have not tried to evaluate the propriety of NHTSA's decision to continue monitoring the performance of the more than 800,000, 1980 X-body cars that were not affected by the August 1981 or February 1983 recalls and later model years' cars.

With respect to the research proposal for front wheel drive vehicle braking and handling problems, we interviewed the Associate Administrators for Research and Development and Plans and Programs as well as others at NHTSA headquarters and at NHTSA's Transportation Systems Center, Research and Special Programs Administration, Cambridge, Massachusetts, involved in the preparation, review, and modification of that proposal.

During our review, we received an anonymous allegation that a key NHTSA official involved in the agency's investigation of the General Motors Corporation X-body car rear brake lockup problem violated DOT regulations on "Employee Responsibilities and Other Conduct" (49 C.F.R. part 99). We have referred these allegations to DOT's Office of Inspector General. These allegations included conflict of interest and misuse of travel funds.

As requested by the subcommittee, we did not forward this report to DOT for comment. However, we discussed the report's contents with NHTSA's Acting Administrator, Chief Counsel, and Acting Associate Administrator for Enforcement. On August 3, 1983, we apprised the Director, Industry-Government Relations, Manager, Transportation Issues; and Automotive Safety Engineer, GM's Washington, D.C., office, of specific items extracted from GM documents that we reviewed in NHTSA files and statements made by NHTSA officials concerning their contacts with GM officials that are mentioned in the report.

Except as noted above, we made this review in accordance with generally accepted government auditing standards.

CHAPTER 2

DEFECT INVESTIGATION INVOLVING REAR

BRAKE LOCKUP PROBLEM DELAYED

NHTSA's Office of Defects Investigation (ODI) reviews potential motor vehicle safety-related defects in two phases-- engineering analysis and formal investigation. Neither the engineering analysis nor the formal investigation of the alleged rear brake lockup problem with GM's 1980 X-body cars was completed in a timely manner.

On November 26, 1979, ODI opened an engineering analysis to look into the alleged rear brake lockup problem that some owners of GM's 1980 X-body cars were experiencing. Although ODI's goal is to complete an engineering analysis within 6 months, it did not complete this phase of the GM X-body rear brake case until July 1, 1981, 19 months after opening. Essentially, the only ODI action taken during the first 13 months of the engineering analysis was the May 27, 1980, letter requesting information from GM, 6 months after the case was opened. ODI guidelines provide that such requests be sent to the manufacturer within 2 weeks of a case's opening. The former Associate Administrator for Enforcement told us that the investigation should have been pursued more aggressively during this period.

ODI completed the engineering analysis report on June 26, 1981. The report recommended opening a formal investigation concerning rear brake lockup in GM's 1980 X-body cars equipped with manual transmissions. On July 2, 1981, ODI opened a formal investigation of the alleged rear brake lockup problem in all 1980 GM X-body cars.

Although ODI guidelines do not specify a time frame for completing formal investigations, we found numerous actions called for by ODI's guidelines that were never taken or delayed, including:

- A press release, which is normal practice, was not issued when the formal investigation was opened. Press releases are issued to notify the public of the potential safety problem and to obtain public information to help NHTSA determine the magnitude of the problem.
- An information request letter to the manufacturer (usually written soon after a formal investigation's opening) to solicit information needed to help assess the scope and nature of an alleged problem was not sent until December 17, 1982, about 18 months after the formal investigation was opened on July 2, 1981.
- An information request letter (usually sent out soon after a formal investigation's opening) to automotive magazines, consumer groups, and others interested in vehicle safety, was not sent.

--A contract to obtain detailed information from consumers who complained of having been involved in rear brake lockup incidents or stated that they had knowledge of accidents, injuries, or deaths resulting from such incidents was not awarded until March 22, 1983, nearly 21 months after the formal investigation was opened.

--An audit of the manufacturer's August 1981 recall of 47,371 X-body cars to determine, among other things, the adequacy of the repairs to correct the rear brake lockup problem was delayed about 5 months from when it was originally proposed. The audit should have been planned and implemented earlier because NHTSA questioned the adequacy of the remedy.

NHTSA conducted tests in July and November 1981 to identify the conditions under which rear brake lockup occurred and the causes of such lockup. NHTSA did not disclose to the public the existence of these tests until January 1983. These tests indicated that the most significant cause of the rear brake lockup problem was the "aggressive" brake linings used in the production of all manual transmission and certain automatic transmission 1980 X-body cars. Aggressive linings have greater friction per square inch than other brake linings.

Although ODI had information that indicated that GM's August 1981 recall might not be adequate to correct the rear brake lockup problem, it did not formally advise GM of its concern when GM proposed the remedy and did not aggressively pursue testing the affected cars or implementing the recall audit. In addition, ODI prepared a draft report in April 1982 in an apparent effort to close out the formal investigation.

By delaying or not taking these and certain required actions, NHTSA delayed the recall of cars with potential safety defects. Decisions regarding most of these actions were made by a single NHTSA official, with no apparent review by top agency officials.

In response to an October 15, 1982, petition from the Center for Auto Safety, ODI agreed to expand its formal investigation of 1980 GM X-body car rear brake lockup on December 8, 1982, to include 1981, 1982, and 1983 cars.

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In February 1982, NHTSA's Office of Research and Development (R&D) prepared a research proposal to obtain front wheel drive vehicle braking and handling performance data. The research had been suggested by the Associate Administrator for Enforcement and included proposed testing of X-body vehicles. During planning meetings held between March and August 1982, NHTSA officials did not assign the proposal high priority, and procurement activities for the proposal were terminated in October 1982. However, in May 1983 R&D prepared a proposal to

test and evaluate certain braking characteristics and stability in FWD vehicles. We were unable to determine whether NHTSA's decision not to award the February 1982 research proposal had any relationship to its investigation of the X-body cars' alleged rear brake lockup problem.

ODI INITIATES REVIEW OF REAR BRAKE
LOCKUP PROBLEM IN NOVEMBER 1979

ODI opened an engineering analysis in November 1979 to look into the problem of alleged rear brake lockup that some owners of GM's 1980 X-body cars were experiencing. This action was initiated in response to negative reviews in magazine and newspaper articles during May through October 1979 and consumer complaints it had received. The automotive magazine articles noted that the 1980 X-body cars experienced loss of control when making stops to achieve minimum stopping distance. ODI received its first owner complaint in July 1979, 3 months after the cars were introduced. This loss of control was attributed to rear brake lockup. Information on domestic automakers' efforts to produce front wheel drive cars and GM's introduction of the 1980 X-body cars and new braking system are presented in appendix VII.

The engineering analysis was made difficult in attempting to isolate and define the problem of the X-body rear brake lockup because there were no broken parts associated with the alleged defect. Under these conditions the safety defect is not readily apparent and the failure might involve a system malfunction, a manufacturing production problem, and/or a design problem. In such cases, consumers can rationalize that they did something wrong, it won't happen again, it never fails for the mechanic, or that they will have to live with the problem. According to the case engineer, these statements are typical of consumer complaints received by NHTSA involving the rear brake lockup problem. The ODI formal investigation engineer advised us that such attitudes, coupled with no broken parts, cause many people to hesitate about writing to NHTSA. He said this is one reason why public notification on a potential problem is important to the development of a case.

ENGINEERING ANALYSIS WAS DELAYED

The engineering analysis was initiated on November 26, 1979, and was completed on July 1, 1981. ODI's goal is to complete an engineering analysis within 6 months; however, in the case of the X-body car rear brake problem, it took 19 months. Except for sending an information request letter to GM on May 27, 1980, the engineering analysis was inactive during the period November 1979 through December 1980. The former Associate Administrator for Enforcement told us that the investigation should have been pursued more aggressively during this period. Also, the Acting Administrator, the Chief Counsel, and the Acting Associate Administrator for Enforcement stated

that the case should have been pursued more aggressively during this period.

ODI guidelines indicate that an initial information request letter should be sent to the manufacturer within 2 weeks after an engineering analysis is opened. However, agency files show that the Acting Director, ODI, sent an information request letter to GM dated May 27, 1980, and indicated that it had received 23 reports of rear brake lockup and skidding in 1980 X-body cars. The letter requested information on production figures for the 1980 X-body cars, reports of complaints alleging rear brake lockup problems, accident reports and GM's investigation thereof, recall data, service bulletins, production design changes, brake system component data, any analysis of this hazard by GM, and any lawsuits due to the alleged rear brake lockup problem.

The information request letter is important because (1) ODI needs pertinent information from the manufacturer to identify and analyze potential safety-related defects and (2) the manufacturer is made aware of the potential safety problem and can begin its own investigation, which may lead to a voluntary recall to repair the vehicles involved.

In a reply dated July 21, 1980, GM provided the information requested and stated that it had not conducted any recall campaigns, issued any service bulletins, made any warranty changes, or issued other instructions to dealers involving rear brake lockup in the subject cars. GM concluded that the consequences of premature rear brake lockup, if experienced, in any motor vehicle may involve some degree of change in the orientation of that vehicle.

NHTSA files contain no evidence that ODI actively pursued the investigation until late 1980 when the engineering analysis file was transferred to another staff engineer--the third engineer to be assigned to the review since November 1979.

The engineering analysis received increased attention beginning in January 1981 when ODI sent a second letter to GM requesting an update of the information forwarded in its letter of July 21, 1980. ODI provided GM with an additional 59 consumer complaints received by NHTSA and indicated that there were reports involving 20 accidents with 4 injuries. ODI stated that because of the potentially serious consequences resulting from this condition, it was requesting GM to review all the information it had available and advise ODI of the action planned to remedy this continuous problem. In a reply dated March 11, 1981, GM provided the information that ODI requested and stated that the only production changes that may be responsive to ODI's concern about rear brake lockup in GM's 1980 X-body cars involved a variation in the proportioning valve function from 41 percent to 27 percent. This change in valves would reduce the hydraulic pressure applied to the rear brake system. GM stated that this valve was introduced into production and service stock during August 27-29, 1980, and was applicable to all 1980 X-body

cars regardless of brake or transmission options. GM added that the 27-percent valve was substituted to effect a rebalance of the front to rear ratio in favor of the lightly loaded operating condition which proved to be more representative of typical customer usage. The proportioning valve is discussed in greater detail in appendix IV.

The engineering analysis generally followed prescribed procedures during the period January to June 1981. For example, owner complaints and accident reports were obtained and analyzed. A breakdown of this information for GM's 1980 X-body cars is as follows.

ODI and GM Complaints
and Accident Reports

Complaints and reports	<u>a/212</u>
Alleged accidents	58
Alleged injuries	14
Alleged fatalities	<u>b/1</u>

a/Includes ODI data as of June 2, 1981, and GM data as of March 11, 1981.

b/ODI had been unable to obtain any more than preliminary information on this accident.

Also, technical data on the vehicle production figures and design changes was obtained and analyzed. This data was furnished by GM in its letter dated March 11, 1981, in response to ODI's request of January 2, 1981. This information principally involved the proportioning valves, rear brake drums and linings, and parking brake cable routing. Further, a test work plan was completed in May 1981 to identify the causes of the GM 1980 X-body cars' rear brake lockup. A more complete discussion of the braking components and the vehicle testing are presented later in this chapter and in appendix VII and appendix IV, respectively.

The results of ODI's engineering analysis of the alleged problem of rear brake lockup during moderate-to-hard braking was presented in its June 26, 1981, report to the Director, ODI. The report concluded that the defect in manual transmission 1980 X-body cars appeared to be the aggressive rear brake lining in combination with the 41-percent proportioning valve. The report recommended that a Defects Review Panel meeting be held to initiate a formal investigation involving premature rear brake lockup in GM's 1980 X-body cars equipped with manual transmissions.

On July 1, 1981, the defects review panel met to review the X-body cars' rear brake lockup problem. The panel was made up of representatives from ODI, Chief Counsel, and Public and

Consumer Affairs. The panel members review the various documentation analyzed by the engineer and decide whether to open a formal investigation, close out the review, or request that further information be obtained before making a decision. The panel decided that the evidence presented at the meeting warranted opening a formal investigation involving rear brake lockup in all 1980 X-body cars, including manual and automatic transmissions. A formal investigation case was opened on July 2, 1981.

Although the engineering analysis report concluded that only cars with manual transmissions be included in the formal investigation, the ODI engineer who conducted the engineering analysis said that the analysis of consumer complaints showed both models had alleged rear brake lockup problems. He advised us that the complaint rate as of June 1981 for the manual transmission cars was higher than automatic transmission cars--29.5 to 3.47 per 100,000 cars, respectively. This was the basis for concluding in the engineering analysis report that manual transmission cars posed the greatest problem. According to the ODI engineer, the panel concluded, however, that the complaint rate for the automatic transmission cars was significant enough to include them in the case.

GUIDELINES NOT FOLLOWED IN FORMAL INVESTIGATION

On July 2, 1981, ODI opened a formal investigation on all GM 1980 X-body cars concerning the alleged rear brake lockup problem. Our review of the available files and interviews with NHTSA officials disclosed that important aspects of the guidelines were not followed in handling the formal investigation of the rear brake lockup problem. Except for the press release, the decisions regarding these actions were made by the former Director, ODI, with no apparent review by top agency officials.

Press release not issued when formal investigation was opened

Although ODI's guidelines indicate that a public advisory (press release) should be prepared and coordinated with NHTSA's Office of Public and Consumer Affairs when opening a formal investigation, a press release was never issued by NHTSA for the X-body rear brake lockup investigation, which was opened on July 2, 1981. We were unable to determine why the press release was not issued. Press releases are important because they receive widespread circulation and request vehicle owners experiencing similar problems with their cars to contact NHTSA. Thus, it puts the public on notice and also assists NHTSA in determining the magnitude of the problem.

In March 1983, the House Subcommittee on Telecommunications, Consumer Protection, and Finance; Committee on Energy and Commerce, held hearings on NHTSA's defect and recall program. At these hearings, the Administrator stated that the defects review panel makes the the decision as to whether or not a press release should be made. He indicated that in this particular case a decision had been made, apparently, to issue a press release upon opening a defect investigation case. Also, the Administrator stated that events rapidly overtook that situation and GM itself put out a press release. The Administrator stated that he had not made the decision that a press release would not be issued by NHTSA upon opening of the formal investigation concerning the X-body cars' rear brake lockup problem in July 1981.

ODI's case engineer said that summary information on the rear brake lockup problem presented at the July 1, 1981, meeting was made available to the public and Consumer Affairs representative. In response to our inquiries, a NHTSA Public Information Specialist told us that he had drafted a press release and it was sent to the Director, Public and Consumer Affairs, for various clearances. The Director, Public Affairs Division within that office, told us that he remembered that a press release was drafted, but there is no evidence to indicate that the draft was prepared nor what happened to the draft. The former Director, Public and Consumer Affairs, advised us that he has no recollection of the draft press release in question. He did indicate that while he was Director, he had never stopped the issuance of any press releases involving formal investigations.

To obtain insight into NHTSA's past practice with respect to the issuance of press releases when opening formal investigations, we examined cases opened during the years 1979 through 1982. The results are as follows.

Comparison of Formal Investigations Opened
and Press Releases Issued on Such Openings
During Calendar Years 1979 through 1982

<u>Calendar year</u>	<u>Formal investigations opened</u>	<u>NHTSA press releases issued</u>
1979	10	10
1980	5	5
1981	<u>a/3</u>	0
1982	<u>b/7</u>	<u>6</u>
Total	<u>25</u>	<u>21</u>

a/Case C 81-07, American Motors General concerning bus doors. Case opened on February 6, 1981, and a press release was not issued because there were only 11 known locations affected by the potential problem and each transit authority was contracted by NHTSA.

Case 81-02, Volkswagen concerning throttle cable. Case opened on January 9, 1981, and a press release was not issued because the manufacturer notified NHTSA of recall on January 23, 1981, and issued its own press release.

Case C 81-09, General Motors Corporation concerning rear brake lockup. Case opened on July 2, 1981, and a press release was not issued. The manufacturer notified NHTSA of a recall on August 5, 1981, and issued its own press release on August 21, 1981. The case is the subject of this report.

b/C 82-021, Nissan Company concerning problem with tail light. Case opened on August 30, 1982, and a press release was not issued because the manufacturer notified NHTSA of recall on September 8, 1982, and issued its own press release.

