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REPORT ON THE OVERSIGHT HEARINGS
AND INVESTIGATION OF THE
DC-10 AIRCRAFT

PREPARED AT THE DIRECTION OF
HONORABLE WARREN G. MAGNUSON, Chairman

FOR THE USE OF THE
COMMITTEE ON COMMERCE
UNITED STATES SENATE

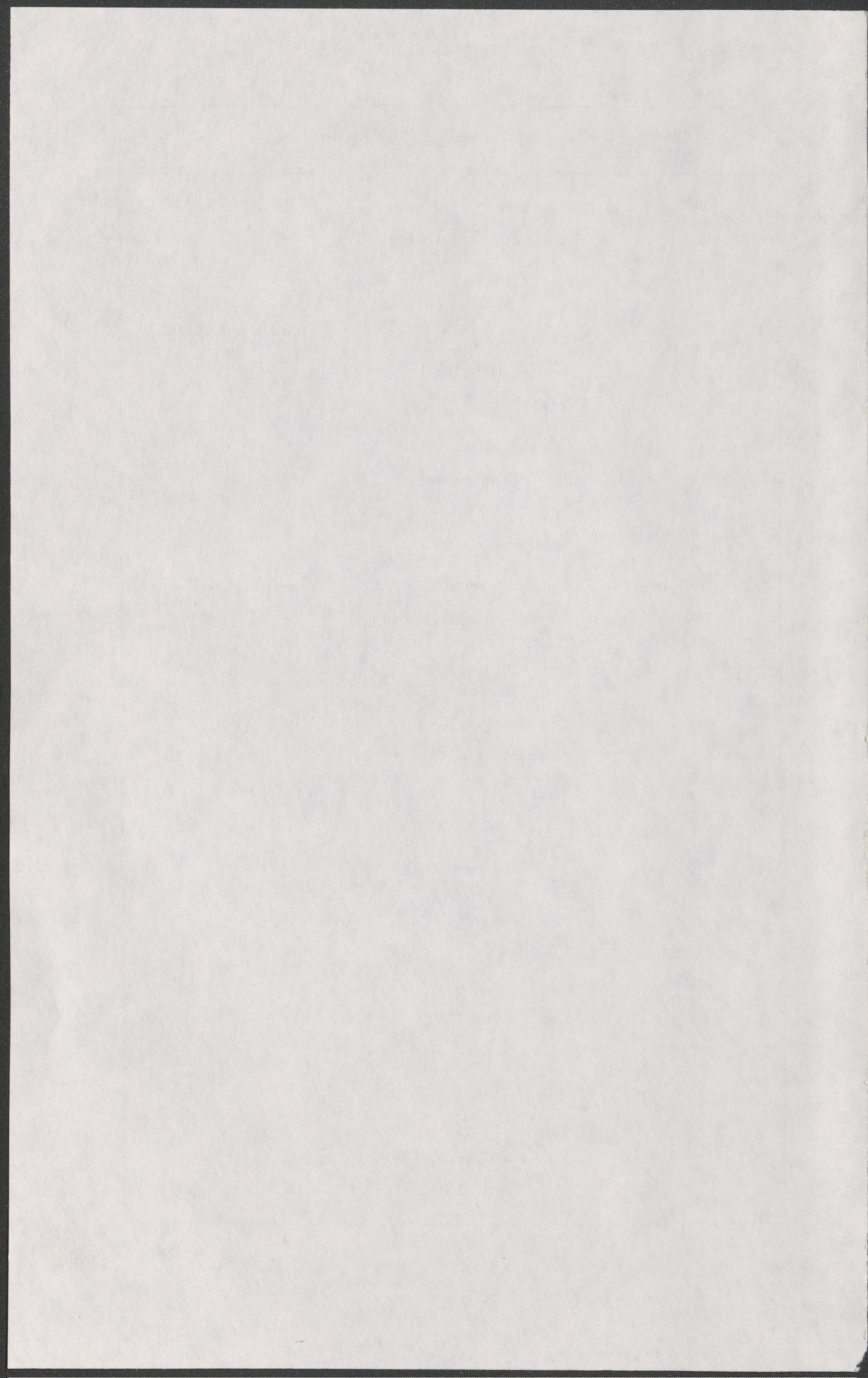


JUNE 1974

U.S. GOVERNMENT PRINTING OFFICE

33-379 O

WASHINGTON : 1974



LETTER OF TRANSMITTAL

JUNE 27, 1974.

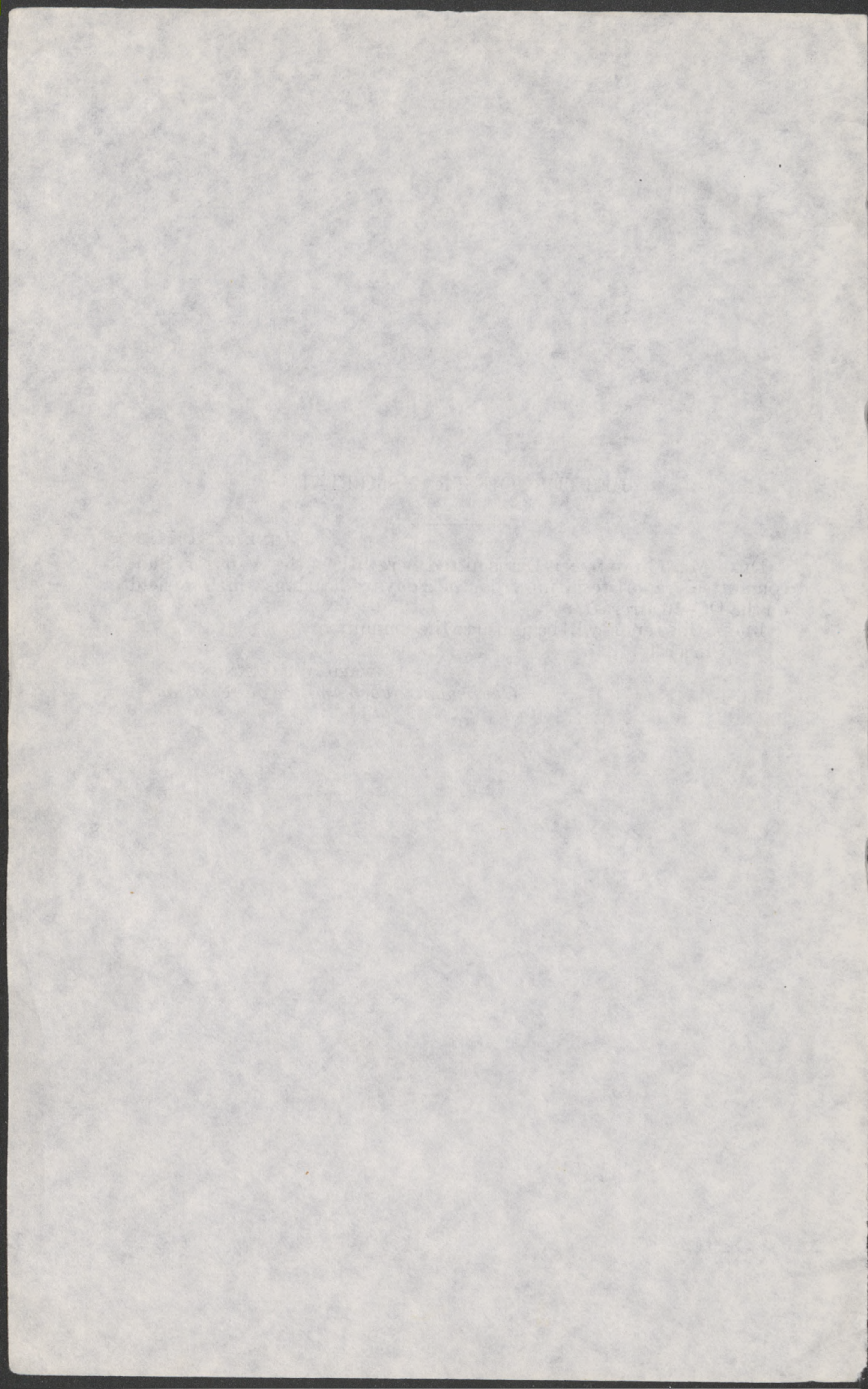
DEAR MR. CHAIRMAN: Transmitted herewith is the Aviation Subcommittee's report resulting from the 2 days of hearings which we held on the DC-10 aircraft.

I hope this report will be useful to the committee.

Sincerely,

HOWARD W. CANNON,
Chairman, Subcommittee on Aviation.

(III)



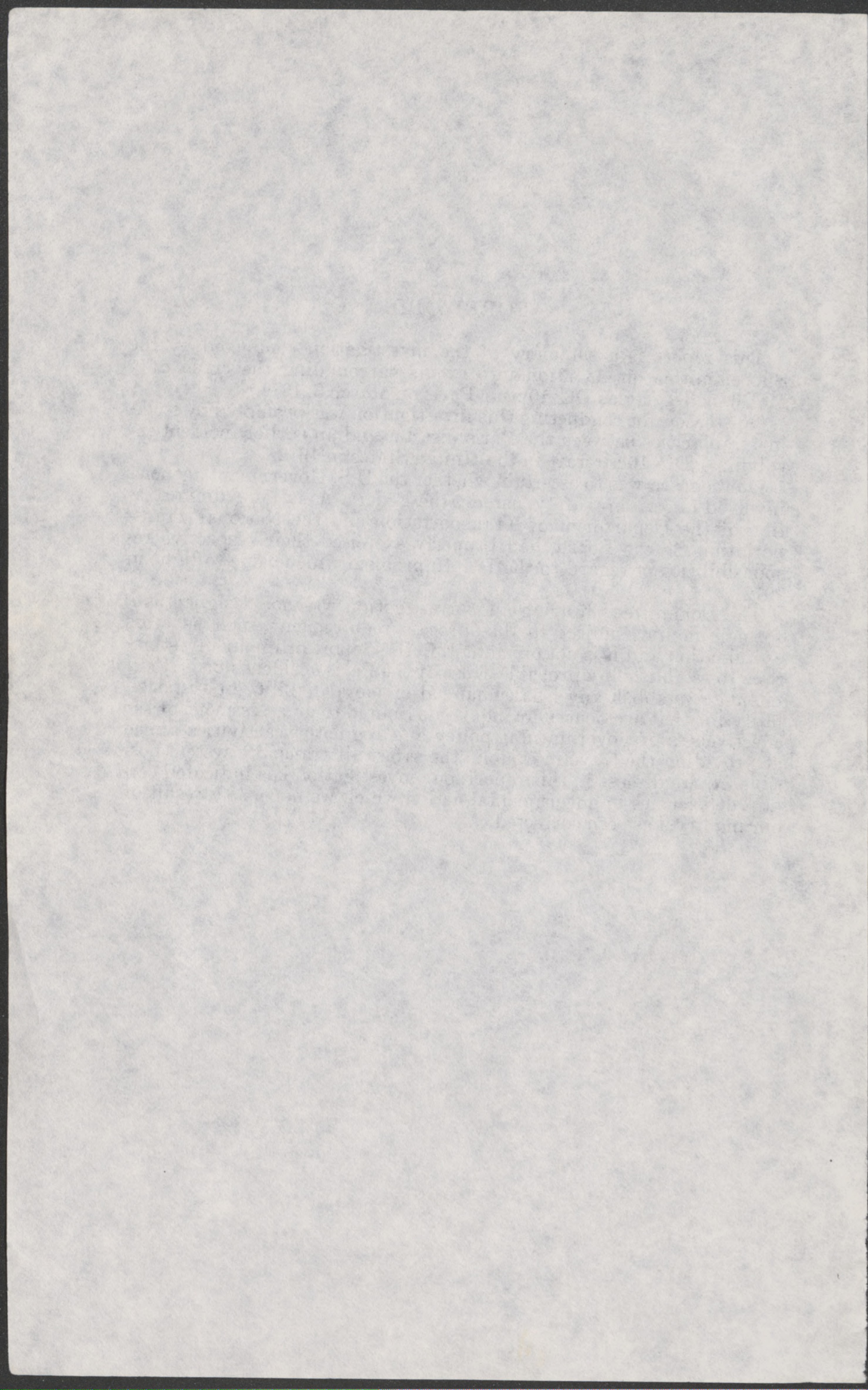
FOREWORD

This report is a summary of the investigation conducted by the Subcommittee on Aviation into events surrounding the crash of a McDonnell-Douglas DC-10 near Paris on March 3, 1974.