The Chief, Defects Evaluation Division, ODI, and the formal investigation engineer advised us that except for the GM rear brake lockup case, a decision not to issue press releases in the previously mentioned three cases was probably acceptable because of the nature of the defect. They stated that the rear brake lockup potentially represented a serious problem involving a significant number of cars, and therefore a press release was warranted in order to obtain owners' experience for use in assessing the matter.

Information request letter not sent
when formal investigation opened

Upon opening a defect investigation case, ODI's guidelines provide that the manufacturer be notified that NHTSA is opening

a defect investigation involving the manufacturer's vehicles. This letter advises the manufacturer that an information request will be forthcoming. ODI has normally followed the practice of both calling the manufacturer and sending a formal letter which indicates that a case has been opened and provides a resume of the problem. The former Director, ODI, told us that he telephoned GM officials on July 1, 1981 (the same day the panel decided to go ahead with a formal investigation), to notify them that a defect investigation case on the 1980 X-body cars' rear brake lockup problem was opened. However, according to the Chief, Defects Evaluation Division, ODI, and the formal investigation engineer, a letter notifying GM of the case opening was never sent.

The ODI formal investigation engineer advised us that he did not draft an information request letter to GM on the X-body rear brake lockup problem shortly after the case opened in July 1981. The former Director, ODI, told us that ODI did not send out an information request at the time the formal investigation was opened on July 2, 1981, because he believed that ODI needed more testing data and data on the adequacy of the remedy to correct the problem on those X-body cars with manual transmissions that were produced before August 27-29, 1979, with the 41-percent proportioning valve. He said this information was needed to ask specific questions of GM concerning the rear brake lockup problem.

Regarding the notification letter, ODI sent a letter to GM dated July 6, 1981, concerning alleged premature rear brake lockup in 1980 X-body cars. The ODI letter stated that the rear brake systems of the 1980 X-body cars (utilizing the 41-percent valves and aggressive brake linings) contain an engineering defect which has safety-related implications. That letter further stated that current information indicated to ODI that the problem was much more prevalent among 1980 X-body cars equipped with manual transmissions. (ODI's July 6, 1981, letter did not mention that NHTSA had opened a formal investigation.) That letter stated that in view of the seriousness of this situation and the continuing receipt of complaints by ODI, GM was urged to review this matter. ODI requested that GM respond within 5 working days, stating its planned corrective action. In a reply dated July 8, 1981, GM stated it did not agree that the subject vehicles contained an engineering defect with safety-related implications. However, GM stated that to preclude the possibility of prolonged and costly litigation procedures which would ensue, it agreed to initiate a recall for the involved vehicles.

ODI's files contained a draft of a notification letter, along with a case resume. The Chief of ODI's Defect Evaluation Division and the formal investigation engineer advised us that the draft notification letter was first forwarded on July 2, 1981, to the Office of the Director, ODI. They said that a copy was again forwarded to that office on August 4, 1981; however, the letter was never sent to the manufacturer. The Chief and the formal investigation engineer told us that they were never

offered an explanation of why the letter was not sent to GM. The draft notification letter indicated that a formal investigation was opened on July 2, 1981, and stated that an information request would be forthcoming. The notification letter, if sent, would have put GM on notice that ODI had officially opened a formal investigation on the rear brake lockup problem, whereas ODI's July 6, 1981, letter to GM asked what actions GM intended to take.

On December 17, 1982--almost 18 months after the case was opened--ODI sent an information request to GM and requested, among other things, that all lawsuits be identified in which it is or was a defendant against allegations of the rear brake lockup problem. ODI also requested a description of design or other changes that would relate to the rear brake lockup tendency. In a reply dated January 31, 1983, GM stated that it had lawsuits involving nine such incidents and stated that the only change relating to the rear brake lockup was to change the proportioning valve from the 41-percent to the 27-percent.

Information request to media and consumer groups not sent

ODI's guidelines state that an information request be sent to the media, consumer groups, General Services Administration, and others that could reasonably be expected to have information on the vehicles in question. However, according to the formal investigation engineer and the Chief, Defects Evaluation Division, no such requests were sent to these groups during the formal investigation on GM's 1980 X-body cars' rear brake lockup problem.

The files show that a draft request was prepared on two occasions indicating that ODI had initiated an investigation and soliciting any information concerning the problem. A list of addresses indicated the request was to be sent to five consumer groups, six magazines, the State of California, the Canadian Ministry of Transport, and the General Services Administration. According to ODI's formal investigation engineer, drafts of these documents dated July 2, 1981, and August 4, 1981, were forwarded to the ODI Director's office, but were not sent. Because of GM's indication on July 8, 1981, that it would recall some vehicles, the former Director, ODI, told us that there was no need to send the requests at that time. We believe that these requests should have been sent when GM announced its remedy in August 1981 because at that time ODI had information which indicated that the proposed remedy might not have been adequate.

Interviews of owners and others were delayed

Another ODI technique that is used in conducting a defects investigation is interviewing individuals who (1) have complained that their vehicle has the defect under review or (2)

have knowledge of an accident or fatality that allegedly resulted from such defect. These interviews are generally performed by NHTSA contractors early in the investigation. According to the case engineer, he did not seek to contract for such interviews as a part of the defects investigation of the GM X-body cars' rear brake lockup problem before early 1983.

The case engineer on February 8, 1983, initiated a procurement request for a contractor to "interview vehicle owners, drivers, and other necessary persons who have knowledge of the facts concerning the alleged accidents involving injury and/or death."

A March 22, 1983, task order was issued under an existing contract for interviews of individuals knowledgeable about 13 deaths allegedly resulting from 10 incidents involving rear brake lockup of X-body cars, plus 7 additional accidents as received by ODI. This action was 19 months after the formal investigation was opened. The final costs for the task order will be determined through negotiation after the work has been completed--not to exceed \$17,011.

The task order's statement of work calls for the contractor to

- determine if the vehicles involved were, in fact, GM X-body vehicles;
- determine if the cause of the accident was related to the rear brake lockup problem;
- obtain a complete description of the accident events; and
- determine if the people died as a result of injuries received during the accident, and whether they died within 30 days of the accident.

As of May 24, 1983, the contractor had completed interviews and submitted reports on 9 of the 10 incidents (one incident had been deleted from the task order) involving fatalities allegedly due to rear brake lockup that the ODI project monitor had requested. At that time, ODI had not completed its assessment of these reports.

Recall audit delayed by NHTSA
and incomplete GM data

In February 1982, the Engineering Analysis Division, ODI, prepared a list of 10 manufacturers' recall campaigns as candidates for audit. The audits are conducted primarily to determine whether owners have responded to the recall, but are also a valuable source of information concerning any problem after the recall work has been performed. The Chief, Campaign Analysis Branch, Engineering Analysis Division, who is responsible for such audits, told us that audits of recalls are usually done 6

to 9 months after a recall is initiated. He said it is at that point in time when owners' participation in the recall campaign starts to drop off. In February 1982 when the list was prepared, the 10 recalls had been in process between 1-1/2 to 15 months. Although GM's recall of the affected 1980 X-body cars had been announced only 5 months earlier (August 21, 1981), the information ODI had available as of August 1981, such as preliminary testing data, raised questions about the adequacy of GM's remedy. According to the Chief, Defects Evaluation Division, and the formal investigation engineer, this warranted ODI's promptly initiating its effort to audit the recall. They said that ODI could have reasonably begun the process as early as October 1981 because of the leadtime required to actually send out letters to owners.

In May 1982 the former Director, ODI, approved all the recalls for audit, except the recall involving the X-body cars' rear brake lockup recall. The Chief, Campaign Analysis Branch, told us that they never received an explanation as to why the former Director, ODI, had rejected the audit of this recall. The former Director, ODI, told us that by February 1982, he felt it was not necessary to spend funds to audit GM's August 1981 recall because it was evident that GM still had a problem with the 1980 X-body cars' rear brakes locking up. Also, he said that his later approval of the audit in July 1982, 5 months after it was originally proposed, was to further substantiate that there was a problem with the braking on the 1980 X-body cars in order to help build the strongest case possible. The former Director, ODI, told us that by this time he was starting to share the formal investigation engineer's concerns about the adequacy of GM's remedy.

Problems with GM-furnished data

On July 13, 1982, ODI requested GM to provide information on its 1980 X-body car recall campaign, including the vehicle identification numbers (VINs) of the vehicles involved, the names and addresses of the vehicle owners, and the identification of those vehicles on which the recall work had been reported completed. ODI requested that this information be sent on magnetic tape. GM responded on August 12, 1982, to ODI's request and provided the magnetic computer tapes of vehicle owners' names and addresses to NHTSA's contractor that sends out the audit letters to car owners. On September 23, 1982, NHTSA's contractor sent audit letters to "owners" of the 47,371 recalled X-body cars. In the audit letter, the contractor asked the owner to help NHTSA evaluate the effectiveness of the safety defect recall campaign and its impact on highway safety by punching out the answers to questions on a computer-readable card. The questions include:

- Did you get notice of this recall from the manufacturer?
- Did you get corrective work done? If yes, was work done within 60 days or over 60 days? If no, was it because parts were not available or dealer refused or your choice?

The letter asked for comment on any problems experienced after the recall work was performed and what was done to remedy such problems.

According to the Chief, Campaign Analysis Branch, the contractor checked the beginning of the magnetic tapes and they appeared to be correct. However, shortly after the audit letters had been sent, the contractor received some of the cards from Chevrolet Citation dealers instead of Citation owners. The Chief, Campaign Analysis Branch, advised us that the tapes furnished by GM included, in some cases, the names of the Chevrolet dealers instead of the owners' names.

On October 6, 1982, ODI told GM that there was a problem with the Chevrolet Division's tape and requested correct data. On October 18, 1982, GM provided a second tape which NHTSA's contractor processed and found still contained the dealers' names. Early in December 1982, GM advised ODI by telephone that owner information was on microfilm and on January 14, 1983, provided a microfilm of the recalled vehicles' vehicle identification numbers and owners' names.

Because ODI had experienced a problem in obtaining the necessary owners' names to conduct an audit of the recall, early in December 1982 it sought NHTSA's Chief Counsel's assistance in dealing with GM. On January 28, 1983, NHTSA's Chief Counsel sent a letter to GM seeking information to determine whether GM's failure to furnish the list of owners had violated the National Traffic and Motor Vehicle Safety Act or the regulations applicable to defect recalls and reporting. GM replied on February 10, 1983, and included a computer tape containing the name and address of the current owner, the vehicle identification number, and the recall status for the Chevrolet Citations covered by the August 1981 recall campaign. Because addresses were not available for all owners of the Chevrolet Citations included in the August 5, 1981, recall, ODI's contractor was able to mail audit cards to only about 16,610 of the 47,371 owners of the affected 1980 X-body cars. That represented only 35 percent of the owners whose vehicles were included in this recall. Normally, ODI mails audit cards to 100 percent of owners whose cars are recalled when it conducts an audit of a recall involving 100,000 vehicles or less. The Chief Counsel is currently reviewing the adequacy of GM's compliance in maintaining and providing information necessary for performing an audit.

The Chief, Campaign Analysis Branch, ODI, advised us that the audit is being closed out. He provided us with statistical data on the audit which shows that of the 16,610 audit cards mailed to owners, 5,203, or 31.3 percent, were returned as of January 6, 1983. Of the 5,203 cards only 505 contained written comments. ODI's analysis of 505 cards showed that 288 owners indicated that the corrective action taken by the dealers did not solve the problem.

Allegation concerning closeout memorandum

ODI's case engineer advised us that during March 1982 the former Director, ODI, instructed him to prepare a closeout memorandum for the 1980 X-body brake lockup case. The case engineer provided us with several versions of a draft closeout memorandum prepared during the period April 1, 1982, through June 24, 1982. ODI's case engineer advised us that the former Director of ODI approved a draft closeout letter in late June 1982; however, the draft was never finalized and sent forward for approval by other offices within NHTSA. According to the formal investigation engineer, the former Director, ODI, objected to certain language contained in the initial draft closeout memorandum, which stated that it appeared from the consumer complaints that the GM recall proportioning-valve fix was not correcting the rear brake lockup problem and that the less aggressive rear brake linings were needed. The final version of the draft closeout memorandum in June 1982, as approved by the former Director of ODI, made no mention that the recall fix did not work or that less aggressive rear brake linings were needed.

The former Director, ODI, told us that he did not know why ODI's case engineer prepared a draft closeout memorandum for GM's 1980 X-body cars' rear brake lockup case. He said that they usually wait about 6 months to determine whether the fix was a satisfactory solution to the problem. Also, he stated that it would have been inappropriate for the draft closeout memorandum to discuss the brake linings because GM's proportioning-valve remedy might have solved the problem and any reference to the linings would make the agency look bad if the manufacturer's action was adequate. The former Associate Administrator for Enforcement told us that he had no knowledge about the closeout memorandum; however, he said a closeout memorandum would have been inappropriate and questioned whether it would have been finalized since it would have been reviewed by others outside ODI, including the Chief Counsel's Office, if it had been pursued by ODI. We were unable to determine who initiated the preparation of the closeout memorandum.

TESTING OF 1980 X-BODY CARS

ODI and OVSC within the Office of the Associate Administrator for Enforcement, NHTSA, conducted several tests of GM's 1980 X-body cars between mid-1979 and late 1981. ODI conducted tests of these cars' rear brake lockup tendencies in July 1981 and November 1981. OVSC had completed its tests of these cars' ability to comply with Federal Motor Vehicle Safety Standard 105, Hydraulic Brake Systems, and other informal tests in late 1979.

ODI did not make maximum use of all available test results to (1) formally advise GM that it had reservations about the remedy used by GM for the 47,371 cars recalled in August 1981 and (2) aggressively pursue its detailed vehicle testing to determine whether a safety defect existed in many of the 1980 X-body cars. We found that

--the scope of the ODI testing was reduced from that proposed by its safety engineers, thereby possibly weakening ODI's ability to identify the causes and conditions under which X-body cars experienced rear brake lockup, and

--the existence of preliminary test results and the final report on the instrumented tests were not publicly disclosed immediately after their completion.

The OVSC tests demonstrated that the 1980 X-body cars had a potential problem with loss of vehicle control due to rear brake lockup which needed further testing. ODI's tests showed that during moderate-to-emergency braking efforts, the X-body cars' rear brakes locked up under certain conditions before or in the absence of front brakes locking up. Also, these tests indicated that the type of rear brake lining used on most manual transmission and some early automatic transmission 1980 X-body cars was the most significant contributing cause of rear brake lockup.

Details on both ODI and OVSC performance of tests and the test results are presented in appendix IV.

Scope of testing was reduced

ODI's guidelines for managing an engineering analysis state that preliminary testing should be considered to identify the defect as well as the possible safety consequences involved. Its guidelines for conducting formal investigations of defects call for consideration of new or additional testing to confirm the existence of a defect (if not previously done) or to determine the consequences of the defect.

At ODI's request, NHTSA's Engineering Test Facility, Vehicle Research and Test Center, East Liberty, Ohio, conducted preliminary tests in July 1981 and more formal instrumented tests in November 1981 of the 1980 X-body cars' braking performance.

Numerous revisions were made to the scope and methodology of the testing plans that were conducted in July and November 1981. These revisions were made--according to the ODI engineers assigned to the case during the engineering analysis and the formal investigation and the Chief, Defects Evaluation Division--mostly at the insistence of the former Director, ODI. In their view, ODI's conducting preliminary tests in July 1981 caused some delay in completing its formal investigation. They added that ODI more appropriately should have conducted the formal instrumented tests as outlined in the test request submitted to NHTSA's test facility on May 5, 1981.

The former Director, ODI, said that by May 1981 he had decided to submit the problem to an internal panel that decides whether or not ODI has enough information to support the opening of a formal defect investigation case. In his view, it would

not have been efficient to use resources for testing at that point. He said that GM agreed to recall some X-body cars in July 1981. However, because of concern expressed by the ODI safety engineers responsible for this case as to the adequacy and extent of GM's proposed fix, the former Director, ODI, said that additional testing was subsequently approved and conducted.

ODI started its planning of tests to be conducted on the 1980 X-body cars in February 1981. From February to April 1981, ODI engineers considered the types of testing to be conducted and the variables and parameters to be measured. By April 10, 1981, a test plan had been drafted to

- identify the exact vehicle operating conditions (or range thereof) which produce or contribute to rear brake lockup on 1980 GM X-body cars and
- identify the 1980 GM X-body car components and/or design characteristics which are responsible for or contribute to rear brake lockup.

Under that plan, ODI would have tested two 1980 GM X-body cars (one equipped with automatic transmission and the other with a manual transmission) and a 1980 Dodge Omni as a representative peer group vehicle. The tests were to be of specific brake maneuvers, under varying vehicle operating conditions such as load and brake system component configurations.

According to the the formal investigation engineer and the Chief, Defects Evaluation Division, by April 23, 1981, ODI had reduced the scope of its proposed plan to test only the 1980 X-body cars' brake system at the direction of the former Director, ODI. However, the modified plan stated that pending test results on the 1980 X-body cars, a 1981 X-body car might be tested. The test plan remained essentially the same with respect to its purpose, braking maneuvers to be tested, surfaces on which the tests were to be conducted, brake system component configurations to be tested, and parameters to be recorded.

The April 23, 1981, version of the test plan called for NHTSA's test facility to complete all testing and furnish ODI a final report by July 1, 1981. This plan was sent to the test facility on May 5, 1981. ODI engineers assigned to this case visited the test facility on May 20 and 21, 1981, to discuss this test plan with the personnel who were to conduct the tests. However, those ODI engineers and the Chief, Defects Evaluation Division, told us that shortly after their return from the test facility, the former Director, ODI, decided that before conducting formal instrumented tests, he wanted to conduct "uninstrumented preliminary" tests to assure that the 1980 X-body cars' rear brakes would, in fact, lock up and affect their stability.

On July 8 and 9, 1981, the uninstrumented preliminary tests were conducted on a 1980 manual transmission-equipped Buick Skylark that NHTSA's test facility purchased. After the preliminary tests were completed in July 1981 and GM had agreed to its

recall, ODI safety defect engineers began modifying the May 5, 1981, test plan. According to the ODI engineer and the Chief, Defects Evaluation Division, the former Director's decisions during July and early August 1981 resulted in the plan for the tests eventually conducted in November 1981 being reduced in scope so as to possibly weaken ODI's ability to identify the causes of and conditions under which X-body cars experienced rear brake lockup. Regarding the reduced scope of testing, the former Director, ODI, said that none of the professional engineers had brought to his attention that reducing the number of cars from four to one to be tested might weaken ODI's ability to identify the causes of and conditions under which X-body cars experience rear brake lockups.

On July 22 and 23, 1981, the ODI formal investigation engineer discussed the test proposal, as revised, with personnel at NHTSA's test facility. That proposal provided for the testing of four vehicles: a Buick Skylark, a Chevrolet Citation, a Ford Mustang or Capri, and a Chrysler K-car or Dodge Omni. By July 28, 1981, the Ford Mustang/Capri had been deleted from the proposal. A total of 738 runs were to be made of the three remaining cars to be tested. ODI estimated that it would cost \$57,000 to conduct this test request, including \$18,750 for the three cars. The request was submitted to the former Director, ODI, on July 29, 1981. In a note transmitting this draft to the former Director, ODI, the Chief, Defects Evaluation Division, stated that ODI had to carefully determine what GM was going to do as a result of its recall and the problems it would solve. According to the ODI engineer and the Division Chief, the former Director, ODI, decided that only the 1980 Chevrolet Citation should be tested at an estimated cost of \$10,000. A test request reflecting this and other changes was submitted to the test facility on August 13, 1981. NHTSA's test facility was to submit a work plan for conducting these tests to ODI by August 24, 1981. The test facility was to complete the tests and prepare a final report summarizing all work performed and results obtained by September 30, 1981.

On August 27, 1981, NHTSA's test facility furnished a plan for conducting the requested test at an estimated cost of \$30,300 (included \$6,350 for the car). The tests were to be completed about 20 days after their start. The test facility was to submit a draft report to ODI within 30 days of the last test and a final report within 30 days of the receipt of ODI's comments on the draft report. The former Director, ODI, approved the test facility's proposed test plan and estimated costs on September 11, 1981. There was no indication of how long it might take to prepare for the tests. The tests were started on November 4, 1981. The test facility project engineer assigned to conduct the tests told us that this was not an unreasonable time lapse because equipment needed for the tests, including instrumentation and brake components, had to be purchased. The instrumented tests of the 1980 Chevrolet Citation were completed on November 19, 1981.

Preliminary and instrumented tests not publicized

According to the two ODI safety engineers and the Chief, Defects Evaluation Division, who were involved in the July 1981 and November 1981 testing of the 1980 X-body cars, the former Director, ODI, stated that there was to be no publicity of the tests' performance.

Preliminary tests

The two ODI safety defects engineers visited the test facility on July 8 and 9, 1981, to assist in conducting the uninstrumented preliminary tests. The formal investigation engineer and the Chief, Defects Evaluation Division, told us that the former Director, ODI, stated that there was to be no publicity of this testing, no written test plan, the tests were not to be instrumented, and no summary report prepared on their results. Although these tests were not instrumented, they were videotaped. The former Director, ODI, told us that he had no recollection of telling the professional staff that there would be no publicity of the July 1981 testing of the 1980 Buick Skylark. The former Director, ODI, also told us that the reason for not having a written test plan, instrumented tests, and a summary report was because the effort was to be done quickly and was aimed at getting an indication of the lockup problem. He said that it was his goal to have GM recall the cars and make the necessary repairs to the braking system. Further, he told us that during the July 1981 time period, he was not sure if the problem was the proportioning valve, the brake linings, or something wrong with the total braking system.

The ODI engineers used a June 24, 1981, handwritten plan to conduct these tests that was basically the same as the test plan furnished to the test facility on May 5, 1981, except for the number of cars to be tested and the parameters to be recorded.

The ODI engineers who participated in the performance of tests told us that the former Director asked that they telephone him once the preliminary test results were known. According to these engineers, the former Director was advised of these results and he telephoned GM's Director, Product Investigations, Engineering Staff, to inform him of those results. The ODI safety engineers said that the former Director, ODI, called them back on the same day to say that GM's Product Investigations Director had asked some questions that he was unable to answer concerning the tests. They said that the former Director, ODI, instructed them to call GM's Director and provide him more details on the test results.

The former ODI Director told us that GM should be fully aware of the preliminary test results and convinced that ODI was trying to cooperate in solving the alleged rear brake lockup problem. However, the ODI engineers told us that office policy, as they perceived it, was normally not to share test data with a manufacturer because of the possibility that ODI might have to

eventually use such data in court to seek that manufacturer's correction of a safety-related defect. The former Associate Administrator for Enforcement told us that it is not ODI practice to tell a manufacturer the results of tests. He said the manufacturer should only be told that ODI conducted such tests prior to ODI making an initial determination. Also, he said that only the Director, ODI, should inform the manufacturer that the tests support ODI's position without giving specifics on how the tests were conducted and what they showed.

The ODI engineer who handled the engineering analysis said that he called the GM Director to tell him about the preliminary tests' results as the former Director, ODI, had instructed. Although he could not recall exactly how much detail was provided, he said that the GM Director was told that based on the tests, the 1980 X-body cars' rear brake lockup problem appeared to be due to more than just the 41-percent proportioning valve. The ODI engineer said that the GM Director was told that the aggressive type of brake lining used on the manual transmission-equipped cars appeared to be a major part of the problem. He said that his comments were qualified on the basis of the tests having been preliminary.

The informal test plan used to conduct the July 1981 tests and the results of those tests were placed in ODI's public file on January 13, 1983, 1 day before NHTSA made its initial determination that a safety-related defect existed in all manual transmission, and some early production automatic transmission, 1980 X-body cars.

Instrumented tests

We found no evidence that ODI made any effort to delay the test facility's preparation of a final report on its instrumented November 1981 tests. The test facility submitted that report to ODI on June 14, 1982, about 7 months after the tests were completed. The existence of that report was not made public, however, until January 7, 1983--more than 6 months after its submission to ODI.

The test facility project engineer and the Director, Vehicle Research and Test Center, told us that there was no suggestion from or attempt by ODI to delay its submission of the final test report. They said that the project engineer worked full time on the data analysis and preparation of the report after the test runs were completed. As noted by the former Associate Administrator for Enforcement, the preparation and submission of the final report probably could have been completed sooner if additional personnel and resources had been used. NHTSA's test facility determines its own priorities.

On March 31, 1982, the test facility submitted its draft report on the November 1981 Chevrolet Citation tests to ODI. The transmittal memorandum from the Director, Vehicle Research and Test Center, stated that the final report would be submitted within 30 days after receipt of ODI's comments. The ODI case

engineer said that the former Director, ODI, would not allow any written comments to be sent to the test facility on the draft report. He said that he furnished his oral comments on May 5, 1982 and they were mostly editorial.

The test facility submitted its final report on June 14, 1982, and ODI received it on June 21, 1982. The ODI formal investigation engineer and the Chief, Defects Evaluation Division, told us that the former Director, ODI, on June 25 or 28, 1982, took all copies of the final report submitted by the test facility. The Chief, Engineering Analysis Division, said that the former Director, ODI, brought him copies of the final June 1982 test report "to hold for security purposes." The Chief, Engineering Analysis Division, gave the report to the safety engineer who had been assigned the case during its engineering analysis phase for safekeeping. According to the case engineer, he received the reports on or about July 1, 1982.

ODI's policy on the handling of test results completed during the engineering analysis or formal investigation phases of a case was not written. The policy as explained to us by the former Associate Administrator for Enforcement; the Director, ODI; and the Chief, Defects Investigation Division, is that the test results should not normally be released to the general public or the affected manufacturer until ODI has made an initial determination of defect or closed a case for any reason. They said, however, that the test results should be entered on the formal investigation file's index so that the public and others may be aware that ODI had conducted tests.

The engineering analysis engineer said that he told the former Director, ODI, that the existence of the November 1981 Chevrolet Citation test results should be reflected in the formal investigation file. According to the ODI engineer, the former Director, ODI, disagreed.

The engineering analysis engineer said that he kept the test report until November 1, 1982, when he went to the Chief, Engineering Analysis Division, to remind him that he had it. The ODI engineer said that he left the report with the Chief and suggested that it be made part of the formal investigation public file. The ODI engineer said that the Chief indicated that he would not place the report in the file at that time but that he would meet with the Chief, Defects Evaluation Division, to resolve what to do with the reports. The Chief, Defects Evaluation Division, told us that after the former Director, ODI, transferred to another office within NHTSA, he began searching for the June 1982 test report. He said that he located copies of the report and retrieved them from the Chief, Engineering Analysis Division, on December 2, 1982. Because of the attention being given to the case at that time, the Chief, Defects Evaluation Division, said that he did not have an opportunity to make the report part of the formal investigation public file until January 7, 1983, about 1 week before ODI's initial determination that 1980 X-body cars equipped with aggressive brake linings constituted a safety-related defect.

ODI INFORMATION RAISED QUESTIONS ON
ADEQUACY OF GM'S AUGUST 1981 RECALL

In its August 5, 1981, letter, GM told ODI the details of the recall which affected some 47,371 manual transmission cars. The proportioning valves that control the hydraulic pressure on the rear brakes were to be changed from 41-percent to 27-percent valves. At the time this recall was announced, ODI had information which raised a question on the adequacy of the remedy to correct the rear brake lockup problem.

The former Director, ODI, told us that he was convinced that replacing the 41-percent proportioning valve on the 47,371 manual transmission X-body cars built with that valve could fix the alleged rear brake lockup problem. He said that the complaint rate per 100,000 cars built subsequent to the introduction of the 27-percent proportioning valve was much lower than the complaint rate for those 1980 X-body cars built before that time with the 41-percent proportioning valve.

Regarding the Director's position, the engineering analysis engineer told us that the number of complaints NHTSA had received by the end of June 1981 were so few as to preclude any firm conclusions on the 27-percent proportioning valve's potential effect on solving the problem.

A breakdown of the 125 complaints in ODI's June 26, 1981, Engineering Analysis Report follows.

Breakdown of Complaints by Type of
Transmission and Proportioning Valve
As of June 24, 1981

<u>Categories</u>	<u>Number of complaints</u>
Automatic transmission equipped with:	
41-percent proportioning valve	20
27-percent proportioning valve	9
Manual transmission equipped with:	
41-percent proportioning valve	30
27-percent proportioning valve	23
Unknown transmission type:	
41-percent proportioning valve	6
27-percent proportioning valve	3
Unknown proportioning valve type	<u>34</u>
Total	<u>125</u>

These complaints show that 56, or 62 percent, of the 91 complaints for which a determination could be made involved cars

that apparently had 41-percent proportioning valves. But the analysis also shows that 53, or 65 percent, of the 82 complaints for which a determination could be made involved cars with manual transmissions that had the more aggressive rear brake linings that ODI's engineering analysis report had concluded was the cause of the rear brake defect "in combination with the 41-percent proportioning valve * * *." In addition, the July 1981 preliminary tests had indicated that the aggressive brake lining was the most significant contributing cause of rear brake lockup.

Preliminary tests conducted on July 8 and 9, 1981, at NHTSA's test facility using a 1980 Buick Skylark with a manual transmission indicated that the type of rear brake linings (aggressive or nonaggressive) had a greater effect on the vehicles' tendency for its rear brakes to lock up first than did the type of proportioning valve used. The informal results for the four brake component configurations tested are shown in the following table.

Rear Brake Lockups Observed During
Preliminary Tests Conducted in July 1981
of 1980 Buick Skylark

<u>Brake component configuration</u>	<u>Total test runs</u>	<u>No lockups</u>	<u>Front and rear brakes locked up simultaneously</u>	<u>Front brakes locked up first</u>	<u>Rear brakes locked up first</u>
41-percent proportioning valve, aggressive rear brake lining	20	4	0	0	16
27-percent proportioning valve, aggressive rear brake lining	15	3	1	0	11
41-percent proportioning valve, nonaggressive rear brake lining	15	8	0	2	5
27-percent proportioning valve, nonaggressive rear brake lining	<u>24</u>	<u>16</u>	<u>1</u>	<u>7</u>	<u>0</u>
Total	<u>74</u>	<u>31</u>	<u>2</u>	<u>9</u>	<u>32</u>
Percent	<u>100</u>	<u>42</u>	<u>3</u>	<u>12</u>	<u>43</u>

In August 1981, GM forwarded to ODI, in accordance with applicable safety regulations, a copy of the Pontiac Motor Division's service letter (as an example of instructions provided to dealers) which discussed the remedy and the possible need for further corrective action to fix the rear brake lockup problems. As part of its January 31, 1983, response to ODI's December 17, 1982, information request, GM provided ODI the service letters sent by the other three GM divisions to their dealers in August 1981 which stated that the dealers might receive complaints of rear brake lockup on cars with manual transmissions which had 27-percent proportioning valves. The four GM divisions' letters stated that in the event such a complaint was received, rear brake service linings (nonaggressive linings) should be installed. Three of GM's division letters stated such installation should be made to avoid any dissatisfaction stemming from a particular owner's driving habits. All four GM divisions' letters also stated that this service lining was the same material used on the automatic transmission vehicles.

The former Associate Administrator for Enforcement; the Chief, Defects Evaluation Division; and the ODI formal investigation engineer advised us that the July 1981 preliminary test information coupled with the GM service letters indicating that aggressive brake lining might also need to be replaced were factors which should have raised questions on the adequacy of GM's August 1981 remedy. Although they stated that ODI generally cannot challenge a manufacturer's proposed remedy, they said that ODI should have vigorously pursued the formal investigation in accordance with applicable guidelines, including further testing of vehicles when information on the remedy was made public.

During our review, the Chief Counsel and the former Associate Administrator for Enforcement told us that, in their opinion, the GM X-body rear brake lockup case was the only defect investigation that was handled in this manner. They expressed the belief that all other defect investigations were handled in accordance with the applicable guidelines.