Our reason for conducting this investigation was prompted by striking similarities between the Paris disaster and an earlier incident involving a DC-10 aircraft in the United States in 1972.

Our concern was to ascertain whether the U.S. Government agencies involved in civil air safety, namely the Federal Aviation Administration of the Department of Transportation and the National Transportation Safety Board, had properly exercised their respective responsibilities in regard to the DC-10 problem which came to light in 1972.

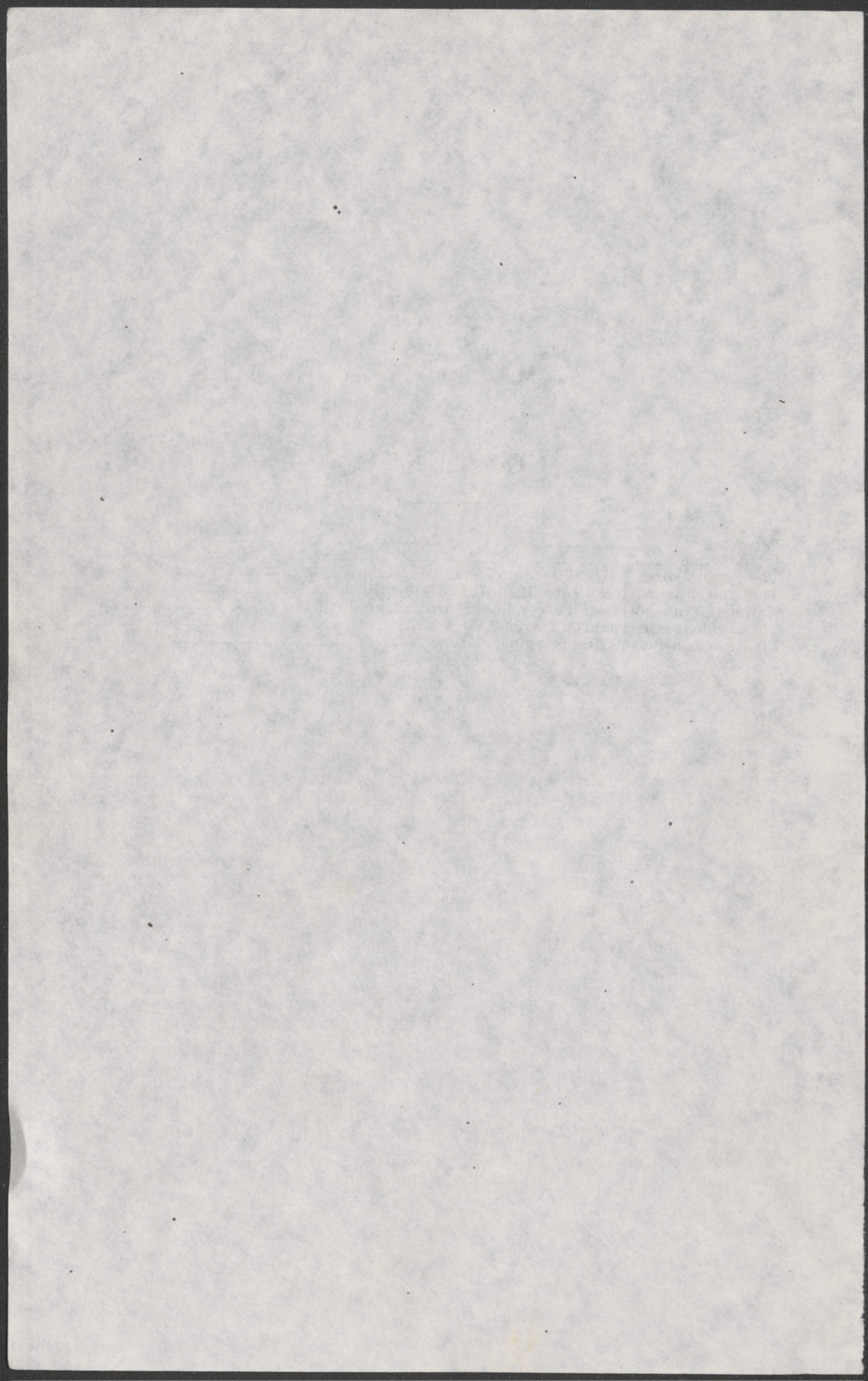
The Committee's hearing and investigation was not designed as a formal inquiry subject to due process requirements such as cross examination and it is not our intent, in this report or in our investigation, to establish any probable cause of the Paris accident nor is it our intent to establish any legal, financial or moral liability or responsibility for that accident. Our inquiry is limited to an assessment of the effectiveness of governmental policy and regulatory activities aimed at providing the traveling public the safest air transport system possible. As we discuss in this report, our investigation has indicated certain deficiencies in governmental action which we hope, as a result of our inquiry, has been corrected.



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INTRODUCTION

On Sunday, March 3, 1974, shortly after a takeoff from Paris, France, a McDonnell Douglas DC-10 aircraft operated by THY Airlines of Turkey plunged to the earth killing all 346 persons on board.

Shortly after the accident occurred, a French investigation team was sent to the crash site to determine the cause of the accident. The United States National Transportation Safety Board and the Federal Aviation Administration also sent observers to the scene to observe and assist the French investigators. The U.S. participation in the accident investigation was deemed important for two reasons; first the aircraft was of U.S. manufacture and second the accident bore remarkable resemblance to an incident which occurred June 12, 1972, in which another DC-10 aircraft, in this case operated by American Airlines of the United States, was forced to make an emergency landing following an explosive decompression which occurred in the aircraft cabin and which partially debilitated the aircraft. That incident was investigated by the National Transportation Safety Board and a probable cause report was issued.

Because of the magnitude of the disaster near Paris in March and because the aircraft involved was a new U.S. manufactured wide-body jet, extraordinary public interest and concern focused on the disaster.

Based on initial reports from the crash scene, the public and press speculation focused on the possibility of sabotage by bomb. However preliminary analysis by experts conducting the investigation eliminated the bomb possibility and investigators began to focus on the similarities between this crash and the 1972 incident.

The Aviation Subcommittee, based on reports from U.S. investigators in Paris, began to conduct its own inquiry into events surrounding the crash and particularly into what governmental and industry actions were taken immediately after the June 1972 incident to preclude such an occurrence in the future.

Before the Subcommittee began its oversight hearings on Tuesday, March 26, 1974, both U.S. and French accident investigators had reached preliminary or tentative conclusions regarding the cause of the Paris disaster. The investigators concluded that the accident was caused by the separation of the aft bulk cargo door from the aircraft while the aircraft was climbing to its assigned cruising altitude. The investigators further determined that following the in-flight separation of the cargo door, an instantaneous explosive decompression occurred as pressure within the passenger cabin sought to escape through the opening in the fuselage. This decompression caused the cabin floor to buckle or collapse in the vicinity of the aft cargo door and this in turn jammed, severed or otherwise damaged the aircraft's flight control cables which passed through beams in the aircraft floor running from the cockpit to the empennage. This sequence of events rendered

(1)

the DC-10's flight controls incapable of controlling the aircraft and the crash resulted.

As we will discuss in detail below, our investigation has indicated certain deficiencies in governmental action which we hope, as a result of our inquiry, have been corrected.

THE HISTORY OF THE DC-10 DOOR PROBLEM

The central issue confronting air safety investigators following the crash of the Turkish DC-10 aircraft was the integrity of the rear cargo door, the manner in which it operated and whether improper closure of the door could begin a chain of events leading to loss of control of the aircraft.

In conducting its inquiry the Committee has learned that McDonnell-Douglas, beginning early in the DC-10 program has experienced difficulty with the cargo doors. These problems apparently came to light in 1970 at which time the company was conducting pressure vessel tests on the fuselage on the ground at its Long Beach facility. This difficulty occurred before the aircraft had made its first flight and before it had been type certificated by the FAA and of course before the DC-10 had entered commercial airline service.

According to Mr. John Brizendine, president of the Douglas Aircraft Company, a division of the McDonnell-Douglas Corporation, the preflight problems were as follows:

On May 29, 1970, while conducting a ground pressurization test during the construction stage of DC-10 fuselage No. 1, the forward cargo door had been improperly latched and the door came open due to the cabin pressure loads. The cabin floor sustained local damage in the vicinity of the door.

Because of this incident, all cargo doors were redesigned to incorporate a vent door linked to the lock pin actuating handle and sized so as to make it impossible to pressurize the aircraft if the door was not properly latched and locked. This system was installed on all DC-10 aircraft prior to delivery.

I would like to insert a comment here, Mr. Chairman. The FAA requested and Douglas performed a demonstration of the accuracy of the front door on the pressurization of the aircraft. A compliance report was prepared, submitted, accepted and approved by the FAA as part of the type design, and part of the type certification.

Reference was made or has been made, to the lack of fault analyses required. The FAA did in fact require 32 separate system fault analyses for certification of the DC-10, which were submitted and are part of the type certification.

The Federal Aviation Administration was aware of the problem at the time as recalled by Mr. Arvin Basnight, the director of the Western Region of the FAA:

Senator CANNON. During the precertification tests of the DC-10, were you ever made aware of problems concerning the DC-10 which involved the blowout of a door in precertification testing?

Mr. BASNIGHT. Yes, sir. The early stages of the DC-10 included a pressure vessel test, not of a production airplane, but of one of the first prototypes, I think No. 1 to be exact, and in a test not witnessed by the FAA, but one of their own methods of proving the airplane; they did have a pressure demonstration that blew out a door, a cargo door, and I think Mr. Shaffer here could indicate which one it was.

It was the right forward door, which had been hand cranked closed, rather than operated with the normal mechanism. This door was not the door presented in the airplane at the time it came up for certification.

And after that experience, they applied themselves and upgraded the design and engineering and features of the door to assure as best they were able to that the probability was remote of a cargo door blowout.

Senator CANNON. Did the Western Region go into that thoroughly and determine that the fix they had accomplished was adequate under the circumstances?

Mr. BASNIGHT. We went into it to the extent of making the best judgment that we could. We did not require what in retrospect might have been required, a so-called fault analysis testing.

Mr. BAKKE [Oscar Bakke is the Associate Administrator for Safety, FAA]. I might interject, Mr. Chairman, that under the regulations under which the DC-10 was certificated, an explicit requirement for fault analysis with respect to this door was not contained in the rules.

Such a requirement has, however, subsequently been added.