INCREASED ATTENTION TO X-BODY CAR REAR BRAKE LOCKUP INVESTIGATION

Beginning in November 1982, the formal investigation concerning the 1980 X-body car rear brake lockup problem received increased attention when a new Director, ODI, was appointed in November 1982. According to the Chief of the Defects Evaluation Division, his staff briefed the new Director in early November 1982 and highlighted the problems they had experienced in their investigation of the X-body car rear brake problem. The Director told us that after reviewing the case, he instructed that the case should be updated and processed according to applicable guidelines.

On January 12, 1983, the Director, ODI, forwarded its Investigative Report, Phase I, Case Number C81-09, entitled "Alleged Rear Brake Lockup on 1980-1983 X-Body Vehicles (Chevrolet Citation, Pontiac Phoenix, Buick Skylark, and Oldsmobile Omega) Manufactured By General Motors Corporation" to the Office of Chief Counsel and recommended that an initial determination of safety-related defect of rear brakes be made for all 1980 manual transmission X-body cars and for certain 1980 automatic transmission cars built prior to May 1, 1979.

The report concluded that:

"The recall campaign conducted by GM to replace the proportioning valve on certain early production 1980 X-body manual transmission equipped vehicles did not adequately correct the premature rear wheel lockup problem. Additional corrective action is necessary on the recalled vehicles and those manual transmission equipped 1980 cars built after the production change in August 1979. The number of complaints of rear brake lockup for automatic transmission equipped 1980 vehicles is less than for manual transmission equipped cars. However, because automatic transmission X-body cars built before May 1, 1979, have the same aggressive brake linings as the manual transmission cars, which performed poorly when tested, and have never been recalled to replace their 41 percent valves, these cars should also be recalled. In addition, ODI should continue to monitor future complaints, especially for those automatics built between May 1, 1979, and the August 1979 change from the 41-percent valve to the 27 percent valve.

The production changes to 1981 and later X-body vehicles have apparently corrected many of the earlier vehicle brake lockup problems."

In March 1983, ODI obtained information from GM indicating that the 1980 automatic transmission X-body cars built before March 18, 1979, rather than May 1, 1979, should be included in the population of vehicles affected by the initial determination.

NOTICE OF INITIAL DETERMINATION

On January 14, 1983, NHTSA issued a press release announcing that it had made an initial determination that a safety-related defect exists in approximately 320,000 (later reduced to 240,000) model 1980 GM X-body cars because their rear brakes have a tendency to lock up in moderate to hard braking. ODI initially estimated that 320,000 cars would be recalled on the basis of production information GM had furnished in March 1981. In February 1983, however, GM provided revised production figures that showed 240,000 vehicles would be recalled. The notice indicated that the safety agency had received more than 364 complaints of rear brake locking incidents involving GM X-body

cars. These reports included allegations of more than 100 accidents involving 22 injuries and at least 1 fatality. The Chief, Defects Evaluation Division, told us that after NHTSA's announcement (press release) of its initial determination, it received 2,058 additional complaints by owners of 1980 to 1983 X-body cars relating to rear brake lockup experiences, as of July 6, 1983.

NHTSA's January 1983 notice scheduled a public meeting to air the problem on February 14, 1983. The meeting was postponed because in its February 9, 1983, letter, GM stated that it had decided to recall all 1980 X-cars equipped with manual transmissions and certain early production 1980 X-cars equipped with automatic transmissions. Details on the production, modifications to the braking system, and the remedies proposed by GM to correct the safety defect are presented in appendix VI. NHTSA's Chief Counsel told us that they were investigating whether GM had furnished all information pertinent to the rear brake lockup problem and whether all 1980 X-body cars that may be reasonably expected to experience rear brake lockup have been recalled.

On August 3, 1983, the Department of Justice filed in the United States District Court for the District of Columbia a complaint on behalf of DOT and NHTSA against GM seeking the recall of about 1.1 million 1980 X-body cars due to faulty brake systems and asking for civil penalties of \$4,027,000 from GM for providing false information to NHTSA during its defect investigation. The complaint alleges that the design of the cars' braking system contains a defect that, under a variety of conditions, causes the rear brakes of the cars to lockup prematurely in medium to hard braking conditions.

According to the complaint, GM began production of the X-car in 1979 even though it was fully aware that the brake system was defective. During the course of NHTSA's investigation of the defect, GM is alleged to have intentionally made numerous false statements in an effort to cover up the extent of the defect.

The complaint also alleges that though GM conducted recall campaigns in 1981 and 1983, ostensibly to correct the defect, the recalls failed to include all 1980 model year X-cars, and that GM knew that the proposed repairs would be inadequate to repair the defect in the limited number of X-cars that were recalled.

FRONT WHEEL DRIVE VEHICLE BRAKING AND HANDLING RESEARCH PROPOSALS

In February 1982, NHTSA's Office of Research and Development (R&D) prepared a research proposal to obtain front wheel drive (FWD) vehicle braking and handling performance data and began the process of contracting for such research. However, during planning meetings held between March and August 1982 to identify and rank research priorities, NHTSA officials did not

assign the FWD vehicle research proposal high priority. Procurement activities for that proposal were terminated in October 1982. However, in May 1983, R&D prepared a proposal to test and evaluate certain braking characteristics and stability in FWD vehicles.

Proposed research testing for FWD
vehicle braking and handling

In February 1982, NHTSA's R&D proposed a \$250,000 FWD vehicle braking and handling research project in response to alleged performance problems and consumer concern with various FWD vehicles, including the GM X-body cars. The research proposal's objective was to evaluate the braking and handling characteristics of FWD vehicles during both normal and extreme driving conditions and to compare the results with those of rear wheel drive vehicles.

NHTSA identified potential performance problems with FWD vehicles during a research project conducted in 1980. During braking tests, a Chevrolet Citation deviated 22.5 feet from the lane in which it was traveling when a hydraulic brake fitting worked loose. In a letter to GM in April 1980, R&D pointed out that the research test results suggested a potential performance problem on vehicles with large front-to-rear weight and brake proportioning ratios. These are characteristics of GM X-body vehicles. In its May 16, 1980, reply, GM stated that it did not believe the results of NHTSA's tests suggested a potential problem for vehicles with large front/rear weight proportioning ratios.

In February 1981, NHTSA's Associate Administrator for Enforcement suggested that R&D initiate a research program to address potential FWD vehicle handling problems. At that time, ODI was conducting its engineering analysis of GM X-body cars in response to consumer complaints and accident reports related to the alleged rear brake lockup problem.

The suggestion from the Associate Administrator for Enforcement prompted R&D to reexamine the problem of FWD vehicle stability during braking. In March 1981, R&D identified several factors affecting rear wheel lockup on FWD vehicles and informed the Associate Administrator for Enforcement that it planned to initiate a comprehensive research program in fiscal year 1982 to examine the stability of FWD vehicles during braking. R&D completed the statement of work in February 1982. It called for a contractor to, among other things:

- Select five FWD vehicles for testing.
- Evaluate straight braking performance on smooth, rough, dry and wet surfaces.

- Evaluate vehicle handling and stability during turning and braking maneuvers on smooth, rough, dry and wet pavement.
- Analyze vehicle handling and stability during recovery from pavement shoulder dropoff.
- Analyze the ability of the vehicle to recover from skids on smooth pavement.
- Analyze test results.

R&D forwarded the project to DOT's Transportation Systems Center (TSC), a transportation-related technological and socioeconomic research organization, to contract for the research. TSC prepared a statement of work in May 1982.

Review of research proposals leads to termination of FWD vehicle braking and stability proposal

In March 1982, NHTSA's Plans and Programs Office in conjunction with the Associate Administrators for Rulemaking, Research and Development, Enforcement, and Traffic Safety Programs, began reviewing research proposals as part of a long-range planning effort to establish research priorities. The Associate Administrator for Plans and Programs said that three general criteria were used to rank research proposals: (1) magnitude of the alleged safety problem to which the research was directed, (2) the potential ability of the research results to solve the problem, and (3) the cost of the research. He said that Plans and Programs' objective was to change R&D's past emphasis on vehicle testing to increased data analysis and computer simulations to help identify safety problems.

One of the proposals considered was the Light Vehicle Braking Stability project, which included the FWD vehicle braking and handling research. The Associate Administrator for Plans and Programs objected to the project because NHTSA had not performed data analysis to establish safety problems with FWD or other light vehicle braking and handling performance. He stated such data analysis should precede vehicle testing. The proposal was consequently not given a high priority relative to other research proposals. The officials decided to incorporate the research proposal into NHTSA's "harmonization" project, aimed at developing an international braking standard.

In May 1982, the NHTSA Administrator, Associate Administrators, and other officials met to further review research proposals and establish priorities. The FWD braking and handling research testing was presented this time as part of the Vehicle Unfamiliarity Project to investigate why drivers of newly-introduced vehicles were overrepresented in fatal crashes. This project had received a high priority in the March 1982 meeting. However, the Associate Administrator for Plans and Programs

again objected to the FWD vehicle braking and handling research portion of the project because (1) there still had been no data analysis to demonstrate a safety problem warranting vehicle testing and (2) the decision had been made to incorporate the proposal into the harmonization project.

In August 1982, the Associate Administrator for Plans and Programs met with the NHTSA Administrator to make final decisions on research proposals. The Administrator decided that the Vehicle Unfamiliarity Project should not include vehicle testing. However, because the Administrator's decision apparently was not communicated to TSC, in September TSC advertised the research proposal in a trade journal, and 38 prospective contractors responded. In October 1982, a NHTSA R&D official instructed TSC to terminate the process of contracting for the FWD vehicle braking and handling stability research.

Current FWD vehicle braking and handling research plan

In May 1983 NHTSA's R&D prepared a plan for research referred to as the Brake Adhesion Utilization Project. The project, which R&D estimates will cost \$125,000, is designed to analyze the stability of 1983-84 model foreign and domestic FWD vehicles during certain braking maneuvers. R&D plans for the research project to be performed by NHTSA's testing facilities at East Liberty, Ohio. The plan provides that

- about 20 vehicles will be tested,
- each vehicle will be subjected to a series of stopping distance tests to determine (1) wheel lockup sequence and (2) minimum stopping distance without wheel lockup, and
- each vehicle will be further tested using two testing procedures: a proposed international braking standard and the Federal Motor Vehicle Safety Standard 105.

The project is an expansion and continuation of research performed in conjunction with NHTSA's Rulemaking's preparation of a technical paper entitled "Vehicle Braking, Stability, and Control" that was presented at the March 1983 convention of the Society of Automotive Engineers. NHTSA's Rulemaking initiated that testing in August 1982 as part of its first efforts to evaluate the proposed international braking standard.

R&D included analysis of accident data in the technical paper. As of June 1983 the Office of Plans and Programs had not concurred on the Brake Adhesion Utilization Project. The Chief, Vehicle Dynamics and Simulation Group, Crash Avoidance Division, stated that R&D anticipates that Plans and Programs will concur with R&D's performing the project.

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We were unable to determine whether NHTSA's decision not to award the February 1982 research proposal had any relationship to its investigation of the X-body cars' alleged rear brake lockup problem.

CONCLUSIONS

We believe that there were serious problems in NHTSA's handling of the defect investigation on GM's 1980 X-body cars' rear brake lockup investigation.

NHTSA's investigation was a lengthy process lasting about 37 months--November 1979 to January 1983. During the engineering analysis phase, the investigation was allowed to remain essentially inactive for about 13 months, and later in the formal investigation phase, there were numerous actions that the guidelines called for that were not taken or were delayed.

It appears to us that the engineering analysis conclusion, the July 1981 preliminary test results and the August 1981 Pontiac service bulletin are factors that should have triggered NHTSA to challenge the GM August 1981 remedy and/or expedite the testing of the X-body cars, thus enabling a speedier initial determination to be made that a safety defect existed in many of the 1980 X-body cars.

To get speedy recalls and remove unsafe cars from the highways requires a large degree of cooperation on the part of manufacturers in dealing with NHTSA. In order to gain the trust and respect of the manufacturers being regulated, it appears to us that NHTSA should adopt and follow consistent and uniform policies, procedures, and practices in conducting safety-related defect investigations. The deviation from the guidelines as happened in the X-body car brake case can only detract from NHTSA's primary goal of removing unsafe cars from the highways.

The failure to follow the guidelines during the formal investigation phase can deprive the agency of getting complete and timely information which is needed to analyze and make an overall judgment on the alleged defect under investigation. This point is illustrated by the large number of X-body car owners that responded (2,058) to NHTSA after it made its initial determination in January 1983 that GM's 1980 X-body cars had a safety-related defect involving rear brake lockup. Because NHTSA failed to issue a press release in July 1981 when the formal investigation was opened, it lost the opportunity to obtain information from many owners of the vehicles under investigation. Also, there was an apparent reluctance to let the public know of certain tests performed on the GM 1980 X-body cars. Although NHTSA conducted tests of the vehicles under review in July and November 1981, the existence of such tests was not immediately made known to the public. Decisions regarding most of these actions were made with no apparent review by top agency officials.

Although ODI had written guidelines for conducting the engineering analysis and the formal investigation phases, we noted several instances where problems developed with the 1980 X-body car rear brake lockup case because the guidelines either made no provision or were not clear with respect to taking certain actions. For example, there were no written policies on when the existence of test reports should be made known to the public and when the test results may be made known to the manufacturer and others.

We could not determine the precise reasons for actions taken by NHTSA on this defect investigation. However, the problems evident in this case were significant enough to warrant our recommending actions to improve the defect investigation program.

Our review was conducted at DOT and focuses on the Safety Administration's handling of the rear brake lockup case on X-body cars. While we did address certain factual information originated by GM, it was limited to information obtained from DOT's files. Consequently, we did not draw any conclusions regarding GM's action in the case.

RECOMMENDATIONS

We recommend that the Secretary of Transportation instruct the Administrator, NHTSA, to:

- Reaffirm the need for compliance with the policies and procedures for conducting defect investigations. Specifically, the Administrator should stress that the actions called for by the policies and procedures be performed in a timely manner.
- Clarify the defect investigation policies and procedures. Specifically, the Administrator should clarify when defect investigation test reports should be entered in the case files and what test information should be provided to a manufacturer and when and by whom. Also, any exception to issuing a press release when opening a formal investigation should be justified and made a part of the public record.
- Require top-level officials to participate in the defect investigation process. Specifically, a representative from the Administrator's or Deputy Administrator's staff should attend key defect investigation decision meetings, such as the defect review panel meetings when a decision is made to open a formal defects investigation case, close out the investigation, or seek more information on the alleged problem.

On July 13, 1983, we met with the Acting Administrator, Chief Counsel, and Acting Associate Administrator for Enforcement to provide them a detailed briefing on the results of our review. The Acting Administrator stated that because of NHTSA's concern over the handling of the X-body brake investigation, it was (1) requiring a representative from the Deputy Administrator's office to attend all panel meetings involving defect investigations and (2) updating all policies and procedures pertaining to the defects investigation recall program. We believe that the planned actions, if implemented, should improve the defects investigation program.

NINETY-SEVENTH CONGRESS

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 SUBCOMMITTEE ON TELECOMMUNICATIONS,
 CONSUMER PROTECTION, AND FINANCE
 OF THE
 COMMITTEE ON ENERGY AND COMMERCE
 Washington, D.C. 20515
 January 5, 1982

Honorable Charles A. Bowsher
 Comptroller General
 General Accounting Office
 441 G Street NW
 Washington, D.C. 20548

Dear General Bowsher:

I am writing to request that the General Accounting Office investigate the National Highway Traffic Safety Administration's defect and investigatory proceedings in connection with possible brake defects in the 1980 General Motors X-body cars. As Chairman of the House Subcommittee with jurisdiction over automobile safety, I am deeply concerned that NHTSA's delay in determining whether there is a defect or ordering a recall of these vehicles may have grave and serious repercussions for the driving public.

I am aware that the GAO released a report last August which recommends that changes in NHTSA's motor vehicle recall program could reduce potential safety hazards. I have already planned for my Subcommittee to hold oversight hearings on the efficiency of the agency's defect and recall programs and, specifically, on the implementation of your recommendations. New revelations, about the potential danger of the X-car defects, highlighted in today's New York Times, gives these plans new urgency, and a study of this case will greatly help us in preparing for the hearing.