Despite the FAA's view that Douglas had corrected whatever deficiency caused the pressure test blowout of the cargo door, door problems continued to afflict the aircraft following certification by the Agency. After the DC-10 entered commercial service, three of the four U.S. airlines then operating the aircraft began to experience service difficulties with the cargo doors. Specifically, the electrical-mechanical device which raised and lowered the cargo doors was not functioning properly in service. In some cases, due to voltage loss, the device had insufficient power to fully close the cargo doors so that the latches and lockpins could be properly secured. In some instances, airline ground personnel had to use alternative manual means to effect door closing and this more tedious technique led to service delays. Although at this time there had yet to be a door failure incident in flight, Douglas and the FAA were aware of the fact that the airlines were experiencing difficulty in closing the cargo doors.

In fact the American Airlines aircraft which was later to be involved in the June 12, 1972 incident, N103AA, had experienced cargo door difficulty on March 3, 1972. The aircraft's log entry noted that the door would not close electrically, and that it had to be manually latched. Corrective action consisted of an adjustment to the door-closing switch to permit electric operation of the latches.

As a result of this problem and others being experienced by other airlines, McDonnell-Douglas issued a service bulletin on May 30, 1972, Service Bulletin 52-27, which pertained to the electrical wiring of the latch actuator. The modification recommended replacement of the cargo door latch actuator wiring with heavier gage wire.

In stating the reason for the service bulletin, Douglas said:

Reason: Three operators have reported failure of the electrical latch actuators to latch/unlatch the cargo doors. Latch actuator failure is attributed to an excessive voltage drop reducing the output torque to the actuator. This condition may prevent electrical latching/unlatching of the hooks. Failure to provide adequate torque necessitates manual latching/unlatching of the doors resulting in flight delays. Increasing the wire gage between the circuit breakers and the actuators will reduce the voltage drop and provide adequate torque to operate the latch hooks under all anticipated conditions.

This service bulletin was routinely issued by the manufacturer without an alert tag and compliance was "recommended".

THE AMERICAN AIRLINES JUNE 12, 1972 DC-10 INCIDENT

On February 28, 1973, the National Transportation Safety Board released its report on the 1972 incident which covered its findings and recommendations. The report is reprinted here in order to acquaint the reader with the circumstances surrounding the incident.

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D. C. 20591
AIRCRAFT ACCIDENT REPORT

Adopted: February 28, 1973

AMERICAN AIRLINES, INC.
McDONNELL DOUGLAS DC-10-10, N103AA
NEAR WINDSOR, ONTARIO, CANADA, JUNE 12, 1972

SYNOPSIS

An American Airlines, Inc., McDonnell Douglas DC-10-10, was damaged substantially when the aft bulk cargo compartment door separated from the aircraft in flight at approximately 11,750 feet mean sea level. The separation caused rapid decompression, which, in turn, caused failure of the cabin floor over the bulk cargo compartment. The floor partially collapsed into the cargo compartment, disrupting various control cables which were routed through the floor beams to the rear engine and to the empennage control systems.

The separated door caused minor damage to the fuselage above the door opening and substantial damage to the leading edge and upper surface of the left horizontal stabilizer.

There were 56 passengers and a crew of 11 aboard the aircraft. Two stewardesses and nine passengers received minor injuries.

The National Transportation Safety Board determines that the probable cause of this accident was the improper engagement of the latching mechanism for the aft bulk cargo compartment door during the preparation of the airplane for flight. The design characteristics of the door latching mechanism permitted the door to be apparently closed, when, in fact, the latches were not fully engaged and the latch lockpins were not in place.

As a result of the investigation of this accident, the Safety Board made two recommendations to the Federal Aviation Administrator.

1. INVESTIGATION

1.1 History of the Flight

American Airlines, Inc., Flight 96, a DC-10-10, N103AA, was a scheduled passenger flight from Los Angeles, California, to LaGuardia Airport, New York, with intermediate stops at Detroit, Michigan and Buffalo, New York. Flight 96 departed Los Angeles International Airport at 1436 e.s.t.,¹ on June 12, 1972, 46 minutes after its scheduled departure. The delay was a result of passenger handling and air traffic control. Flight 96 arrived at Detroit at 1836. This segment of the flight was without incident.

Fuel, cargo, and passengers were loaded aboard the airplane at Detroit and its takeoff gross weight was computed to be 300,888 pounds, well under the maximum allowable. The last compartment to be secured prior to dispatch of the flight was the aft bulk cargo compartment.

The ramp service agent who serviced the aft cargo compartment had difficulty closing the door. He stated that he closed the door electrically. He listened for the motor to stop running and then attempted to close the door handle. This handle is designed to close the small vent door which is located on the cargo door, to position a lockpin behind a cam on each of the

¹ All times used herein are eastern standard, based on the 24-hour clock.

four latches and to open the circuit to the cockpit warning lights.

The agent could not close the handle with normal force, so he applied additional force with his knee. This caused the handle to stow properly, but the vent door was closed in a slightly cocked position. The agent brought this to the attention of a mechanic who gave his approval for release of the aircraft. The flight departed the ramp at 1911 with the door in this condition. According to the flight engineer, the cargo door warning light on his panel never illuminated during the taxi-out, or at any time during the flight. This light was designed to illuminate when any cargo door is not properly secured for flight.

Following receipt of clearance to Runway 03 Right, the flight took off at 1920. The first officer was flying the airplane. Flight 96 was cleared to maintain runway heading and to contact the departure controller who cleared it to climb to 6,000 feet and vectored it to intercept V-554. Upon interception, the flight was further cleared to continue climbing to Flight Level 210² and to contact the Cleveland Air Route Traffic Control Center (ARTCC).

About 1925, while the airplane was at approximately 11,750 feet altitude and climbing at 260 knots Indicated Airspeed (KIAS), the flightcrew heard and felt a definite "thud." Simultaneously, dust and dirt flew up into their faces, the rudder pedals moved to the full left-rudder position, all three thrust levers moved back to near the flight idle position, and the airplane yawed to the right. The captain reported that he lost his vision momentarily; he thought that a midair collision had occurred and that the windshield had been lost.

The captain immediately disengaged the autopilot and took control of the airplane. He remained on the controls for the rest of the flight. Nos. 1 and 3 engines responded to power application; however, the No. 2 engine thrust lever could not be moved. The airspeed was stabilized at 250 knots, and at this speed the aileron re-

sponse was normal, elevator response was extremely sluggish, and directional control required continuous left aileron input. Rudder control was not available and the airplane remained in a right yaw. The captain declared an emergency, and Air Route Traffic Control cleared the flight back to Detroit via radar vectors.

At the time of the occurrence, most of the flight attendants heard a loud noise, observed "fog" in the cabin, and felt motion of the cabin air. They recognized the rapid decompression of the cabin air, and one of the first actions of most of the flight attendants was to see whether the passenger oxygen masks had deployed. The decompression of the cabin air through the aft cargo compartment door caused the cabin floor in the aft lounge area to fail downward and partially drop into the cargo compartment. No passengers were in this area of the cabin; however, two flight attendants, who were in their seats at the aft exits, were thrown to the floor and received minor injuries. Their injuries did not prevent them from performing their duties.

During the return flight to Detroit, the passengers were briefed on a possible crash landing and were given instructions for the emergency evacuation of the aircraft.

The airplane was radar vectored to the localizer course for an Instrument Landing System (ILS) approach to Runway 03 Left at the Detroit Metropolitan Wayne County Airport. At the captain's request for a long final approach, the controller planned for a 20-mile localizer course intercept. A slow descent was initiated and, according to the captain, because of limited elevator control, the No. 2 engine was secured. He applied power on the Nos. 1 and 3 engines to assist in pitchup control. The captain decided not to dump fuel because of the unknown damage in the empennage area. During the initial part of the final approach the airspeed was 150 knots and the sink rate was approximately 800 feet per minute. Extension of the landing gear and 35° flaps increased the sink rate to 1,500 feet per minute. Additional thrust increased the airspeed to 160 to 165 knots and stabilized the sink rate at approximately 800 feet per minute. The remainder of the approach was made in this

²Flight Level 210 indicates an altitude of 21,000 feet m.s.l. Flight level is written without the last two zeros.

profile. The captain stated that the aircraft's deck angle was extremely flat compared to that of a normal approach and that at touchdown, he had serious doubts if the landing gear was extended. He further stated that he used no stabilizer trim and that he and the first officer both had to apply back pressure to the controls to flare the airplane. The airplane landed at 1944.

The airplane touched down 1,900 feet down the runway and immediately started to veer to the right. The captain applied reverse thrust to engines No. 1 and No. 3 and applied full left aileron. As the aircraft veered further right, the first officer applied full reverse thrust to the left engine and brought the right engine out of reverse. This action provided directional control, and the airplane paralleled the right side of the runway for 2,800 feet before it began a gradual left turn back to the runway. The airplane came to rest approximately 8,800 feet from the runway threshold. The nose and left main landing gear were on the runway surface, and the right main landing gear was off the runway surface.

The captain ordered the emergency evacuation alarm activated after the airplane came to rest. The evacuation slides were deployed and all passengers and crew used the slides.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Other
Fatal	0	0	0
Nonfatal	2	9	0
None	9	47	

1.3 Damage to Aircraft

The cabin floor in the aft lounge area sustained major damage. The first nine transverse floor beams in the lounge area were fractured approximately 6 inches from the vertical struts near the left side of the compartment. These beams also failed in bending near the right side of the airplane, and allowed the floor to settle partially into the cargo compartment. There were no seats attached to this floor section; however, a

circular bar installed near the aft end of the lounge tore loose. This bar came to rest in the left corner of the lounge, where the cabin floor deflection was the greatest. The deflection of the floor damaged and jammed a number of the engine and flight control systems cables. One cable to the left rudder and a pair of elevator cables were severed. In the cockpit area, the manual stabilizer trim handles were inoperative, and the rudder pedal torque tube and left rudder cable horn were separated. The aft cargo compartment door separated from the airplane and caused minor damage to the fuselage above the door and substantial damage to the leading edge and upper surface of the left horizontal stabilizer. The cargo door was recovered from a field several miles from the airport.

1.4 Other Damage

None.

1.5 Crew Information

The flightcrew and cabin attendants were qualified and certificated for the operation of this flight. (For detailed information, see Appendix B.)

1.6 Aircraft Information

The airplane was a McDonnell Douglas DC-10-10, registration No. N103AA, serial No. 46503. It had accumulated 2142:13 total flying hours and 8:47 hours since the last line maintenance. The most recent major airplane maintenance inspection was performed on April 26, 1972, at 1,825 hours' total time.

The airplane was properly certificated and had been maintained in accordance with company and Federal Aviation Administration (FAA) requirements.

The only recorded discrepancy to the cargo door closing mechanism occurred on March 3, 1972. The log entry noted that the door would not close electrically, and that it had to be manually latched. Corrective action consisted

of an adjustment to the door-closing switch to permit electric operation of the latches.

No Airworthiness Directive pertaining to DC-10 cargo doors was in effect at the time of the accident. However, McDonnell Douglas Service Bulletin 52-27, DC-10 SC 612, which pertained to the electrical wiring to the latch actuator, had been issued on May 30, 1972. The modification recommended replacement of the cargo door latch actuator wiring with heavier gage wire. American Airlines had not complied with this bulletin at the time of the accident nor was compliance mandatory. The reason for the issuance of this bulletin was stated in the bulletin as:

"Reason:

Three operators have reported failure of the electrical latch actuators to latch/unlatch the cargo doors. Latch actuator failure is attributed to an excessive voltage drop reducing the output torque to the actuator. This condition may prevent electrical latching/unlatching of the hooks. Failure to provide adequate torque necessitates manual latching/unlatching of the doors resulting in flight delays. Increasing the wire gage between the circuit breakers and the actuators will reduce the voltage drop and provide adequate torque to operate the latch hooks under all anticipated conditions."