I have recently received reports that NHTSA is unnecessarily delaying resolution of the various issues pertaining to possible brake defects in the X-car, and, most importantly, may be covering up the existence of very serious defects. More than a month ago I therefore requested all relevant documents concerning potential X-car defects from the agency. I have not yet received them. Given your familiarity with the agency's recall program, I hope that you will be able to provide the Congress with answers to the following serious questions:

- * If NHTSA has known about the possibility of a defect since 1979, why has the agency taken so long to order a recall of the X-car or, alternatively, to close the defect investigation?
- * What further information is needed in order to reach a conclusion regarding the presence of a safety defect, or

lack thereof?

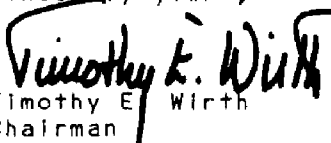
- * Why did NHTSA allow General Motors to recall only a small number of X-cars--those with manual transmissions produced before July, 1979--and not recall other 1980 X-cars with both manual and automatic transmissions?
- * In those cars that were recalled, is the remedy chosen adequate or does NHTSA have information which indicates that more should be done to ensure public safety?

Given the potential ramifications of any additional delay in determining the presence of a defect in these cars, I would like to request that the GAO investigate NHTSA's conduct in this defect proceeding and report to Congress as soon as possible, but no later than 30 days. I will be happy to cooperate with you in every way possible.

I appreciate your attention to this matter and look forward to hearing from you soon.

With best wishes,

Sincerely yours,


Timothy E. Wirth
Chairman

[GAO COMMENT: Because of the scope of this request, it was agreed by the Chairman's office that the reporting date would be changed to August 1983.]

NHTSA'S SAFETY DEFECT INVESTIGATION PROCESS

The National Traffic and Motor Vehicle Safety Act of 1966, as amended, gives NHTSA the authority to perform tests, inspections, and investigations to identify safety-related defects in motor vehicles and motor vehicle equipment. Using that authority, NHTSA has established an Office of Defects Investigation with three divisions--Defects Information Systems, Engineering Analysis, and Defects Evaluation--and has given each specific responsibilities for performing safety defect investigations. A description of each Division's responsibilities follows.

Defects Information Systems Division

This Division, among other things, gathers and organizes all information NHTSA receives relating to possible safety defects in motor vehicles, vehicle equipment, or tires. The information is received in many forms and is the primary source from which NHTSA first learns of possible safety defects.

The Division operates a toll-free Auto Safety Hotline (800-424-9393) which gives 24-hour service for consumers to report motor vehicle safety problems or request information on recalls. NHTSA sends a questionnaire to each consumer who calls the Hotline about his or her potential safety defect so that vital information NHTSA needs in its investigations can be recorded. The consumer fills out the questionnaire and returns it to NHTSA for processing.

At the time of our review, NHTSA was receiving about 500 consumer calls a day (either by Hotline operator or by a recording device). In addition, NHTSA was receiving about 1,000 to 2,500 letters a month. Some of the letters were Hotline questionnaire returns; others were unsolicited complaints from consumers, requests for recall information, Freedom of Information Act requests, or specific defect search requests from lawyers and other interested parties.

The Division staff initially reviews and sorts all consumer complaint letters and questionnaire forms for trends and then enters those complaints not related to a formal investigation but determined to be safety-related into the Division's computerized data base. Copies of the complaint letters and questionnaire forms are then sent to the respective manufacturers for their records.

NHTSA's computerized data base contains other information--such as manufacturers' service bulletins that describe specific repair procedures to be followed by dealers, motor vehicle warranty data, and past defect recall reports--which can also be used to support safety defect investigations. All

computerized data is stored for 9 years (complying with an 8-year statute of limitation requirement).

Periodically, the Division staff uses a computer program known as the "trender" to identify large numbers of complaints made against similar vehicle makes and models. This program coupled with an ongoing staff review of each questionnaire and letter for obvious trends can provide early warnings to alert the staff that a motor vehicle, motor vehicle equipment, or tire may be defective. In those instances, the staff turns over all pertinent data to ODI's Engineering Analysis Division for further analysis.

Engineering Analysis Division

This Division reviews numerous consumer complaints and other documents to analyze and identify potentially dangerous safety defects. This is accomplished by two types of evaluations--inquiries and engineering analyses. As part of an inquiry or engineering analysis, the Division staff examines Hotline questionnaires, accident reports, manufacturers' and dealers' service bulletins, prior recalls, and other pertinent sources for data that could identify or pinpoint the problem.

At the start of an engineering analysis, the staff will usually notify the manufacturer that it is analyzing a possible defect. The staff will ask the manufacturer to submit detailed information on the particular item in question to help the ODI engineers analyze the extent of the problem. The staff may also perform tests during this phase to help determine the cause of the problem. Because an inquiry or engineering analysis is an internal NHTSA activity that precedes a formal investigation, the staff is not required to make the testing and closing analysis memorandum available to the public. However, an engineering analysis file containing correspondence with the manufacturer is maintained for public view, and occasionally NHTSA will issue a press release if a potential defect poses an immediate threat to safety.

Inquiries may be opened before or instead of engineering analyses. An inquiry is much less detailed and consists of a limited request for information from the manufacturer. Within a relatively short period, the staff can decide whether it wants to proceed with an engineering analysis, close the inquiry without additional work, or continue the inquiry to obtain more information on the potential problem. During an inquiry, if a manufacturer determines that a safety defect exists and initiates a recall, there may be no further need to analyze the problem if the scope of the problem and the vehicle population recalled is compatible with the information developed during the inquiry.

A manufacturer may also agree to conduct a recall during an engineering analysis, which could negate any further need for NHTSA analysis. If a manufacturer takes no such action, the staff, after reviewing all information pertinent to the engineering analysis, may decide that a formal investigation is warranted. A NHTSA review panel--made up of representatives from ODI and NHTSA's Office of Chief Counsel--will then evaluate the information and determine either to

- open a formal investigation,
- perform additional engineering analysis work before making a final decision, or
- close the engineering analysis.

Defects Evaluation Division

This Division conducts formal investigations after NHTSA's review panel decides to proceed beyond the engineering analysis phase. ODI notifies the manufacturer that it has opened an investigation. This notification allows the manufacturer the opportunity to open its own investigation if it has not already done so. NHTSA issues a press release to inform the public that it is conducting a formal investigation and to solicit relevant information. The purpose of the formal investigation is to develop documentary evidence which will bridge the gap between an alleged motor vehicle defect and the official determination that a safety-related defect does or does not exist.

During a formal investigation, the staff may contract with outside sources for additional tests to support its case. Also, the staff will usually contract to have interviews conducted with vehicle owners who have experienced the defect being investigated. During those interviews, the contractor will collect tangible evidence, such as vehicle parts and photographs, to help support the case. Other investigatory actions, including visits to manufacturers and accident investigations, may be conducted. Surveys may be taken to define the problem's magnitude.

At the end of each formal investigation, the staff prepares an investigatory report which includes

- the basis for the investigation,
- a description of the problem,
- an analysis of information from the manufacturer,
- a summary of test results,

- a summary and analysis of consumer letters,
- details of other investigatory actions, and
- conclusions.

The report, along with a recommendation that an initial determination of defect be made or that the case be closed, is sent to NHTSA's Office of Chief Counsel. All recommendations require the concurrence of the Office of Chief Counsel. When the Chief Counsel concurs with an initial determination of defect, NHTSA's Deputy Administrator must also approve the determination before the case can proceed. After this approval, NHTSA notifies the manufacturer that it has made an initial determination of safety-related defect and has a public notice printed in the Federal Register.

The manufacturer then has an opportunity to present its views at a public hearing, or it can decide to go ahead with the recall. If the manufacturer decides to present its views at a public hearing and the NHTSA Administrator believes that a final determination of safety-related defect is warranted after the public hearing, the Administrator will order the manufacturer to initiate a recall to correct the safety-related defect. If the manufacturer refuses to initiate a recall, NHTSA will proceed with court action against the manufacturer. The final decision to recall or not to recall is then made by the court.

CHRONOLOGY OF NHTSA'S INVESTIGATION OF
ALLEGED REAR BRAKE LOCKUP ON 1980-1983
X-BODY CARS PRODUCED BY GENERAL MOTORS
CORPORATION

Calendar year 1979

January 1979	GM started production of 1980 X-body cars (Chevrolet Citation, Buick Skylark, Oldsmobile Omega, Pontiac Phoenix).
March 18, 1979	Rear brake lining material changed to less aggressive linings for automatic transmission cars.
April 1979	Sales of X-body cars started.
May 1979	Tests started by OVSC of 1980 X-body cars for compliance with Federal Motor Vehicle Safety Standard 105, "Hydraulic Brake System," and special tests to evaluate stability.
July 9, 1979	Date of first owner complaint received by NHTSA that "rear brakes lock up easily, causing spinout."
August 27-29, 1979	GM changed the brake proportioning valve functions from 0-350 psi x 41 percent to 0-350 psi x 27 percent for production and service replacement stock for all 1980 X-body cars regardless of brake or transmission options.
November 26, 1979	ODI opened an engineering analysis of the alleged rear brake lockup problem on the basis of 10 consumer complaints.
December 10, 1979	OVSC, ODI, and GM representatives conducted subjective road tests of a 1980 Chevrolet Citation to evaluate stability during numerous stops from varying speeds. OVSC concluded that the car did not maintain straight ahead direction on high speed stops (car swerved to the left on one stop and swerved to the right on the other stop).

Calendar year 1980

March 4, 1980	OVSC provided ODI a copy of its February 12, 1980, memorandum summarizing the results of OVSC
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contractor's tests to determine 1980 X-body cars' compliance with Federal Motor Vehicle Safety Standard 105 and special tests to assess those vehicles' stability. OVSC concluded that all vehicles met the standard and the investigation should be transferred to ODI.

May 27, 1980

ODI sent a letter to GM requesting information on the alleged rear brake lockup problems to assist ODI in determining whether reported incidents represented a potential hazard to motor vehicle safety.

July 21, 1980

GM responded to ODI's May 27, 1980, information request.

Calendar year 1981

January 2, 1981

ODI requested updated information from GM needed for its review of the rear brake lockup problem.

March 11, 1981

GM responded to ODI's January 2, 1981, information request.

April 9, 1981

ODI engineer first became aware that more aggressive brake linings had been used on manual transmission 1980 X-body cars which could account for most of the complaints about rear brake lockup coming from owners of these vehicles. The more aggressive lining was used on the manual transmission vehicles to help meet the parking brake requirements of Federal Motor Vehicle Safety Standard 105. According to ODI, GM subsequently changed the parking brake system to preclude the need for the aggressive rear brake lining on 1981 X-body cars.

- April 10, 1981 First plan was drafted to test two 1980 X-body vehicles (one with automatic transmission and one with manual transmission) and one peer vehicle.
- April 23, 1981 The second draft of test plan eliminated peer vehicle from its scope. It was sent as the final plan to NHTSA's Engineering Test Facility, East Liberty, Ohio, on May 5, 1981.
- June 26, 1981 ODI completed its Engineering Analysis Report which recommended that a defects review panel meeting be held to initiate a formal investigation involving premature rear brake lockup in GM's 1980 X-body cars equipped with manual transmissions.
- July 1, 1981 The defects review panel met and decided that ODI should open a formal defects investigation.
- July 2, 1981 A formal defects investigation case was opened based on 212 complaints (125 received by ODI and 124 received from GM of which 37 were apparently duplicates).
- July 6, 1981 An ODI letter to GM stated the belief "that the rear brake system of the 1980 X-body vehicles (utilizing the 41-percent valve and aggressive brake linings) contains an engineering defect which has safety-related implications." ODI urged GM to review this matter and notify it within 5 days of the corrective action GM planned to take.
- July 8, 1981 GM letter to ODI responded:
- "General Motors does not agree with your assertion that the subject vehicles contain 'an engineering defect with safety-related implications.' However, to preclude the possibility of prolonged and costly litigation procedures which could ensue based on your apparently adamant position in this matter, General Motors will initiate a recall modification relative to the involved vehicles.

Details concerning this proposed action will be transmitted to the NHTSA at the earliest possible date."

July 8-9, 1981

To gain quick insight into whether the 1980 X-body cars appeared to have a rear brake lockup problem, ODI decided to test only one manual transmission 1980 Buick Skylark. ODI engineers assisted Engineering Test Facility personnel in conducting uninstrumented tests. Results of those tests were discussed with GM's Director, Product Investigation, per instructions of former Director, ODI. Those results indicated that the more aggressive brake linings used on all 1980 manual transmission-equipped cars appeared to be a major part of the problem.

July 11 through
August 4, 1981

ODI considered scope of additional testing. The July 22, 1981, draft testing request included four vehicles. The number of vehicles was reduced to three by July 28, 1981, and to one (1980 Chevrolet Citation) by August 4, 1981.

August 5, 1981

GM stated that they would recall 47,371 1980 X-body vehicles with manual transmissions that were produced with the 41 percent proportioning valve before August 27, 1979. This valve was replaced with a 27 percent valve that was designed to reduce the hydraulic pressure on the rear brakes.

August 13, 1981

Testing request for 1980 Chevrolet Citation was submitted to the Engineering Test Facility.

August 27, 1981

Engineering Test Facility furnished ODI a plan for testing the 1980 Chevrolet Citation at an estimated cost of \$30,300.

August 1981

Four divisions of GM-Chevrolet, Buick, Oldsmobile, and Pontiac--sent out service letters to their dealers.

October 1981 ODI engineers sought approval of an audit to determine, among other things, the adequacy of the remedy made by GM to the 47,371 1980 X-body cars recalled in August 1981 to correct the rear brake lockup problem.

November 4-19, 1981 Instrumented tests were conducted on 1980 Chevrolet Citation at Engineering Test Facility.

November 23, 1981 Case engineer's preliminary analysis of November 4-19, 1981, test results indicated that the greatest contributor to the 1980 X-body cars' rear brake lockup problem was the aggressive brake linings.

Calendar year 1982

January 11, 1982 ODI received first letter from owner complaining that the replacement of the proportioning valve did not correct the car's rear brake lockup problem.

February 9, 1982 Chief, Campaign Analysis Branch, Engineering Analysis Division, ODI, submitted a list of 10 recalls for potential audit, including the 1980 X-body August 1981 recall. In May 1982, the former Director, ODI, approved all of those recalls for audit, except the 1980 X-body car. The former Director, ODI, approved the 1980 X-body car recall for audit in early July 1982.

March 31, 1982 Engineering Test Facility submitted draft report on results of the November 1981 tests of 1980 Chevrolet Citations to NHTSA headquarters.

June 21, 1982 Final report on 1980 Chevrolet Citation tests was received at NHTSA headquarters from Engineering Test Facility.

July 13, 1982 ODI notified GM of plans to audit the August 1981 recall of 47,371 vehicles.

September 23, 1982 Recall audit letters were sent to "owners" of the 47,371 recalled vehicles, but addresses provided by GM for 30,761 Chevrolet Citation owners were incorrect--names of dealers had been provided instead of owners.

November 15, 1982 New Director, ODI, was officially appointed. (He began in the position unofficially on November 1, 1982.)

December 17, 1982 NHTSA sent an information request letter to GM--18 months after the case was opened--requesting, among other things, that all lawsuits be identified in which it is or was a defendant against allegations of the rear brake lockup problem, including a description of design or other changes that related to the rear brake lockup tendency.

Calendar year 1983

January 7, 1983 Existence of the November 1981 test report noted in public file.

January 13, 1983 The July 1981 test plan and results were placed in public file.

January 14, 1983 NHTSA issued a press release and informed GM that it had initially determined that all 1980 X-body car equipped with aggressive brake linings (208,154 manual and 31,645 automatic transmission cars) contained a defect which related to motor vehicle safety. NHTSA also stated that evidence indicated that the remedy furnished to some owners of the 1980 manual transmission cars (replacement of original proportioning valve) had not corrected the condition which may lead to accidents, injuries, death, or property damage.

February 9, 1983 GM agreed to the recall of 239,799 1980 X-body cars with manual transmissions, and certain early production models with automatic transmissions.

March 30, 1983

NHTSA announced that GM would begin sending letters out April 4, 1983, notifying owners of the 240,000 1980 X-body vehicles of the recall and the proposed fix. Specifically, GM proposed to replace the rear brake lining with a different lining material; replace parking brake cables on manual transmission cars; inspect, lubricate and adjust parking brake cables on automatic transmission cars; and make certain other repairs, if necessary.

DETAILS ON NHTSA'S OFFICE OF
ENFORCEMENT TESTING OF GENERAL MOTORS
CORPORATION'S 1980 X-BODY CARS

ODI and OVSC within the Office of the Associate Administrator for Enforcement conducted several tests of the 1980 GM Corporation 1980 X-body cars between mid-1979 and late 1981. These tests showed that during moderate to emergency braking efforts, the X-body cars' rear brakes locked up under certain conditions before or in the absence of front brakes locking up. Also, these tests indicated that the type of rear brake lining used on most manual transmission and some early automatic transmission 1980 X-body cars was the most significant contributing cause of rear brake lockup.

Testing by OVSC on these cars' ability to comply with Federal Motor Vehicle Safety Standard 105, Hydraulic Brake Systems, and other special and informal tests were completed in late 1979. These tests demonstrated that the 1980 X-body cars had a potential problem with loss of vehicle control due to rear brake lockup which needed further testing. ODI first conducted tests of the 1980 X-body cars' rear brake lockup tendencies in July 1981--about a year and a half after it had opened an engineering analysis of the potential safety problem.

In general, the consequences of rear brake lockup may involve some degree of loss in control of that car. The extent of such loss in control of the car may be influenced by many factors, including but not necessarily limited to: car speed, initial and corrective steering angles, single or dual wheel lockup, road surface conditions, road-to-tire frictional coefficients, front-to-rear car weight distribution, car loading conditions, proportioning of braking at front and rear and side to side, braking force applied, weather conditions, and type of brake linings used.

OVSC TESTING TO EVALUATE VEHICLE STABILITY

OVSC is responsible for conducting tests necessary to insure compliance by foreign and domestic motor vehicle manufacturers with the Federal Motor Vehicle Safety Standards. The 105 standard specifies requirements for service brake and associated parking brake systems for passenger cars.

Compliance and special tests
conducted by OVSC contractors

From May through December 1979, OVSC's contractors tested the four 1980 X-body cars for compliance with the 105 standard and conducted special tests on the four X-body cars beyond the standard's requirements to evaluate those cars' stability.

These special tests were conducted because of negative reviews by several newspapers and automobile magazines concerning the cars' instability during stops and long stopping distances and because of consumer complaints. These special tests were also conducted because of the initially tested manual transmission cars' marginal compliance with the third effectiveness stopping distance test from 60 miles per hour.

The 105 standard requires that the service brakes be capable of stopping each car in four effectiveness tests within specified distances and from specified speeds. In the third effectiveness tests the car must be capable of stopping within 194 feet at lightly loaded car weight (for cars of 10,000 pounds or less, unloaded vehicle plus 300 pounds). The stopping distance results for the three manual transmission X-body cars for this test were: 185 feet for the Buick Skylark and Oldsmobile Omega and 193 for the Pontiac Phoenix. Conversely, the Chevrolet Citation, which had an automatic transmission and less aggressive rear brake linings, stopped in 175 feet for this test.

The former Associate Administrator for Enforcement told us that these special tests were conducted to ensure that the 1980 X-body cars fully met all requirements of the 105 standard. He said that if the X-body cars were found to have been in noncompliance with the standard, the alleged problem possibly could have been solved by simply requiring the manufacturer to modify the cars so that they complied with the standard.

As part of these brake compliance tests, OVSC also found that all X-body cars with a manual or an automatic transmission marginally passed the parking brake section of the standard. That section requires that the parking brake system on cars 10,000 pounds or less must be capable of holding the car stationary for 5 minutes in both a forward and reverse direction on a 30-percent grade. The manufacturer, at its option, may comply with the parking brake standard by using a transmission or transmission control which incorporates a parking mechanism that must be engaged before the ignition key can be removed.

To help comply with the parking brake standard, GM chose to install a more aggressive rear brake lining on manual transmission 1980 X-body cars than those linings used on the automatic transmission cars built after March 18, 1979.

OVSC's special test results were summarized in a February 12, 1980, internal memorandum from a Safety Compliance Engineer to the Chief, Validation Division. The safety engineer in his memorandum stated that:

"* * * The consumer and media complaints of these vehicles leaving a 12 foot wide lane, for the most part, could not be reproduced. Almost all stops with 2 or more locked wheels involved a front wheel locked, which tends to make the vehicle skid straight ahead."

On the other hand, our review of those test results showed--with respect to the three manual transmission cars--that wheels locked in 21 of 63 test runs. Eight of the 21 lockups involved only the rear brakes, 6 of which involved only the left rear brake.

Because all the 1980 tested X-body cars passed the 105 standard compliance test, he recommended that the car stability investigation be transferred to ODI for possible consideration as a vehicle-in-use deficiency. ODI had opened an engineering analysis of this matter on November 26, 1979. The OVSC safety engineer told us that the ODI case engineer had been kept advised of OVSC's testing as it was being conducted. He said that a copy of the February 12, 1980, OVSC memorandum was furnished to ODI on March 4, 1980.

OVSC informal tests

On December 10, 1979, OVSC and ODI representatives met with representatives of GM at the Agricultural Research Center, Beltsville, Maryland, to conduct some informal brake tests on a 1980 Chevrolet Citation. Stops were made from speeds varying from 60 miles per hour to 30 miles per hour. As a result of these tests, the Chief, Validation Division, OVSC, concluded in a December 12, 1979, memorandum to the Director, OVSC, that the car "displayed unpredictable performance characteristics on repetitive stops" and the car "did not maintain straight ahead stops on high speed stops (vehicle swerved to the left on one stop and swerved to the right on other stop)."

The Chief also stated in his memorandum that originally it was planned to perform a diagnosis of the brake system components but based on the limited observation at Greenbelt and the four special tests performed by contractors, the diagnosis was set aside at that time. The memorandum states that:

"The final conclusion is that the brakes will pass the FMSS No. 105-75 requirements but may still be subject to non-straight line stop during 'panic' stops. The effectiveness of the panic stop is related to driver experience and capability consideration given to the fact that wheels should

never be locked for any period of time during the stop."

ODI guidelines for conducting an engineering analysis of a potential safety-related defect calls for consideration of testing to identify such defect as well as its possible safety consequences.

ODI opened the engineering analysis on the alleged rear brake lockup problem in November 1979. ODI first conducted tests in July 1981--about 19 months later. The planning and performing of those initial tests and later tests in November 1981 are discussed below.

ODI TESTING OF X-BODY CARS IN JULY AND NOVEMBER 1981

At ODI's request, NHTSA's Engineering Test Facility, Vehicle Research and Test Center, East Liberty, Ohio, conducted preliminary tests in July 1981 and more formalized tests in November 1981 of the 1980 X-body cars' braking performance. The results of both tests indicated that the type of rear brake lining (referred to commonly by ODI as either aggressive or nonaggressive) contributed more to rear brake lockup than the type of proportioning valve or brake drums used in their production.

The planning for the tests was started about February 1981--about 1 year after OVSC had furnished the results of its compliance and special tests of the 1980 X-body cars. The engineering analysis had been underway for about 14 months. ODI had received 92 complaints by the end of January 1981.

There were numerous revisions to the scope and methodology of the plans prepared for the testing that was conducted in July and November 1981. These revisions were made--according to the ODI engineers assigned to the case during the engineering analysis and the formal investigation phases and the Chief, Defects Evaluation Division--mostly at the insistence of the former Director, ODI.

July 1981 preliminary tests of Buick Skylark

From February to April 1981, ODI engineers considered the types of testing to be conducted, testing variables, parameters to be considered, and factors possibly influencing lockup. By April 10, 1981, a test plan had been drafted to:

- Identify the exact car operating conditions (or range thereof) which produce or contribute to rear brake lockup on 1980 GM X-body cars.

- Identify the 1980 X-body car components and/or design characteristics which are responsible for or contribute to rear brake lockup.

Under that plan, ODI would have tested two 1980 GM X-body cars (one with an automatic transmission and another with a manual transmission) and a 1980 Dodge Omni as a representative peer group vehicle. The tests were to be specific brake maneuvers, under varying vehicle operating conditions such as load and brake system component configurations. Specific parameters were to be recorded. The three brake maneuvers to be tested from 55 miles per hour were moderate braking (12 feet per second squared deceleration), moderate to hard braking (18 feet per second squared deceleration), and emergency braking (24 feet per second squared deceleration). Each of these brake maneuvers was to have been performed on three different driving surfaces: ASTM Skid Number 25-30, 45-50, and 70-75. ASTM is an abbreviation for the American Society for Testing and Materials. The society is composed of 30,500 engineers, scientists, managers, professionals, academicians, consumers, and skilled technicians. It establishes voluntary consensus standards for materials, products, systems, and services. An ASTM Skid No. 25-30 was described as a smooth asphalt or concrete highway or urban road, such as might be encountered on a polished road surface in combination with rain and road oils. An ASTM Skid No. 70-75 was described as a dry, typical asphalt or concrete highway or urban road surface.

The higher the skid numbers the more friction the surface provides during braking thereby decreasing the prospects of brake lockup, if other conditions remain constant.

Each of the X-body cars was to be tested for five brake component configurations and the Dodge Omni was to be tested only as received. For example, one brake component configuration to be tested on the automatic transmission X-body car was: nonaggressive rear brake lining, 27-percent proportioning valve, and nonfinned rear brake drums. The other configurations to be tested on both the manual and automatic transmission 1980 X-body cars involved various mixes of the nonaggressive rear brake lining, aggressive rear brake lining, 27-percent proportioning valve, 41-percent proportioning valve, finned rear brake drums, and nonfinned stopping brake drums. Eight parameters were to be tested including stopping distance, hydraulic brake fluid pressure for each wheel, and the time when wheel lockup occurred. ODI did not provide a cost estimate for this initial test plan.

According to the ODI formal investigation engineer and the Chief, Defects Evaluation Division, by April 23, 1981, ODI had reduced the scope of its proposed plan to test only the 1980

X-body cars' brake system at the direction of the former Director, ODI. The 1980 Dodge Omni that was to represent peer vehicles was eliminated from the test plan. However, the modified plan stated that pending test results on the 1980 X-body cars, a 1981 X-body car might be tested. The test plan remained essentially the same with respect to its purpose, braking maneuvers to be tested, surfaces on which the tests were to be conducted, brake system component configurations to be tested, and parameters to be recorded.

The April 23, 1981, version of the test plan called for NHTSA's test facility to complete all testing and furnish ODI a final report by July 1, 1981. This plan was sent to the test facility on May 5, 1981. ODI engineers assigned to this case visited the test facility on May 20 and 21, 1981, to discuss this test plan with the personnel who were to conduct the tests. However, those ODI engineers and the Chief, Defects Evaluation Division told us that the former Director, ODI, changed his mind about conducting these tests shortly after their return from the test facility. They said that before conducting formal instrumented tests, he wanted to conduct "uninstrumented preliminary" tests to assure that the 1980 X-body cars' rear brakes would in fact lock up and affect the cars' stability. According to the Director, Vehicle Research and Test Center; the former Associate Administrator for Enforcement; and the Director, ODI; this is an acceptable procedure that allows ODI to determine whether or not its investigations are proceeding in the right direction before conducting more sophisticated tests. The ODI formal investigation engineer told us, however, that ODI already had enough evidence to justify more sophisticated tests, including its having received more than 200 consumer complaints and the results of the OVSC testing done about 1 year earlier.

The ODI formal investigation engineer and the Chief, Defects Evaluation Division, told us that the former Director's insistence on conducting these preliminary tests caused some delay in completing its formal investigation. They added that ODI more appropriately should have conducted formal instrumented tests as outlined in the test request submitted to NHTSA's test facility on May 5, 1981.

In this regard, the former Director, ODI, said that by May 1981 he had already decided to submit the problem to an internal panel that decides whether or not ODI has enough information to support the opening of a formal defect investigation case. In his view, it would not have been efficient to use resources for testing at that point. He said that GM agreed to recall some X-body cars in July 1981. However, because of concern expressed by the ODI safety engineers responsible for this case as to the

adequacy and extent of GM's proposed fix, the former Director, ODI, said that additional testing was later approved and conducted in November 1981.

On July 8 and 9, 1981, the two ODI engineers again visited the test facility to assist in conducting the uninstrumented preliminary tests. Those tests were conducted on a 1980 manual transmission Buick Skylark purchased by NHTSA's test facility on July 1, 1981. The formal investigation engineer and the Chief, Defects Evaluation Division, said that the former Director, ODI, said that there was to be no publicity of this testing, no written test plan, the tests were not to be instrumented, and no summary report was to be prepared on them. Although these tests were not instrumented, they were videotaped. The ODI engineers used a June 24, 1981, handwritten test plan that was basically the same as the test plan furnished to the test facility on May 5, 1981, except there was no provision for possibly testing a 1981 X-body car and less data was to be recorded. The data to be measured and recorded for each test run included:

- Initial vehicle speed at which brakes were applied (based on vehicle's speedometer calibrated against a fifth wheel).
- Deceleration (moderate to emergency).
- Lockup position for each wheel.

These preliminary tests were conducted on July 8 and 9, 1981, with stops initiated at speeds from 20, 25, 40, and 55 miles per hour. The informal results for the four brake component configurations tested were:

Rear Brake Lockups Observed During
Preliminary Tests Conducted in July 1981
of 1980 Buick Skylark

<u>Brake component configuration</u>	<u>Total test runs</u>	<u>No lockups</u>	<u>Front and rear brakes locked up simultaneously</u>	<u>Front brakes locked up first</u>	<u>Rear brakes locked up first</u>
41-percent proportioning valve, aggressive rear brake lining	20	4	0	0	16
27-percent proportioning valve, aggressive rear brake lining	15	3	1	0	11
41-percent proportioning valve, nonaggressive rear brake lining	15	8	0	2	5
27-percent proportioning valve, nonaggressive rear brake lining	<u>24</u>	<u>16</u>	<u>1</u>	<u>7</u>	<u>0</u>
Total	<u>74</u>	<u>31</u>	<u>2</u>	<u>9</u>	<u>32</u>
Percent	<u>100</u>	<u>42</u>	<u>3</u>	<u>12</u>	<u>43</u>

As shown above, these tests indicated that the type of rear brake lining (aggressive or nonaggressive) had a greater effect on the cars' tendency for their rear brakes to lock up first than did the type of proportioning valve used. The data sheets used to record the results of these tests showed that there were varying degrees of loss in car control in 18 of the 32 instances when the rear brakes locked up first.

The ODI engineering analysis and formal investigation engineers who participated in the performance of these tests told us that the former Director asked that they telephone him once the preliminary test results were known. According to

these engineers, the former Director was advised of these results and he telephoned GM's Director, Product Investigations, Engineering Staff, to inform him of those results. The ODI safety engineers said, however, that the former Director, ODI, called them back on the same day to say that GM's Product Investigations Director had asked some questions concerning the tests that he was unable to answer. They said that the former Director, ODI, instructed them to call GM's Director and provide him more details on the test results.

The former ODI Director's position was that GM should be fully aware of the preliminary test results and made to feel that ODI was trying to cooperate in solving the alleged rear brake lockup problem. The ODI engineering analysis engineer said that he called the GM Director to tell him about the preliminary tests' results as instructed by the former Director, ODI. He could not recall exactly how much detail was provided. However, he said that the GM Director was told that based on the tests, the 1980 X-body cars' rear brake lockup problem appeared to be due to more than just the 41-percent proportioning valve. He said that the GM Director was told that the aggressive type of brake lining used on the manual transmission-equipped cars appeared to be a major part of the problem. He said that his comments were qualified on the basis of the tests having been preliminary.

November 1981 instrumented tests of Chevrolet Citation

After the preliminary tests were completed in July 1981 and GM agreed to its recall, the ODI formal investigation engineer began modifying the May 5, 1981, test plan that had been furnished to NHTSA's test facility. According to this engineer and the Chief, Defects Evaluation Division, the former Director, ODI, told them there was to be no publicity on this case. They also said that the former Director's decisions during July and early August 1981 resulted in the plan for the tests eventually conducted in November 1981 being reduced in scope so as to possibly weaken ODI's ability to identify the causes of and conditions under which X-body cars experienced rear brake lockup. There was no evidence in the public file maintained on the ongoing formal investigation that a final report had been completed in June 1982 on these November 1981 tests until January 7, 1983. According to the ODI safety engineers and the Chief, Defects Evaluation Division, the former Director, ODI, instructed that no reference be made to the report in the public file.