1.7 Meteorological Information

The surface weather observations at Detroit Metropolitan Wayne County Airport, Detroit, Michigan, for a period prior to and following the accident were, in part, as follows:

1906—Special estimated 4,500 feet broken, 7,000 feet overcast, visibility 2 miles, restriction to visibility smoke and fog, wind 090° at 7 knots, temperature 56° F., dew point 70° F., altimeter setting 29.85.

1955—Estimated 4,500 overcast, 1-1/2 miles visibility, restriction to visibility smoke and fog, wind 140° at 6 knots, temperature 61° F., dew point 58° F., altimeter setting 29.85

1.8 Aids to Navigation

There were no reported malfunctions of the navigational aids during the emergency. Runway 03L, is equipped with a full Instrument Landing System, which was utilized by the crew for the approach.

1.9 Communications

All communications with Flight 96 were routine and in accordance with established procedures. There were no reported difficulties.

1.10 Aerodrome Ground Facilities

Detroit Metropolitan Wayne County Airport is located approximately 17 statute miles southwest of Detroit, Michigan. The geographic location is 42°13.1' north latitude and 83°20.9' west longitude, at a field elevation of 639 feet mean sea level. The airport is operated continuously. Runway 03 left is 10,500 feet in length, and 200 feet in width, of concrete construction, with all-weather markings. It is equipped with high-intensity runway lights with centerline lights and high-intensity approach lights. The approach lights are equipped with sequence flashing lights. The runway is also equipped with touchdown zone lights.

Firefighting and rescue equipment available were as follows:

- 2—Yankee Walters, 2,500 gallon tankers.
- 1—Yankee Walters, 3,000 gallon tanker.
- 1—Dodge Light Rescue Truck, 1,000 pounds dry chemical.
- 1—750 gallon pumper.
- 1—Dodge Rescue Van.

Ten firefighting personnel were available on 8-hour shifts.

1.11 Flight Recorder

The airplane was equipped with a Sundstrand Data Control Model 573 Flight Data Recorder.

It is a digital recorder with an associated data-acquisition system of the expanded parameter type. The recording medium is one-quarter inch magnetic tape, on which aircraft performance information is recorded serially in digital form or four sequential tracks covering 25 hours of aircraft operation.

The data recorder was operating normally up to the time the door opened. Information obtained from it confirmed the crew's testimony that the incident occurred at an altitude of 11,750 feet. However, the data recorded after the incident was largely aberrant, and little useful information was obtained. The aberrant recording was the result of inadequacies of the installation in this particular data recorder which caused acceleration loads to affect the performance of the recorder.

In addition to the flight data recorder, the aircraft was equipped with a Fairchild Model 100 cockpit voice recorder (CVR). The CVR tape was recovered intact, and a transcript of the pertinent communications is included in Appendix D.

1.12 Aircraft Wreckage

An examination of the airplane and of the aft cargo door which had separated in flight was conducted.

The cargo door hinge, door frame, and the four rollers on the door sill, which engage door latches upon closing were basically undamaged. The rollers were free to rotate and, except for two small gouge marks on the second roller from the front, they were undamaged.

The door actuator gear box was in place; however, the motor had separated from the door and was hanging by its electric wires. The actuator arm had separated and was not recovered. The door itself separated from the fuselage in flight, leaving approximately 80 percent of its exterior skin in place on the door hinge.

The door was found with the four latches nearly closed, with the lockpins not engaged, with the vent door overtraveled beyond the open position and with the door handle in the stowed position. The latches, which were filled with

earth, were approximately 0.1875 of an inch from their fully closed positions, and the latch mechanisms were 0.35 of an inch from their over-center stop positions.

Preliminary examination of the screw-type actuator which operates these latches indicated that the length of the actuator measured between the centerlines of its attach bolts was less than its normal extended position.

The actuator was removed and taken to the manufacturer for examination and disassembly. It was determined that the electrical extend limit switch was closed. The gear train was operated manually until the extend limit switch opened. The fully extended actuator measured 11.777 inches, and the retracted measurement was 9.950 inches. The actuator, as recovered, measured 11.040 inches. The unit was given an electrical load test which consisted of loads of 1,500 pounds, 2,000 pounds, and 2,600 pounds. Voltage readings varied from 28 V DC to 13 V DC. When a load of 1,500 pounds was applied, the unit crept slowly with a voltage of 13 V DC and a current draw of 11 ampere. When 2,000 pounds were applied the unit crept with a voltage of 13 V DC and a current of 13.5 ampere. With a load of 2,600 pounds applied, the unit crept with 18 V DC and 17 ampere. The clutch setting was 2,900 pounds. All testing was performed with a new electrical motor installed. The original motor had separated from the actuator and was never recovered.

Examination showed that a high-compression force was transmitted from the latches through the irreversible latch linear actuator to the door structure. This was evident from the Brinelling of the upper side of the bushing on the actuator attach lug and from the damage observed on the actuator support bracket. This support bracket was in place on its attach structure; however, the two bolts which connected the bracket to the structure were sheared. A part of one bolt was still in the door skin which was attached to the airplane. The holes in the bracket and the attach structure were about 0.375 of an inch out of alignment at the outboard side of the bracket. Other evidence of relative motion between these parts was the successive chafemarks in the paint

of the support bracket where it fitted against the mount structure. These marks indicated a maximum relative motion between these parts of 1.05 inches.

The small vent door on the aft cargo door, the door handle, and the latch lockpins are interconnected. The system is designed to prevent the door from closing and the handle from stowing if the lockpins are not in place behind the closed latches.

The link from the door handle to the horizontal torque tube which controls the vent door and the lockpins had failed in tension near its lower end. The fractured ends were separated by several inches and could not be pulled together.

The horizontal torque tube was bent slightly, and it was out of its bearing on the forward end.

The vent door, which is attached to the torque tube, had overtraveled its normal open position and was jammed in place. The vent door guard had failed in the downward direction.

The linkage from the torque tube to the lockpin mechanism was intact, except that the pivot point was broken on the bellcrank which converts vertical push-rod motion (from the handle) to horizontal lock-tube motion. The forward end of the lock tube was bent outboard. The door frame was partially fractured in the area of this bend. The lockpins were withdrawn beyond their normal unlocked positions.

The cargo actuation and warning systems, the hydraulic power system, the main wheel brakes, the nose steering system, the empennage control, and the No. 2 engine control systems were examined.

The cargo door warning light system was found operable from the cockpit aft to the connector plug on the cargo door frame. None of the circuit breakers which control power to the cargo doors and warning systems was found tripped. The wiring to the door, the lock limit warning switch, the closed limit switch, and the closed limit warning switch were separated from their attachments on the door structure.

No discrepancies were found in the hydraulic power systems, or in the wheel brakes or steer-

ing systems. Although the left rudder pedal was jammed, the left brake pedal operated normally.

Operation of the various controls in the cockpit revealed the following:

1. The nose steering system was positioned approximately 10° left because of the left rudder pedal input signal. The system was operated from the control wheel with the torque link disconnected; this operated the nose steering system normally.
2. The elevator system was operable throughout its range; however, the input loads were higher than normal.
3. The stabilizer trim switches on the control wheel operated normally; however, the position indicator was inoperative.
4. The rudder trim control was operable to the right; however, the trim would not position the rudder to the left.

The collapse of the cabin floor damaged a number of the engine and flight control system cables which were routed through the floor beams in that area. The following damage was observed:

1. *Elevator Control System*

The right hand elevator cables (No. 5 and No. 6) were preloaded downward by the collapsed cabin floor structure. The elevators were operable; however, higher than normal control forces were required.

Both left-hand elevator cables were separated. The No. 4 cable pulled out of the left tension regulator, and the No. 3 cable pulled out of its swaged fitting to the elevator crank.

2. *Rudder Control System*

The No. 2 (right) rudder cable was stretched taut by the collapsed floor structure and could not be moved. The rudder pedal mechanism had overtraveled its forward position and was jammed. The nose-left stop and the lower crank (cable No. 1)

on the rudder torque tube had both failed. The rudder itself was deflected, trailing edge right.

The rudder trim cables were also preloaded by the collapsed floor structure; however, there was limited response to rudder trim in the range from neutral to trailing edge right trim.

3. *Horizontal Stabilizer Trim*

The horizontal stabilizer could be operated up and down by the switches on either control wheel. There was no response from the alternate electrical trim switches on the pedestal.

Both left-hand manual trim suitcase handle cables had failed, and both right-hand cables were preloaded. In order to trim the stabilizer manually with these handles, both handles must be functioning.

The horizontal stabilizer position indicator drive crank shearpins were sheared, and the stabilizer position indicator cables (No. 135 and No. 136) had failed.

4. *No. 2 Engine Controls*

The No. 2 engine throttle, fuel shutoff, and firewall shutoff cables had all failed. The hydraulic, fire, and fuel firewall shutoff valves were in their midpositions.

1.13 Fire

There was no fire.

1.14 Survival Aspects

The accident was survivable.

All crewmembers and passengers exited the airplane through six of its eight emergency exits. All escape slides for these exits functioned normally.

The nine passengers and the two cabin attendants who sustained injuries were examined at a local hospital for possible fractures and internal

injuries. The injuries consisted of contusions and lacerations of extremities and sprained ankles. One passenger suffered a dislocated finger and another passenger a facial injury from being struck by a floor hatch during the decompression. All other injuries were friction burns sustained when the passengers slid down or exited the bottom of the evacuation slides.

The events from the time of decompression until emergency evacuation are as follows:

The Decompression

The decompression manifested itself to the passengers and flight attendants as a muffled explosive sound and a white-gray fog which formed throughout the cabin. The door to the cockpit and the door of the galley lift opened, and several ceiling panels in the center of the cabin fell down. A floor hatch in the aisle next to seat 4H flew up and struck a passenger in the face.

The chief flight attendant, who was standing in the forward service area, was thrown from this area. The two flight attendants seated at the two aft exits were thrown to the floor, which had partially collapsed into the baggage compartment below. The circular standup bar on this collapsed floor section was torn loose from the floor.

Of the eight flight attendants, five reported that their first thought was to reach for oxygen masks. The automatic release for the oxygen system is preset to operate at 14,000 feet, and, since the airplane was below that altitude, the system did not actuate. One flight attendant at Exit 2L obtained a walk-around oxygen bottle and called the cockpit on the intercom system to tell the crew that the damage was in the rear of the airplane. The chief flight attendant and the flight attendant stationed at Exit 1R, went to the cockpit for instructions at various times.

Passenger Preparation

The chief flight attendant, upon instructions from the captain, told the other flight

attendants to prepare the cabin for an emergency landing. She obtained an estimate of available preparation time (8 to 10 minutes) and proceeded, with the aid of the emergency checklist, to brief the passengers by means of the public address system. The other flight attendants demonstrated the brace position to the passengers, pointed out exit locations, gave instructions for use of the emergency escape slide and collected personal belongings and shoes. A number of passengers reported that the emergency instruction card was very useful in determining their nearest exit location.

Passengers seated adjacent to the collapsed floor section were relocated, as were several of the passengers seated in the vicinity of the fallen ceiling panel. The two flight attendants assigned to Exits 4L and 4R were relocated to the jumpseats in the forward service area.