On July 22 and 23, 1981, the ODI formal investigation engineer discussed the test proposal as revised with personnel

at NHTSA's test facility who would conduct the test. That proposal provided for the testing of four cars: Buick Skylark, Chevrolet Citation, Ford Mustang or Capri, and a Chrysler K car or Dodge Omni. All the cars to be tested had manual transmissions. By July 28, 1981, the Ford Mustang/Capri had been deleted from the proposal. A total of 738 runs were to be made of the three remaining cars to be tested. ODI estimated that it would cost \$57,000 to conduct this test request, including \$18,750 for the three cars. The request was submitted to the former Director, ODI, on July 29, 1981. In a note transmitting this draft to the former Director, ODI, the Chief, Defects Evaluation Division, stated that ODI had to carefully determine what GM was going to do as a result of its recall and the problems it would solve. According to the ODI engineer, and the division chief, the former Director, ODI, decided that only the 1980 Chevrolet Citation should be tested at an estimated cost of \$10,000. A test request reflecting that and other changes was submitted to NHTSA's test facility on August 13, 1981.

This August 13, 1981, test request provided that the 1980 Chevrolet Citation would be subjected to 63 test conditions, each of which would be run three times, for a total of 189 test runs. The test conditions were:

- Three deceleration rates (12 feet per second squared, 18 feet per second squared, and 24 feet per second squared).
- Three skid surfaces (skid numbers 55-65, 35-45, and 15-25).
- Seven brake component configurations:

<u>Proportioning valve</u>	<u>Drums</u>	<u>Linings</u>
27 percent	Nonfinned	Aggressive
27 percent	Finned	Aggressive
27 percent	Finned	Nonaggressive
41 percent	Finned	Aggressive
41 percent	Finned	Nonaggressive
41 percent	Nonfinned	Aggressive
41 percent	Nonfinned	Nonaggressive

NHTSA's test facility was to submit a work plan for conducting these tests to ODI by August 24, 1981. NHTSA's test facility was to complete the tests and prepare a final report summarizing all work performed and results obtained by September 30, 1981.

On August 27, 1981, NHTSA's test facility furnished a plan for conducting the requested test at an estimated cost of \$30,300 (included \$6,350 for the vehicle). The tests were to be completed about 20 days after their start. The test facility was to submit a draft report to ODI within 30 days of the last test and a final report within 30 days of the receipt of ODI's comments on the draft report. The former Director, ODI, approved the test facility's proposed test plan and estimated costs on September 11, 1981. There was no indication of how long it might take to prepare for the tests. The tests were started on November 4, 1981. The test facility project engineer assigned to conduct the tests told us that this was not an unreasonable time lapse because equipment needed for the tests, including instrumentation and brake components, had to be purchased.

The instrumented tests of the 1980 Chevrolet Citation were completed on November 19, 1981. The test vehicle was instrumented to measure: vehicle speed, foot brake pedal force, deceleration rate, brake fluid pressures for each individual front and rear wheel, angular wheel velocity (descending wheel speed), and total test time.

By November 23, 1981, the ODI engineer assigned to the formal investigation had analyzed data sheets prepared by the test facility project engineer who conducted the tests. His preliminary analysis showed the following.

Rear Brake Lockups Observed During
November 1981 Instrumented Tests of
1980 Chevrolet Citation

<u>Brake component configuration</u>	<u>Total test runs</u>	<u>No lockups</u>	<u>Front and rear brakes locked up simultaneously</u>	<u>Front brakes locked up first</u>	<u>Rear brakes locked up first</u>
Nonfinned drums, aggressive rear brake linings, and 27-percent proportioning valve	27	7	6	-	14
Finned drums, aggressive rear brake linings, and 27-percent proportioning valve	27	8	-	-	19
Finned drums, aggressive rear brake linings, and 41-percent proportioning valve	27	6	-	-	21
Nonfinned drums, aggressive rear brake linings, and 41-percent proportioning valve	27	12	1	-	14
Finned drums, nonaggressive rear brake linings, and 41-percent proportioning valve	27	21	-	6	-
Finned drums, nonaggressive rear brake linings, and 27-percent proportioning valve	27	21	-	6	-
Nonfinned drums, nonaggressive rear brake linings, and 41-percent proportioning valve	<u>27</u>	<u>18</u>	<u>-</u>	<u>9</u>	<u>-</u>
Total	<u>189</u> ===	<u>93</u> ===	<u>7</u> ==	<u>21</u> ===	<u>68</u> ===
Percent	<u>100</u> ===	<u>49</u> ===	<u>4</u> ==	<u>11</u> ===	<u>36</u> ===

The ODI formal investigation engineer told us that these tests results indicated--as the July 1981 preliminary tests had done earlier--that the greatest contributor to rear brake lockup of the 1980 X-body vehicles was the more aggressive rear brake linings. As shown by the above table, there were no observed instances where the rear brakes locked up first with nonaggressive brake linings regardless of whether the 27-percent or 41-percent proportioning valve was used (see brake component configurations 5, 6, and 7). Similarly, the type of proportioning valve had little effect in these tests on the number of instances where rear brake lockup occurred when the aggressive rear brake linings were tested. Of the 68 instances where rear brakes locked up first, 33 were on brake configurations that included the 27-percent proportioning valve with aggressive linings and 35 were on configurations that included the 41-percent proportioning valve with such linings.

On March 31, 1982, the test facility submitted its draft report on the November 1981 Chevrolet Citation tests to ODI. The transmittal memorandum from the Director, Vehicle Research and Test Center, stated that the final report would be submitted within 30 days after receipt of ODI's comments. The ODI formal investigation engineer said that the former Director, ODI, would not allow any written comments to be sent to the test facility on the draft report. The ODI engineer said that he furnished his comments to the NHTSA test facility project engineer over the telephone on May 5, 1982.

The test facility submitted its final report on the November 1981 tests on June 14, 1982. It was received by ODI on June 21, 1982. That report concluded--as the preliminary analysis of the data made in late 1981 had indicated--that the aggressive rear brake linings contributed more to rear brake lockup than did the less aggressive linings, regardless of whether (1) the 27-percent or 41-percent proportioning valve or (2) the nonfinned or finned brake drums were used in various combinations with such linings.

The test facility project engineer and the Director, Vehicle Research and Test Center told us that there was no suggestion from or attempt by ODI to delay its submission of the final test report. They said that the project engineer worked full time on the data analysis and preparation of the report after completion of the test runs. As noted by the former Associate Administrator for Enforcement, the preparation and submission of the final report could have been completed sooner if additional personnel and resources had been used. But NHTSA's test facility determines its own priorities.

The June 1982 final test report was not placed in the public file until January 7, 1983. The ODI formal investigation engineer and the Chief, Defects Evaluation Division, told us that shortly after the final reports were received by ODI, the former Director, ODI, on June 25 or 28, took all copies of the report.

The Chief, Engineering Analysis Division, said that the former Director, ODI, brought him copies of the final June 1982 test report "to hold for security purposes." The Chief gave the report to the safety engineer who had been assigned the case during its engineering analysis phase for safekeeping. The engineer said that he received the reports on or about July 1, 1982.

The engineer said that he told the former Director, ODI, that the existence of the November 1981 Chevrolet Citation test results should be reflected in the formal investigation file. According to the engineer, the former Director disagreed.

ODI's policy on the handling of test results completed during the engineering analysis or formal investigation phases of a case is not written. The policy as explained to us by the former Associate Administrator for Enforcement; Director, ODI; and the Chief, Defects Investigation Division, is that the test results should not normally be released to the general public or the affected manufacturer until ODI has made an initial determination of defect or closed a case for any reason. They said, however, that the test results should be entered on the public file's index so that the public and others may be aware that ODI had conducted tests.

The engineering analysis engineer said that he kept the test report until November 1, 1982, when he went to the Chief, Engineering Analysis Division, to remind him that he had the test report. The ODI engineer said that he left the report with the Chief and suggested that it be placed in the formal investigation public file according to office policy. The ODI engineer said that the Chief indicated that he would not place the report in the file at that time but that he would meet with the Chief, Defects Evaluation Division, to resolve what to do with the report. The Chief, Defects Evaluation Division, told us that after the former Director, ODI, left the office, he began searching for the June 1982 test reports. He said that he located copies of the report and retrieved them from the Chief, Engineering Analysis Division, on December 2, 1982. Because of attention being given to the case at that time, the Chief, Defects Evaluation Division, said that he did not have an opportunity to place the report in the formal investigation public file until January 7, 1983, about 1 week before ODI's initial determination that 1980 X-body cars equipped with aggressive brake linings constituted a safety-related defect.

RECALL CAMPAIGNS FOR GENERAL MOTORSCORPORATION 1980 X-BODY CARSAS OF JUNE 15, 1983

<u>Date of manufacturers' notification to NHTSA</u>	<u>Makes and models</u>	<u>Problem</u>	<u>Number of vehicles recalled</u>	<u>Initiator of recall</u>
March 19, 1979	Chevrolet Citation Buick Skylark Oldsmobile Omega	Vehicles did not conform to Federal Motor Vehicle Safety Standard 207 "Anchorage of Seats."	35	Voluntary by manufacturer
April 3, 1979	Chevrolet Citation Buick Skylark Oldsmobile Omega Pontiac Phoenix	Possible interference between the clutch control cable and brake pipe in the area of master cylinder.	4,382	Voluntary by manufacturer
April 3, 1979	Chevrolet Citation Buick Skylark Oldsmobile Omega Pontiac Phoenix	Fuel hoses could be incorrectly positioned and could contact a portion of the front axle when the vehicle was being driven.	4,626	Voluntary by manufacturer
April 3, 1979	Chevrolet Citation Pontiac Phoenix	Longitudinal body bars at the rear control arm location might not be adequately welded into the structure.	10,751	Voluntary by manufacturer

APPENDIX V

APPENDIX V

<u>Date of manufacturers' notification to NHTSA</u>	<u>Makes and models</u>	<u>Problem</u>	<u>Number of vehicles recalled</u>	<u>Initiator of recall</u>
April 12, 1979	Chevrolet Citation Buick Skylark Oldsmobile Omega Pontiac Phoenix	Front suspension coil spring could have a larger than desired inside diameter of the lower coil where it rested on the spring seat.	23,725	Voluntary by manufacturer
September 19, 1979	Chevrolet Citation Buick Skylark Oldsmobile Omega Pontiac Phoenix	Certain vehicles with automatic transmission cooler line hoses could have material voids, which coupled with a high thermal expansion at elevated temperatures, could result in hose failure during vehicle operation.	224,892	Voluntary by manufacturer
September 19, 1979	Chevrolet Citation Buick Skylark Oldsmobile Omega Pontiac Phoenix	On certain vehicles the steering gear mounting plate could develop fatigue cracks at high mileage which would allow the steering gear attachment to become loose.	161,225	Voluntary by manufacturer
October 19, 1979	Buick Skylark	On certain vehicles an incorrect turn signal flasher unit was installed.	236	Voluntary by manufacturer

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<u>Date of manufacturers' notification to NHTSA</u>	<u>Makes and models</u>	<u>Problem</u>	<u>Number of vehicles recalled</u>	<u>Initiator of recall</u>
August 5, 1981	Chevrolet Citation Buick Skylark Oldsmobile Omega Pontiac Phoenix	On certain vehicles equipped with manual transmission, the rear brakes would lock up during moderate to hard braking efforts.	47,371	Influenced by NHTSA
February 18, 1983	Chevrolet Citation Buick Skylark Oldsmobile Omega Pontiac Phoenix	All vehicles equipped with manual transmission and those equipped with automatic transmission produced before mid-March 1979 had a tendency to lock up in moderate to hard braking.	239,799	Influenced by NHTSA

INFORMATION ON PRODUCTION, MODIFICATIONS,
AND RECALLS OF GENERAL MOTORS
CORPORATION'S 1980 X-BODY CARS

PRODUCTION

From January 1979 to August 1980, General Motors Corporation's four divisions produced 1,057,959 1980 X-body cars for sale in the United States which were subject to the regulatory activities of the National Highway Traffic Safety Administration as shown below.

Production of 1980 Model X-Body Cars

<u>Division/model</u>	<u>Manual transmission equipped</u>	<u>Automatic transmission equipped</u>	<u>Total</u>
Chevrolet Citation	144,298	423,545	567,843
Buick Skylark	22,991	210,990	233,981
Oldsmobile Omega	13,279	97,267	110,546
Pontiac Phoenix	<u>27,586</u>	<u>118,003</u>	<u>145,589</u>
Total	<u>208,154</u>	<u>849,805</u>	<u>1,057,959</u>

MODIFICATIONS DURING PRODUCTION THAT COULD
HAVE AFFECTED CARS' STABILITY

During the course of the production of the 1980 X-body cars, General Motors notified NHTSA that certain changes were made to the cars' braking systems as shown in the following table.

Some Changes Made to Brakes
During 1980 Model Year

<u>Date change made in production</u>	<u>Description of change</u>
March 18, 1979	Rear brake lining changed to a less "aggressive" type on automatic transmission-equipped cars.
August 27-29, 1979	A 27-percent proportioning valve substituted for the original 41-percent proportioning valve on both manual and automatic transmission-equipped cars to effect a rebalancing of the front to rear braking function (less force to rear above 350 pounds per square inch) and to accommodate the lightly loaded operating condition that manufacturer said proved to be more representative of customer usage.
July 28, 1980	Rear lining changed to a less "aggressive" type on manual transmission-equipped vehicles to "pull ahead" the 1981 model year parking brake system that was entered into production as a product improvement.

RECALLS OF 1980 X-BODY CARS TO CORRECT
REAR BRAKE LOCKUP

At NHTSA's urging, General Motors Corporation on two different occasions recalled certain 1980 X-body cars because of the tendency of their rear brakes to lock up during moderate-to-hard braking. General Motors notified NHTSA of its decisions to effect such recalls on August 5, 1981, and February 18, 1983. The makes and number of vehicles affected by those recalls follow.

1980 X-Body Cars Affected by General Motors' Recalls
to Correct the Tendency of
Rear Brakes to Lock Up

<u>Division/make of vehicle</u>	<u>Number of vehicles recalled</u>	
	<u>August 6, 1981</u>	<u>February 18, 1983</u>
Chevrolet		
Automatic transmission	-	17,851
Manual transmission	32,898	144,298
Buick		
Automatic transmission	-	6,178
Manual transmission	4,316	22,991
Oldsmobile		
Automatic transmission	-	3,210
Manual transmission	2,800	13,279
Pontiac		
Automatic transmission	-	4,406
Manual transmission	7,357	27,586
	<u>47,371</u>	<u>239,799</u>

Repair made as a result of
August 1981 recall

The X-body cars are equipped with a diagonally split hydraulic brake system. The vehicle's right front and left rear brakes are served by one hydraulic chamber of a dual master cylinder, and the left front and right rear brakes are served by the other master cylinder chamber. The system includes two rear brake proportioning valves on the master cylinder--one for each diagonal split. The valves' purpose is to regulate the braking balance between the front and rear axles. These proportioning valves were designed to limit rear brake hydraulic pressure during moderate to hard braking efforts so as to minimize rear brake lockup.

The proportioning valves used in the X-body cars are a fixed ratio type; that is, the front brakes receive full master cylinder hydraulic pressure while the rear brakes receive the first 350 pounds per square inch of master cylinder pressure plus 27 percent (41 percent before the change in production in August 1979) of any pressure in excess of 350 pounds per square inch.

According to ODI's April 1983 status report, GM had replaced, as of December 31, 1982, the 41-percent proportioning valve on 77 percent of the 47,371 recalled manual transmission X-body cars that were produced before August 27-29, 1979, with a 27-percent proportioning valve.

Repairs to be made as a result
of the February 1983 recall

After NHTSA's investigation indicated that the August 5, 1981, recall and subsequent fix might not be sufficient to correct the rear brake locking problem, GM agreed to make additional repairs to 239,799 1980 X-body cars. Included in this total were all 1980 X-body manual transmission cars produced during the 1980 model year and all automatic transmission cars built before mid-March 1979. According to NHTSA, the brake linings in these vehicles had a tendency to lock up in moderate to hard braking which could cause the cars to spin out of control without warning. The following items were to be inspected, repaired, and/or replaced:

- Replace the rear brake shoes with shoes that have a different lining material.
- Replace the parking brake cables on all manual transmission vehicles.
- Inspect, lubricate, and adjust parking brake cables on involved automatic transmission vehicles.
- Replace other parking brake system components, as needed for proper operation.
- Clean and inspect rear brake drums; resurface or replace as necessary.
- Inspect front brake system and repair or replace parts to provide uniformity of the entire brake system.

A NHTSA official told us that General Motors had sent out letters notifying owners of the recall between April 4 and April 12, 1983. NHTSA has announced that it will continue to monitor an estimated 276,000 additional 1980 X-body cars equipped with automatic transmissions that were produced with the 41-percent proportioning valve used in all X-body cars produced before August 27-29, 1979.

INFORMATION ON DOMESTIC CAR MANUFACTURERS'SHIFT TO SMALLER VEHICLES AND GM'SINTRODUCTION OF THE 1980 X-BODY CAR

To compete with foreign auto manufacturers and produce automobiles that meet congressionally established fuel economy standards, U.S. auto manufacturers had to make huge capital investments to retool production facilities needed to build new, smaller cars. The domestic automobile manufacturers moved to the front wheel drive (FWD) cars primarily as a weight reduction measure because it offered the means of achieving better use of the interior volume of a car for a given weight.

The shift to the FWD allowed engines to be mounted transversely, transmitting their power through the front wheels. This resulted in more room through the elimination of the drive shaft and rear axle and differential. The introduction of these new vehicles which are much lighter and more compact than the traditional cars in prior years meant that smaller engines could be used. Also, the steering, braking, and suspension system usually have to be replaced by different designs to accommodate the new powertrains and body structure.

GM INTRODUCED X-BODY CARS

In January 1979, GM started production of the 1980 X-body cars--Chevrolet Citation, Pontiac Phoenix, Buick Skylark, and Oldsmobile Omega. By the end of August 1980, GM had produced 1,057,959 X-body cars. The GM X-body cars are FWD and such vehicles are usually lighter in the rear than the conventional rear wheel drive vehicles.

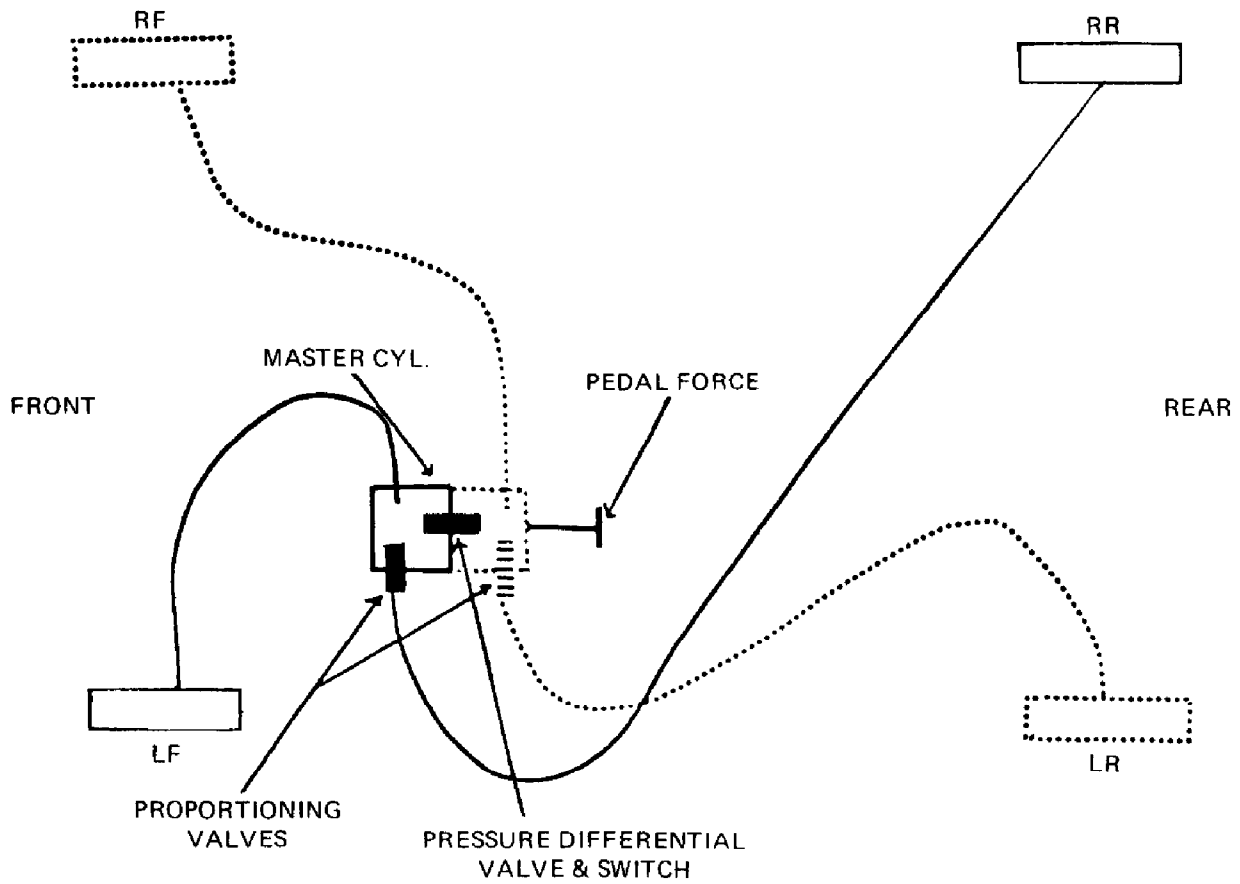
NHTSA's Engineering Analysis Report dated June 26, 1981, states that the GM X-body cars are equipped with a diagonally split hydraulic brake system as shown on page 73. This means that the vehicle's right front and left rear brakes are served by one hydraulic chamber of a dual master cylinder, and the left front and right rear brakes are served by the other master cylinder chamber. The front and rear brakes are disc and drum type, respectively.

There are two rear brake proportioning valves located on the master cylinder, one for each diagonal split. A chart showing proportioning valves is on page 74. Their purpose is to regulate the braking balance between front and rear axles. They

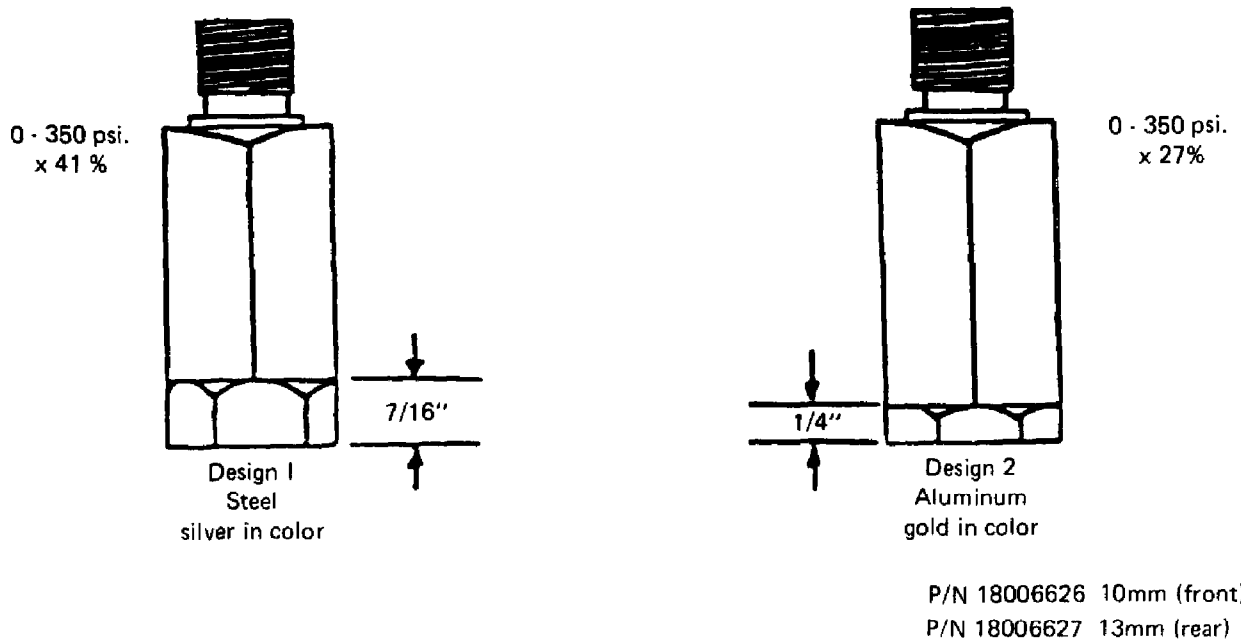
regulate or limit the amount of hydraulic pressure to the rear drum brakes. This is necessary because the rear of the vehicle is typically lighter in weight than the front.

The Engineering Analysis Report stated that during moderate to hard braking efforts where there can be significant dynamic weight transfer toward the front, the proportioning valve limits rear brake hydraulic pressure to preclude premature rear brake lockup. The vehicle with locked rear wheels is less stable than one with locked front wheels because the sliding friction of the rear tires on the road is less than the rolling friction of the front tires. The rear of the vehicle tends to move faster than the front and the vehicle will yaw about a vertical axis located at the front axle, causing loss of control. In contrast, when only the front wheels lock, there is no such instability. There is a loss of directional control--steering--but the vehicle tends to go straight. If it begins to yaw, the dynamics are such that the vehicle self-corrects to a straight path.

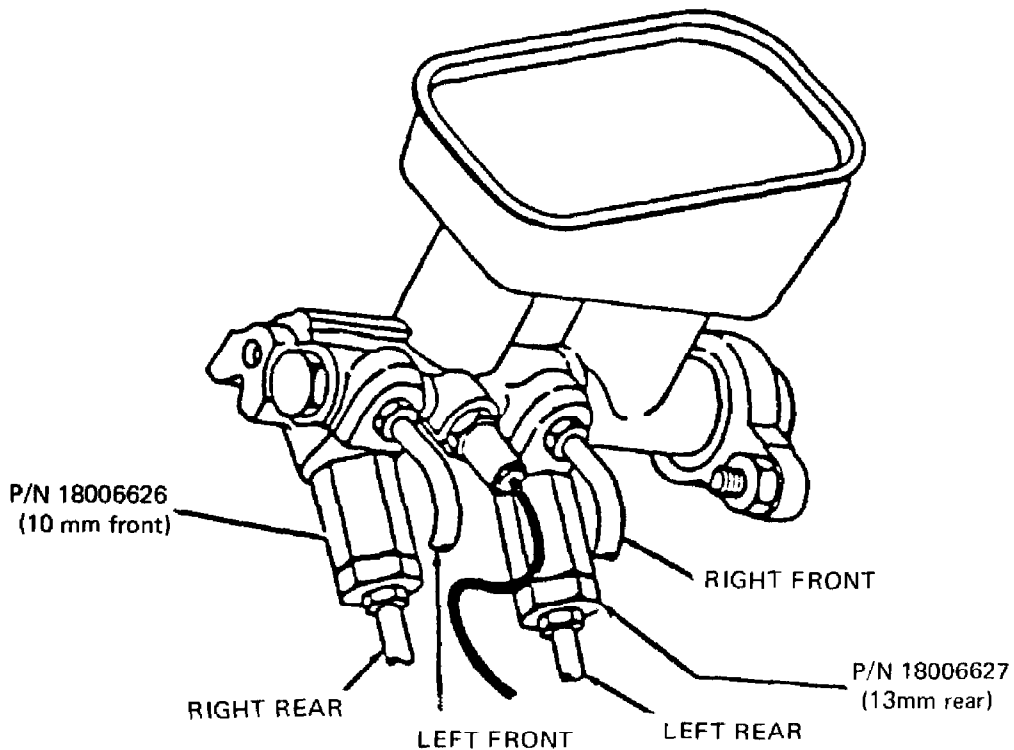
DIAGONALLY SPLIT HYDRAULIC BRAKE SYSTEM



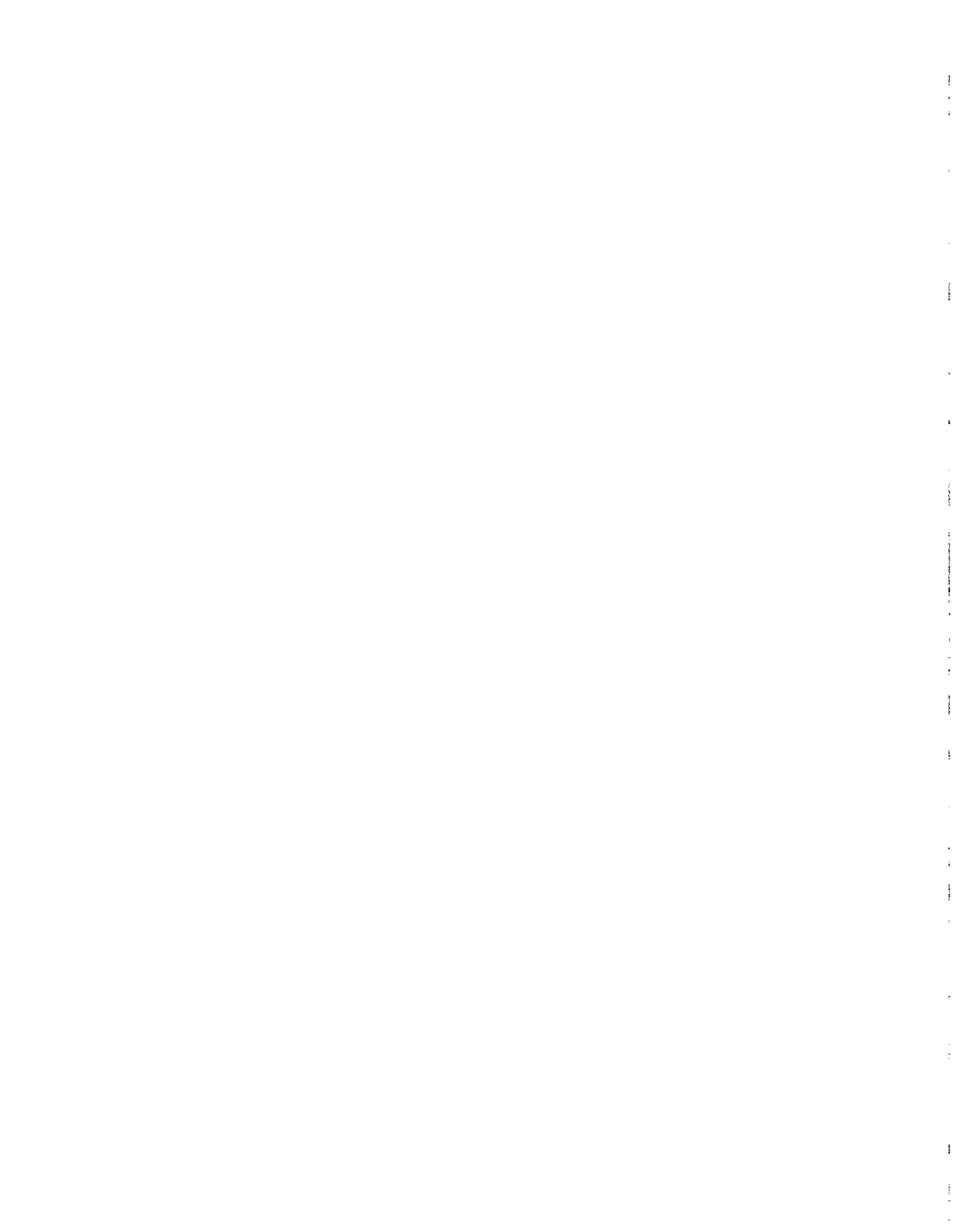
BRAKE PROPORTIONER VALVE IDENTIFICATION



MASTER CYLINDER BRAKE PIPES IDENTIFICATION



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(347510)



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