Evacuation

During the landing rollout of the airplane, several other ceiling panels fell down. When the airplane came to a stop, the cabin lights went out, the emergency lighting system illuminated, and the emergency evacuation signal was activated by the cockpit crew. There was no delay in opening of the six exit doors (three on each side of the fuselage). The two rear exits, 4L and 4R, were not used because of the collapsed floor section in that area. The evacuation slides deployed automatically although two slide packs fell inside the cabin and had to be kicked out. Most passengers reportedly needed no encouragement to leave the airplane and were waiting near the doors for slide deployment. The evacuation proceeded smoothly except that two elderly female passengers had to be helped through exits by a flight attendant, and one passenger's path was obstructed by a fallen ceiling panel.

The evacuation was estimated by the flight attendants to have been completed in 30 seconds.

1.15 Tests and Research

The manufacturer conducted a test to determine if the airplane could be pressurized with the vent door open and the nylon baggage curtain acting as a seal enveloping the vent door cage. Another test was conducted to determine the force necessary to stow the aft baggage door locking handle by forcing the handle linkage overcenter to an apparent door-locked position without the lockpin engaged.

The first test revealed that the curtain as a seal could maintain approximately 5 p.s.i. differential pressure. Above 5 p.s.i., the curtain was sucked into the vent door cage and pressurization was lost.

The second test revealed that the force required to stow the handle was approximately 120 pounds. When the door linkage was forced overcenter, the locking pins did not engage. It was noted further that the sliding lock tube was deflected, and the cap end made contact with the cockpit door warning indicator actuating arm. The indicator switch can be actuated with less than one-eighth inch travel of the actuating arm.

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

The initiating factor of this accident was the in-flight opening and separation of the aft cargo door.

Structural damage to the door verified that the latches were not overcenter when the door opened in flight. The two fasteners which attached the door latch actuator to the door had both failed in shear. Part of one of the bolts was found in the piece of door skin which remained on the airplane—an indication that this failure occurred in the air, and not when the main portion of the door impacted the ground.

Forces transmitted back through the linkages from the door latches are the only means by which the actuator and supporting bracket could be loaded in flight. These latch loads are transmitted back through the actuator only if the

actuator linkages are not overcenter. Thus, the evidence indicates that the latch actuator did not extend far enough to drive the latches beyond the overcenter position, and that pressurization forces on the door were transmitted back through the latch linkage to the actuator support bracket. According to the manufacturer, the dimension between the latch crank and the overcenter stop should have been 0.47 inch for this particular actuator extension. With a 0.47 inch displacement, a 4.5 p.s.i. pressurization differential across the door would have been sufficient to fail the two fasteners which had an ultimate shear strength of 6,600 pounds. The manufacturer noted that the 4.5 p.s.i. figure was an approximation, since redundancy of the system, tolerances, deflections, and variances in rigging can all affect the load transmitted through the mechanism.

When the door latches are fully closed, actuation of the door handle moves a lockpin in place behind a cam on each latch. These pins then prevent the latches from opening for any reason. The lockpins could not have been engaged in this case since the latches did not attain their fully closed positions, and the door handle should not have stowed. The agent who operated the door said that the door handle did not close normally. He had to force the handle closed with his knee, and the vent door, which is also operated by the handle, did not then close properly.

A subsequent test of the door mechanism demonstrated that the door handle could actually be stowed without the lockpins in place if a force of 120 pounds was applied to the handle. Deflection of the mechanism permitted this to happen. The same deflection might have permitted the pilot indicator switch to make contact, which, in this system, prevents illumination of the cockpit warning light. Thus, the crew had no warning that the door mechanism was not functioning properly. Such a switch contact was also observed in the test conducted at the manufacturer's facility.

The increasing pressure differential between the pressurized bulk cargo compartment and the outside atmosphere during the climbout loaded

the latches, which eventually caused failure of the fasteners which secured the actuator support bracket to the door structure. The latches were then sprung open, which permitted the door to blow open. The combination of airloads and impact of the door with the aircraft fuselage caused the door structure to fail, and most of the door separated from the airplane.

The loss of the aft cargo compartment door resulted in a rapid loss of pressurization in that compartment. This particular cargo compartment was not equipped with pressure relief vents to the passenger cabin above it, as were other cargo compartments on the airplane. Thus, the loss of the door caused the full differential pressure between the pressurized passenger cabin and the atmosphere to be exerted on the cabin floor over the compartment. This loading failed the floor support structure, and the cabin floor collapsed downward into the cargo compartment.

The collapse of the floor resulted in the loss of much of the control of the empennage control surfaces; although the airplane was designed with considerable redundancy in its flight control systems, the control cables from the cockpit to the empennage control actuators are routed through the cabin floor beams over this cargo compartment. The cabin floor displacement and floor beam deformation either severed or severely impaired the operation of these cables.

The Board believes that the lack of pressure relief vents in this cargo compartment represents a significant hazard; sudden loss of pressurization in this compartment should not jeopardize the safety of the flight. If complete venting is not feasible, even partial pressure relief might reduce the cabin floor displacement and the attendant interference with critical flight controls.

In this case, the crew reported, and the investigation confirmed, that the captain's left rudder pedal deflected to and jammed beyond its normal maximum forward position, affording no rudder control from the cockpit. The crew also reported that the airplane yawed to the right. The left rudder cable was found broken, permitting slack in the right rudder cable. The weight and force of the cabin floor deflected

the intact right rudder cable downward, putting a right signal into the rudder control valve system. There was no impairment of aileron control and the crew used approximately 45° left aileron to counteract the right yaw.

The crew reported that extremely heavy control forces were necessary for pitch control. Two elevator control cables were separated and two remained intact; however, the downward loading of the floor on the cables made the use of increased forces necessary to move the control yoke.

The crew reported that the stabilizer trim control was lost. Examination of the system did not confirm this statement. The stabilizer trim indicator was inoperative because of a broken cable. The manual stabilizer trim on the pedestal (suitcase handles) was inoperative because the cables to the left handle were separated. To operate the stabilizer trim manually with the suitcase handles, both handles must be functioning. One handle positions the control valve and the other controls the direction of operation (up or down). It was not confirmed which valve was inoperative because of cable separation. The normal operation of the stabilizer trim is by the trim switches on the captain's and the first officer's control yoke. These switches functioned normally when checked.

The crew reported that they secured the No. 2 engine during the descent into Detroit. Examination revealed that the cable to the fire shutoff valve was separated. The cables to the No. 2 engine thrust lever and fuel shutoff valve were also separated. Therefore, the Board believes that the engine was shut down when the cables separated and that no control of the engine existed from the cockpit subsequent to cable separation.

The descent and approach to the Detroit Metropolitan Wayne County Airport were successfully made under these conditions. The problems which manifested themselves during the landing and rollout as described by the crew were high approach speed (160 to 165 knots) to counteract high sink rate, no rudder control, 45° left aileron to counteract right yaw, no left

brake, and uncertain nosewheel steering capability.

The crew stated that when the landing gear and 35° flaps were extended at 150 KIAS airspeed, the sink rate increased to 1500 to 1800 feet per minute and, in order to stabilize at a normal sink rate, an airspeed of 160 to 165 KIAS was necessary. At this airspeed, the airplane had an abnormally shallow deck angle and at touchdown, application of control forces by both the captain and first officer was required to flare the airplane.

Subsequent to touchdown, the airplane yawed to the right and directional control was maintained only by asymmetrical reverse thrust. Since the captain was applying left aileron, the first officer applied the asymmetrical reverse thrust. As the airplane decelerated and the right rudder displacement became less effective, the airplane began a gradual left turn toward the runway. This turn was due to the full left deflection of the rudder pedal which activated the nosewheel steering 10° to 12° to the left.

Rudder trim, although limited, was available. The trim cables reposition the neutral setting of the rudder control valves. The rudder actuator had a right displacement signal from the cable system; this was in the same direction as the trim signal. The trim wheel functioned normally to the right; however, it was necessary for the pilot to use both hands to move the trim wheel to neutral because the floor was binding the cables.

The three hydraulic systems remained intact. There was no leakage of fluid or loss of pressure. When the auxiliary pumps were turned on, pressure was built up in both brake systems. When the two pedals were depressed, both brake gages registered pressure. The report of no left brake was in all probability caused by the pilot's inability to actuate the pedal, as the rudder pedal was overextended to the left, which necessitated a long awkward reach.

The manner in which the flight attendants handled the emergency was indicative of excellent training and a highly professional attitude. This was evident in their immediate recognition of the possible need for supplemental oxygen, the

leadership exhibited by the chief flight attendant in directing the other flight attendants and in staying abreast of the airplane's progress, in preparing the passengers for an emergency landing and evacuation, and in the prompt and elaborate briefing given the passengers.

Several individual, impromptu decisions had to be made by the flight attendants because of the various unknown facets of the situation. For instance, the proximity of the passengers to the collapsed floor section prompted flight attendants to move all occupants from that area. Several passengers were moved from the vicinity of fallen ceiling panels. A flight attendant briefed one of the male passengers near her door in the operation of this exit, just in case she would not be able to operate it after landing. Another flight attendant instructed two foreign passengers on the bracing position and the location and use of their exit because she noticed a lack of comprehension on the part of these persons when emergency instructions were given. Prior to the landing, all flight attendants were seated, and the chief flight attendant had reported to the captain that the emergency checklist had been completed and that the cabin was prepared for emergency landing.

The evacuation was initiated when the emergency evacuation signal was activated from the cockpit. The evacuation alarm produced a favorable influence on passenger behavior. All attendants reported that they were not quite ready at their stations when the first passengers appeared, and many of them had to be held back to give the slides time to deploy. This was especially true in the case of the slides from the overwing exits which require 17 seconds to inflate fully.

Two slide packs fell onto the cabin floor and had to be kicked out of the door. This is not unusual, however, since the motion of the door, in traveling to its full open position, constantly alters the position of the package in relation to the door sill. A slight delay or premature release of the package may cause it to fall on the door sill instead of outside.

Injuries were sustained by nine passengers. Most of the passengers were unable to maintain

a "feet first" position while sliding down the center of the double occupancy surface and were not able to stabilize themselves because they could not reach the raised sides. As a result, some passengers were injured at the end of the slide.

2.2 Conclusions

(a) Findings

1. The crewmembers were properly certificated for the operation.
2. The airplane was operated in accordance with FAA and company regulations and procedures.
3. The airplane was within the gross weight and center of gravity limits.
4. The aft bulk cargo compartment door opened in flight and separated from the airplane.
5. Relief vents were not installed between the passenger cabin and the aft bulk cargo compartment to minimize the pressure loading on the cabin floor in the event of a sudden depressurization of the cargo compartment.
6. The loss of pressure in the cargo compartment created a pressure differential of sufficient magnitude to cause the cabin floor and its supporting structure to fail.
7. The cabin floor displacement and floor beam deformation into the cargo compartment severed some of the cables and severely impaired the operation of others to the No. 2 engine and empennage flight controls.
8. Stabilizer trim was available, although the stabilizer indicator was inoperative. The crew was not aware of that, and they did not use trim for the approach and landing.
9. There were no malfunctions of the three hydraulic systems, the airplane's brake system, and the nose-wheel steering system.

10. The cargo door latches were not latched overcenter; this condition was attributed to low voltage to the latch motor.
11. A service bulletin to correct this condition was in effect at the time of the accident, but the recommended modification had not been incorporated.
12. The ramp service agent forced the door handle closed without the lockpins in place. Although the door was not then properly closed, deflection of its locking mechanism permitted the pilot indicator switch to make contact which turned the cockpit warning light off.
13. The preparation of the passengers for an emergency landing and the subsequent evacuation were well executed.
14. The Board commends the flight-crew for the manner in which they successfully coped with the unusual in-flight emergency. Additionally, the Board commends the flight attendants for their actions which are indicative of excellent training and a high professional attitude.
15. The emergency evacuation alarm system was very effective.
16. The width of the double occupancy emergency slides made it difficult

for the evacuees to stabilize their sitting positions during the descent, which caused injuries to them when they reached the bottom of the slide.

(b) *Probable Cause*

The National Transportation Safety Board determines that the probable cause of this accident was the improper engagement of the latching mechanism for the aft bulk cargo compartment door during the preparation of the airplane for flight. The design characteristics of the door latching mechanism permitted the door to be apparently closed, when, in fact, the latches were not fully engaged and the latch lockpins were not in place.

3. RECOMMENDATIONS AND CORRECTIVE ACTION

As a result of the investigation of this accident, the Safety Board on July 6, 1972, issued two recommendations (Nos. A-72-97 and 98) directed to the Administrator of the Federal Aviation Administration. Copies of the recommendation letter and the Administrator's response thereto are included in Appendix F.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JOHN H. REED
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

February 28, 1973

In conducting its inquiry, the Committee was particularly interested in what actions were taken on the DC-10 cargo door problem immediately following the incident of July 12, 1972. In order to ascertain those events, present and former officials of the Federal Aviation Administration and of the Douglas Aircraft Company were called to testify in public hearings before the Subcommittee on March 26 and March 27, 1974.

Apparently, three days after the June 12, incident, the then-Federal Aviation Administrator, John H. Shaffer telephoned Jackson McGowen, then-President of the Douglas Aircraft Company to inquire as to what facts the company had uncovered relating to the incident and to ascertain what steps the company was considering taking in an effort to preclude such an occurrence in the future. McGowen, according to testimony of Arvin Basnight, Western Regional Director of FAA, explained to Shaffer what needed to be done in the way of a "fix" and that Douglas, working with FAA, had developed the proper procedures. Again according to Basnight, the Administrator "expressed pleasure in finding reasonable corrective actions and had told Mr. McGowen that the corrective measures could be undertaken as a product of a gentlemen's agreement thereby not requiring the issuance of an FAA airworthiness directive. (AD)" An AD relating to the rear cargo door on the DC-10 was not issued until a few days after the fatal Turkish Airlines crash of March 3, 1974.

An airworthiness directive as defined by FAA is "the medium used by the Administrator to provide notice to aircraft operators to require correction of unsafe conditions disclosed in a product after type certification and to prescribe the conditions and limitations under which the product may be continued to be operated".

Issuance of Airworthiness directive or "AD's" as they are known, is relatively common and frequent and indicates the on-going monitoring, inspection and quality control evaluation performed by the Agency on civil aircraft. However, testimony before the Subcommittee indicates that in recent years the FAA has relied less on AD's to correct unsafe situations than it has in the past. Observers have noted a developing tendency to solve safety problems which develop in aircraft through issuance of a manufacturer's service bulletin—a notice from the manufacturer to the aircraft operator of potential problems and suggested modifications to address those problems. A manufacturer's service bulletin is advisory in nature and there is nothing in law or regulation which requires the service bulletin be heeded or implemented by the operator. It should be noted too, that service bulletins are issued relating to all types of aircraft modifications including light bulbs, lavatory facilities, etc. In many cases they are not safety related items at all but are directed at passenger comfort and convenience, airline economies or changing airline service patterns.

Prior to Mr. Shaffer's call to Mr. McGowen on June 15, 1972, the FAA's Western Region in Los Angeles was preparing independently, an airworthiness directive which was to be addressed to mandatory modifications to the DC-10's cargo door. It should be noted that during this period and continuing through today, the issuance of AD's and

the general supervision of the design, manufacture and certification of air transport category aircraft are all handled through FAA regional offices in the field in coordination with the FAA's Flight Standards Service in Washington. The Regional Director, in this case Mr. Basnight, has delegated authority from the Administrator to issue AD's.

Therefore, it was standard procedure for the FAA's Western Region, which had authority over the Douglas plant at Long Beach, California, to take the lead in developing an AD to meet this potentially catastrophic problem. The record is clear that following the June 12, 1972 incident, the Western Region, the Director of Flight Standards in Washington and the Deputy Administrator of the FAA, who was then Kenneth M. Smith, had reached tentative agreement that the FAA would issue an AD requiring modification of the DC-10's rear cargo door.

The decision on whether the FAA would issue an airworthiness directive was significant. An AD, when issued by the Agency, is, in effect, a regulation and has the force of law. It requires the operator of an aircraft to perform certain modifications or changes within a specified time frame and precludes any further use of the aircraft unless the modifications are accomplished within the allotted time. A service bulletin, on the other hand, is issued by the manufacturer and is advisory in nature and there is no necessity, under law or regulation, for the operator to comply with its provisions.

Because the June 12, American Airlines incident over Windsor, Ontario, was such a serious one, we were puzzled why the FAA failed to issue an AD dealing with the rear cargo door problem.

In testimony before the Subcommittee, both Mr. McGowen and Mr. Shaffer confirmed that they had reached an agreement which provided that McDonnell-Douglas would issue a service bulletin relating to the aft cargo door modification. As Mr. Shaffer put it:

I got to Mr. McGowen and we discussed how we were going to fix it and as a result of that discussion, it was determined that the thing that was needed was a simple plate added in the latching mechanism of the cargo door and when we learned how simple it was to fix, really, and how quickly we could get the parts and how easy it would be for Douglas personnel, who were familiar with the airplane, and at that time there were about 35 airplanes in the system, we agreed that we would do it by service bulletin principally because the service bulletin gives you the instructions, it gives you the parts and gives you the trained personnel to accomplish the work, and we were under the impression, or I was under the impression, that we could virtually do the job overnight.

Mr. Shaffer's testimony regarding the sequence of events appears to be in error. The fix that was being discussed at the time and that which the Western Region was preparing to order via an airworthiness directive, related to the installation of a viewing port or window in the fuselage of the aircraft adjacent to the rear cargo door so that one could visually look inside the fuselage when the door was closed to ascertain whether the lock pins were properly in place and the door was securely latched. The modification which Mr. Shaffer refers to was a later modification covered in McDonnell-Douglas Service

Bulletin 52-37 issued on July 3, 1972 and involved the installation of a plate in the door latching mechanism which would make it humanly impossible to close the door and secure the vent door and handle without the lock pins being in place. Parenthetically, this modification, would according to the consensus of testimony have totally eliminated the possibility of improper door closure. At any rate, this modification was never the subject of debate as to whether the FAA would issue an AD or whether the company would issue a service bulletin because in the June 12 to June 16 time frame, this modification had yet to be developed.

Mr. McGowen, in testifying about the agreement commented as follows:

Senator CANNON. * * *. Did you enter into a gentleman's agreement with Mr. Shaffer or anyone else in FAA as to what modifications would be accomplished and how they would be accomplished on the DC-10 aircraft, and particularly would they be accomplished by a service bulletin rather than an airworthiness directive?

Mr. McGOWEN. I don't know whether you call it a gentleman's agreement or not. What I made an agreement with Mr. Shaffer on was that we would work 24 hours a day to get those parts to the airlines so that they could immediately install them, and that was agreed to, and that was what the AD note was all about.

Senator CANNON. Those are the parts that were covered in -35?

Mr. McGOWEN. Yes, that is my understanding.

Senator CANNON. Did you in fact get those out to the airlines in a short period of time thereafter?

Mr. McGOWEN. As Mr. Brizendine has testified, all those went down there in less than 2 weeks from that time—all airlines.

Senator CANNON. What would have been the difference between a service bulletin and an airworthiness directive with respect to that modification being required?

Mr. McGOWEN. There would have been absolutely no difference. When we had the job done at the same time provided we put the same heat on them.

Senator CANNON. Had it been an airworthiness directive, would you have just simply made the part kits available and shipped them out to the air carriers as you did in this instance?

Mr. McGOWEN. We would have done exactly what we did. The AD was not significant as to whether we did them this way or that way.

Senator CANNON. Do you know whether the carriers did or did not comply with the modifications in -35?

Mr. McGOWEN. Yes, they complied immediately, under great pressure from us and from the FAA and their own members.

Mr. Basnight has testified that he personally appealed the decision to proceed with a company service bulletin to Mr. Shaffer a few days after he learned of the agreement. He said that Mr. Shaffer listened to his point of view and promised that he would give it consideration but that he never heard from the Administrator again regarding the decision.

Despite the failure of the FAA to issue an airworthiness directive, the Agency took less than complete action to see that the U.S. airlines then operating DC-10 aircraft complied with the McDonnell-Douglas service bulletins. The following two telegraphic messages were sent to all DC-10 operators even though, absent an AD, the airlines could not be forced to comply.

[Telegraphic message]

[For Official Use Only]

FLIGHT STANDARDS SERVICE,
FEDERAL AVIATION ADMINISTRATION,
Washington, D.C., June 16, 1972.

Mr. G. A. Warde,
President, American Airlines, Inc.,
633 3d Ave., New York, N.Y.

Mr. Robert F. Six,
President, Continental Airlines, Inc.,
Los Angeles International Airport, Los Angeles, Calif.

Mr. Edward E. Carlson,
President, United Airlines, Inc.,
Chicago, Ill.

Mr. L. B. Maytag, Jr.,
President, National Airlines, Inc.,
Miami, Fla.

Mr. G. R. Woody,
Executive Vice President, National Airlines,
P.O. Box 2055, Airport Mail Facility, Miami, Fla.

Mr. Marvin Whitlock,
Senior Vice President, Maintenance & Engineering, Maintenance Base, United
Air Lines, Inc., San Francisco International Airport, San Francisco, Calif.

Mr. Clifton Von Kann,
Senior Vice President, Operations & Airports, Air Transport Association, 1000
Connecticut Ave., NW., Washington, D.C.:

In accordance with our telephone decisions this date I understand that your company will accomplish the following on all of your DC-10 aircraft. This program is effective immediately upon receipt of this telegram because of the possibility of incomplete latching of lower cargo compartment doors, which could cause inadvertent door opening under pressurization. This telegram specifies certain inspections and modifications of the door latching and safety interlock mechanism to assure satisfactory latching will be achieved. Accomplish the following items on all lower cargo compartment external doors and door systems as indicated:

1. Within the next 25 hours' time in service from receipt of this telegram, and thereafter at intervals not to exceed 100 hours' time in service, conduct the following functional check of door systems and door operation on all 3 lower cargo compartment doors:

A. Perform steps 1 through 6 of McDonnell Douglas TWX C1-SVC-DC-10-COM-77 dated 13 June 1972.

B. While performing the steps in (A) above, specifically check door fit and rigging, door and locking mechanism operation and freedom from binding. Check for visual evidence of structural deformation and failure in the door and door latching mechanism.

C. Door checks are to be accomplished by qualified maintenance personnel located both inside and outside the aircraft.

D. Discrepancies found during door inspections must be corrected before further flight in accordance with all applicable McDonnell Douglas service instructions.

2. Within the next 300 hours' time in service from receipt of this telegram, accomplish McDonnell Douglas DC-10-10 service bulletin 52-27, dated 30 May 1972.

3. Prior to each flight following opening of the aft bulk cargo compartment door, ascertain and record in the aircraft maintenance log that the cargo re-

straint curtain has been properly secured in place at top, sides and bottom before closing the door.

4. Within the next 25 hours' time in service from receipt of this telegram, place the following placard near the vent door closure handle on each lower cargo door:

"Do not apply more than 50 pounds of force to handle when closing."

The necessity for application of more than 50 pounds of force in attempting to latch the handle is cause for determining if a problem exists which may make the door latching unsafe.

5. This telegram is an interim action only and will be superseded or augmented as further recommendations and design changes are forthcoming from the manufacturer.

K. M. SMITH,
Deputy Administrator, FAA.

PRIORITY

[For Official Use Only]

FEDERAL AVIATION ADMINISTRATION,
FLIGHT STANDARDS SERVICE,
Washington, D.C., June 19, 1972.

WESTERN REGION, *Los Angeles*,
SOUTHERN REGION, *Atlanta*,
SOUTHWEST REGION, *Fort Worth*,

Following wire sent this date by Acting Director, Flight Standards Service, to Presidents.

NAL, AAL, CAL, and UAL Re DC-10-10 aircraft supersedes wire of 16 June 1972 on same subject:

"This supersedes our telegram dated 16 June 1972 concerning program needed to be accomplished on all of your DC-10-10 aircraft. This program is effective immediately upon receipt of this telegram because of the possibility of incomplete latching of lower cargo compartment doors, which could cause inadvertent door opening under pressurization. This telegram specifies certain inspections and modifications of the door latching and safety interlock mechanism to assure satisfactory latching will be achieved. Accomplish the following items on all lower cargo compartment external doors and door systems as indicated:

"1. Within the next 25 hours' time in service from receipt of this telegram, unless previously accomplished within the last 75 hours, and thereafter at intervals not to exceed 100 hours' time in service, conduct a functional check of systems and operation in all three lower cargo compartment doors:

"A. Perform checks described in McDonnell Douglas TWX-CL-SVC-DC-10-COM-77 dated 13 June 1972, or later FAA approval revisions.

"B. Door checks in (A) above are to be accomplished by qualified maintenance personnel located both inside and outside the aircraft.

"C. Discrepancies found during checks in (A) above must be corrected before further flight in accordance with all applicable McDonnell Douglas service instructions:

"2. Within the next 300 hours' time in service from receipt of this telegram, accomplish McDonnell Douglas DC-10-10 service bulletins No. 52-27 dated 30 May 1972 and alert service bulletin No. A52-35 dated 16 June 1972, or later FAA approved revisions. Upon accomplishment of service bulletins No. 52-27 and A52-35, checks of item 1 above may be discontinued. Return to normal maintenance inspection intervals.

"3. This telegram is an interim action only and will be superseded or augmented as further recommendations and design changes are forthcoming from the manufacturer."

C. R. MELUGIN, Jr.,
Acting Director, Flight Standards Service, FS-1,
Federal Aviation Administration."

Request you take all necessary steps to insure comments are accomplished through your assigned principal maintenance inspector for each carrier involved.

The Committee record indicates that the airlines did indeed comply pursuant to the FAA's request for action on the Service Bulletins 52-27 and 52-35 recommended by the manufacturer:

Senator CANNON. Following the so-called gentleman's agreement with the airlines and the manufacturer regarding the modifications to be made on the DC-10 and the personnel in your western region, did you have the FAA inspectors check to ascertain whether Douglas and the airlines operating in and out of Los Angeles were, in fact, complying with that agreement?

Mr. BASNIGHT. In the sense you phrase the question, we did not require a specific check. We did not issue a specific directive requiring such a check. We did come by information that indicated something less than full effort was addressing on the modifications.

The Douglas Co. letter dated August 7, 1972, is perhaps significant in this regard. It is addressed to the Chief of the Engineering Division of FAA, Western Region, and reads in part:

In accordance with the referenced letter submitted on the status report of the cargo door compartment door modifications, service bulletin 52-27, revised, door latch actuator wiring, modification completed on all airplanes. B. Service bulletin 52-35 install lock mechanism viewing window modification completed on all airplanes.

The item that had not been required as part of the FAA telegram, service bulletin 52-37, modify and adjust door mechanism assembly, no airplanes complete as of this date, kits have been shipped to United Airlines and American Airlines. You will be provided periodic reports as this bulletin is accomplished.

That is August 7, 1972.

Senator CANNON. Were you thereafter provided with periodic reports on that issue?

Mr. BASNIGHT. I personally was not, no, sir.

Senator CANNON. Was the FAA?

Mr. BASNIGHT. On August 18, 1972, we have one additional letter. It reads: In accordance with reference B.

This will provide an up-to-date status of the service bulletin 52-37 accomplishment. The original service bulletin required revisions to the rigging construction. The revised bulletin has now been completed, and checked by United Airlines on airplane fuselage number 45. The installation has been determined to be satisfactory and modifications of the entire fleet will now commence.

So in that sense we did get that.

Senator CANNON. So you were told that modifications were commencing, but were you thereafter told they had been completed?

Mr. BASNIGHT. Not until the last few weeks, when I visited the Douglas plant and had a ship-by-ship report presented by the Douglas Co. then.

But the record also indicates that the Agency did not follow up itself to see if the voluntary compliance was affected, FAA left that determination to McDonnell-Douglas.

While the airlines, with the cooperation of McDonnell-Douglas, did complete the modifications called for in Service Bulletins 52-27 and 52-35 as noted above, the key Service Bulletin in our opinion, namely 52-37 issued on July 3, 1972 was not treated with the same sense of urgency as were its predecessors. This is difficult to understand because of the fact that the consensus of testimony indicated that 52-37 was the "ultimate fix" available during this time frame and had it been accomplished it would have been humanly impossible for a careless, uninformed, or untrained person to improperly close the DC-10's aft cargo door. Witnesses from the FAA, from McDonnell-Douglas and from the National Transportation Safety Board testified before the Subcommittee that the Turkish Airlines DC-10 which crashed near Paris was not completely modified in conformance with Service Bulletin 52-37. Had the modification been incorporated on that particular

aircraft, then testimony indicated it would have been humanly impossible to improperly close the aft cargo door. As the official investigating body has preliminarily concluded that inflight separation of the rear cargo door led to the crash of March 3, 1974 it seems apparent from that conclusion, if affirmed, that modification in accordance with Service Bulletin 52-37 on that aircraft would have prevented the accident.

Here we find criticism of the FAA on two counts. First after entering into an agreement with the airlines and the manufacturer which called for certain modifications, the Agency itself did not follow up with inspections to see if the modifications had indeed been completed, and completed in a timely fashion. The followup was left to McDonnell-Douglas who apparently followed the matter up routinely and advised the FAA of its findings on August 6, 1972, more than six weeks after the telegraphic alert from the FAA on June 19, 1972. We can find no explanation of why the FAA itself failed to follow the matter up and believe that this failure indicates a lack of adequate concern on the part of the Agency for insuring that its policies are carried out.

Second, and more important, after June 19, 1972 the FAA apparently lost any sense of urgency that was first expressed regarding the DC-10 problem. This loss of a sense of urgency was also exhibited by the manufacturer.

The fact that we find difficult to understand is that when McDonnell-Douglas issued Service Bulletin 52-37 on July 3, 1972 it was given a routine priority by the company. That part of the bulletin having to do with compliance was labelled "Recommended". Whereas Service Bulletin 52-35 carried an "alert" tag which connoted a sense of urgency, 52-37 was released in a routine manner and was similar in urgency to a service bulletin which might have been issued relating to modifications relating to passenger comfort.

The president of the Douglas Aircraft Company, Mr. John Brizendine testified regarding the classification of service bulletins as follows:

"2. Alert service bulletins, alter service bulletins shall be issued on all matters requiring urgent attention of the operator and shall be limited to items affecting safety."

The following colloquy from the Subcommittee hearings indicates the view of the McDonnell-Douglas Corporation regarding Service Bulletin 52-37:

Senator CANNON. One of the things that bothers me is that the bulletin 52-35 which was originally proposed to be covered by an AD was accomplished in this instance, but 52-37 had not been accomplished, according to what you said.

Now your investigation was not complete at the time 52-35 was issued, and as a result you later issued the service bulletin 52-37. It was issued, but it was sent out just as a routine service bulletin rather than as an alert as was done in the first instance. Was not the 52-37 modification considered to be as important as the 52-35 modifications?

Mr. BRIZENDINE. The urgency of it was not considered to be as urgent as the 52-35 because the viewing window had been provided and it was a simple matter to view through that window to see that the latch pins were actually in place.

Senator CANNON. To see that the pins were in place, is that it?

Mr. BRIZENDINE. So our company and the airlines have felt that 52-37 was not of that same immediacy as 52-35.

Senator CANNON. So that you felt you had adequate safeguards with 52-35, and that 52-37 was just added precaution, is that it?

Mr. McGOWEN. (Mr. McGowen was the president of Douglas Aircraft Company during the period of development of the DC-10 aircraft.) I think, sir; that we thought that was very important, but it was not imminent as a requirement. The airlines are doing it, we are paying them to do it, and that is all.

Senator CANNON. You say you were paying them to do it?

Mr. McGOWEN. So—oh, absolutely.

Senator CANNON. So the company pays the airline to do the modification.

Mr. McGOWEN. Or we do it ourselves if they prefer.

Senator CANNON. You send them the kit and pay for it, or you have it done yourself? If they prefer.

Mr. McGOWEN. We prefer or we will send men into the field to do it.

Senator CANNON. But you did not see the urgency connected to the 52-37, so that it should be sent out as an alert notice rather than just a routine service bulletin?

Mr. BRIZENDINE. If you recall, Mr. Chairman, I added comments in my text referring to letters we had sent to the airlines on July 7 that advised them that we had added 52-37 to what was called immediate action program, and we had a close communication with the operators, and we had a good response, an excellent response to 52-37, and the program was rolling.

So we add 37 to that same immediate action program, and so advised the operators, not only by sending a service bulletin, but by letter to responsible technical persons in each airline.

Senator CANNON. Mr. Schulink, the vice president of maintenance and production at National, in his letter to the NTSB made the following statement at the end of his letter: "Since alert service bulletin 52-35 had been complied with, assurance of positive door locking was provided by visual means through the investigation window." That is a fact?

Mr. BRIZENDINE. That is a fact.

Senator CANNON. Had that visual means been used to assure positive locking in the Turkish case, it would not have made any difference whether 37 had or had not been complied with?

Mr. BRIZENDINE. That is absolutely correct.

Senator CANNON. Senator Stevenson?

Senator STEVENSON. Thank you, Mr. Chairman. Mr. Chairman, you just raised one of the points that was concerning me most. 52-35 which was the alert service bulletin was aimed at the detection of imperfect locking. 52-37, as I understand it, was aimed at making the imperfect locking impossible. Yet the higher priority was attached to the former.

I just don't understand that. I don't see why the higher priority would not have been attached to the rigging of the latch plates and the installation of the support plates so that with or without detection the improper locking would have been impossible.

How do you explain the higher priority for the detection as opposed to the prevention of improper, or imperfect locking there?

Mr. BRIZENDINE. I will attempt to explain that as well as I can. There already existed a satisfactory door system, a safe door system. If it was operated properly. The viewing window was put in as a means of verifying, you might say, that it had been operated properly, and it could be done very quickly as demonstrated by the short compliance time by the airlines.

It required, as I have already said, 120 pounds of force to abnormally abuse that door, door handle, whereas it takes about 30 pounds to normally operate the door.

So there was already an indication to the door operator that he was abusing the mechanism. We provided a viewing window that he or anyone else from the airline who wished could go and observe and witness that the locking pins were actually in place.

Now we always tried to get a better improvement, improve the product, and get a better way of doing things, and that came along 52-37. We would like to make it absolutely impossible that anybody could abuse, no matter how hard he tried, abuse the system and not have the door closed.

That was why 52-37 came along, and as I just mentioned, we did add it to our immediate action program.

We do not take exception to the Douglas position that Service Bulletin 52-35 provided a visual means by which an operator could ascertain whether the door was in fact closed properly, but that of course brings into question the reliability and training of the operator.

Furthermore, expert testimony before the Subcommittee indicates that the so-called viewing port modification called for in 52-35 is not adequate to enable the door operator to visually see inside and ascertain whether the lock pins are actually in place, even when viewing with a flashlight. Therefore, while Service Bulletin 52-35 was providing a marginally effective cross check against improper door closure, testimony indicated that it would not prevent the careless or uninformed door operator from improperly closing the door.

The fact remains that Service Bulletin 52-37, if accomplished, would render it humanly impossible to improperly close the door, which in the view of the Committee is a much more desirable and complete modification and a modification which removes the factor of human error in door closure. In addition, Service Bulletin 52-37, not 52-35, was the modification designed to meet the Safety Board's safety recommendation for a modification which would make it impossible to improperly close the cargo doors.

The fact that at least one United States flag airline, National, did not attach any sense of urgency to completion of Service Bulletin 52-37 on its DC-10 fleet was illustrated by a letter in the hearing record from National to the National Transportation Safety Board:

NATIONAL AIRLINES, INC.

March 22, 1974.

Mr. FRANK T. TAYLOR,

Chief, Principal Investigation Branch, Investigation Division, Bureau of Aviation Safety, National Transportation Safety Board, Washington, D.C.

Re Your telephone call 3/22/74 at 1345, Re N60NA Cargo Door.

DEAR FRANK. In response to your questions:

(1) Date of return to service of N60NA after the ABQ incident, 12-19-73.

(2) A/C flight hours accumulated between 12-19-73 until compliance with S/B 52-37, 782:48.

(3) A/C landings accumulated 12-19-73 until compliance with S/B 52-37, 438.

NOTE: Service Bulletin 52-37 was completed on N60NA after Trip 34 of March 6, 1974, prior to the issuance of Telegraphic A.D. received 07/00142 March 1974.

(4) Number of discrepancies found regarding cargo doors on N60NA 12-19-73 through 3-6-74:

Discrepancies	Forward cargo bin door	Center cargo bin door	Rear cargo bin door
Pilot reports.....	0	1	0
Maintenance findings.....	4	1	2

The problems associated with the foregoing are concerned with faulty switches and electrical closing of the doors. The closing problem being alleviated by using the alternate manual system. No problems were ever experienced regarding the mechanical portion of the latching mechanisms.

NAL wishes to emphasize that the inclusion of Alert Service Bulletin 52-35 and Service Bulletin 52-27 were preceded by various alert notices which continually emphasized the need for compliance. In view of this, both Bulletins

were completed on five aircraft, N60NA through N64NA, by 7-13-72. In regard to Service Bulletin 52-37, the Bulletin was received in a routine manner with a compliance statement of "recommended" as opposed to "alert" compliance requirement.

Since Alert Service Bulletin 52-35 had been complied with, assurance of positive door locking was provided by visual means through the inspection window.

Sincerely,

NATIONAL AIRLINES, INC.,
W. H. SCHULINK,
*Vice President,
Maintenance Production.*

DC-10

SERVICE BULLETIN

McDONNELL DOUGLAS



3855 Lakewood Boulevard
Long Beach, California 90801

BULLETIN 52-37
DC-10 SC 812

DOORS - Cargo - Modify And Adjust Door Mechanism Assembly.

NOTE

This Service Bulletin is issued as a record type change. Engineering drawings are furnished in lieu of illustrations and detailed modification data.

1. Planning Information:

A. Effectivity:

(1) Aircraft Affected:

Model DC-10, Series 10

<u>Operator</u>	<u>Factory Serial No.</u>	<u>*Mfr's Fuselage No.</u>	<u>Qty of Kits</u> <u>CZZ0812-501</u>
<u>Group I</u>			
AA	46502 thru 46515	3, 5, 7, 9, 12, 13, 20 thru 24, 30, 31, and 37	14
CO	46900 thru 46904	34, 40, 41, 43, and 44	5
NA	46700 thru 46703 46706	14, 16, 18, and 19 38	5
UA	46600 thru 46614	4, 6, 8, 10, 11, 15, 17, 25 thru 27, 32, 35, 39, 42, and 45	15
<u>Group II (No Kits Required)</u>			
AA	46500 46516 thru 46518	1 48, 49, and 51	
LT	46905	47	

Affected aircraft other than those listed above will be modified prior to delivery or included in a subsequent revision to this Service Bulletin.

*Manufacturer's fuselage numbers are applicable to affected aircraft at time of Service Bulletin issue and are for reference only.

(2) Spares Affected:

<u>Spare Part No.</u>	<u>Key Word</u>
ADA3659-1	Collar Assy
ADA3668-1	Shim
ADA3668-501	Shim

B. Reason:

The load required to close the vent door without the lockpins engaged is within the capability of the cargo handlers. When the vent door handle is closed and the lockpins are not engaged, the lockpin tube will deflect and contact the lockpin limit switch striker, giving a false door closed, latched, and locked indication. Readjusting the lockpin tube assembly to prevent the vent door handle from being forced to the closed position when the lockpins are not engaged properly will provide a more positive and reliable cargo door closed, latched, and locked system.

C. Description:

This modification accomplishes the following:

Group I

- (1) Replaces strike plate and adjusts pins and switches on the forward, center, and aft cargo doors.
- (2) Installs support and plate on aft cargo door.

Group II

Adjusts pins and switches and vent door mechanism on the forward, center, and aft cargo doors.

D. Compliance:

Recommended.

E. Approval:

This Service Bulletin is FAA approved.

MCDONNELL DOUGLAS



SERVICE BULLETIN

F. Manpower:

This modification may be accomplished in the following approximate man-hours or elapsed hours per aircraft.

<u>Work Phases</u>	<u>Man-Hours</u>	
	<u>I</u>	<u>II</u>
Gain Access	1.5	1.5
Modify (Aircraft)	7.7	3.0
Close Up	<u>1.5</u>	<u>1.5</u>
Total Man-Hours	10.7	6.0
Total Elapsed Hours	3.5	3.0

G. Material - Cost and Availability:(1) Aircraft:

Operators with aircraft listed under paragraph 1.A.(1) should submit a "no charge" purchase order for service change kits in the quantities shown.

The purchase order must specify this Service Bulletin number and only parts listed herein.

Operators will be advised of delivery schedule upon receipt of purchase order. Direct purchase order to:

Douglas Aircraft Company
P.O. Box 1771
Long Beach, California 90801
Attn: Manager, Warranty 7-21

A "no charge" purchase order for kits under the provisions of this bulletin must be received not later than 90 days after the issue date noted on page 1. Any purchase order received after the 90-day period will be processed on a charge basis.

(2) Spares:

Replacement parts will be supplied for spares purchased from the Douglas Aircraft Company and now in operator's possession. An additional "no charge" purchase order should be submitted referencing this Service Bulletin number, the original spares purchase order, and listing replacement parts required. Availability of replacement parts is the same as indicated in paragraph 1.G.(1).

MCDONNELL DOUGLAS

SERVICE BULLETIN

H. Tooling - Price and Availability:

None.

I. Weight and Balance:Group I

This modification will increase the weight of the aircraft at approximately station 1830.0, as follows:

(1) Mfr's Empty Weight (MEW) Increase	+0.1 LB
(2) Moment Change (MEW)	+183 IN.-LB
(3) Index Unit Change (MEW)	0

Group II

None.

J. References:

(1) Data used in preparation of this Service Bulletin:

<u>Data Identification</u>	<u>Change</u>	<u>Type of Data</u>
ADA7797	New	Rework Drawing
ADA7797	A, B, and C	Advance E.O.
CMM Chapter 52		Component Maintenance Manual

(2) Data supplied in support of this Service Bulletin:

<u>Data Identification</u>	<u>Change</u>	<u>Type of Data</u>
ADA7797	New	Rework Drawing
ADA7797	A, B, and C	Advance E.O.

NOTE: One reproducible and two copies of the drawing and advance E.O.'s will be furnished to each affected operator.

K. Publications Affected:

The modification outlined in this Service Bulletin affects the following DAC DC-10 aircraft publications.

<u>Publication</u>	<u>Chapter and/or Section</u>
Component Maintenance Manual	52-31 and 52-33
Illustrated Parts Catalog	52-31, 52-32, and 52-33

2.. Accomplishment Instructions:

CAUTION: STATICALLY GROUND THE AIRCRAFT.

NOTE: Instructions are identical for forward, center, and aft cargo door assemblies, except as noted.

Group I

- A. Remove and retain door liner and attaching parts.
- B. Aft cargo door only - Install plate, support, jumper, and attaching parts. (See drawing ADA7797, sheets 1, 3, and 5.)
- C. Replace striker and adjust pins and switches. (See drawing ADA7797, sheets 1 through 5, and ADA7797 "A", "B", and "C" change advance E.O.'s.)
- D. Reinstall door liner and attaching parts.

Group II

- A. Remove and retain door liner and attaching parts.
- B. Adjust pins, switches, and vent door mechanism. (See drawing ADA7797, sheets 1 through 5, and ADA7797 "A", "B", and "C" change advance E.O.'s.)
- C. Reinstall door liner and attaching parts.

MCDONNELL DOUGLAS

SERVICE BULLETIN

3. Material Information:A. The basis for the following material data is per aircraft.

(1) Parts furnished in service change kit.

<u>New Part No.</u>	<u>Qty Kit</u> <u>CZZ0812-501</u>	<u>Key Word</u>	<u>Old Part No.</u>	<u>Instructions-</u> <u>Disposition</u>
ADA7773-1	3	Shim		
ADA7773-501	30	Shim	ADA3668-1	Discard
ADA7773-503	3	Shim	ADA3668-501	Discard
ADA7797-3	3	Striker	ADA3659-1	Discard
ADA7797-5	1	Support	(Collar Assy)	
ADA7797-7	1	Plate		
MS20426AD3-7	18	Rivet		
MS21042L3	4	Nut		
MS21075L08	6	Nutplate		
MS25083-2BB4	1	Jumper		
MS25281R2	1	Clamp		
NAS1252-10L	10	Washer		
NAS5602-12	6	Screw		
NAS6103U8	1	Screw		
AS6403U13	3	Screw		
AS6403U5	3	Screw		
RMF9421-3	3	Nutplate		

(2) Parts to be modified by the operator. Reidentification is at operator's option.

<u>New Part No.</u>	<u>Qty</u>	<u>Key Word</u>	<u>Old Part No.</u>
None	1	Tube	ADA7313-1
None	1	Tube	ADA7350-1
None	1	Tube	ADA7350-501
None	1	Tube	ADA7403-501

B. The basis for the following material data is per spares.

(1) Discard spare shims and order replacement parts as indicated in paragraph 3.A.(1).

(2) Discard spare ADA3659-1 collar assembly and order ADA7797-3 striker as a replacement part.

JJP

NATIONAL TRANSPORTATION SAFETY BOARD RECOMMENDATIONS TO THE FAA

Following the June 12, 1972 incident and during the Safety Board's investigation of it, the Board on July 6, 1972 forwarded to the FAA two recommendations relating to the DC-10 cargo door situation.

The recommendations are printed below:

U.S. OF AMERICA,
NATIONAL TRANSPORTATION SAFETY BOARD,
Washington, D.C., July 6, 1972.

ADOPTED BY THE NATIONAL TRANSPORTATION SAFETY BOARD AT ITS
OFFICE IN WASHINGTON, D.C. ON THE 23D DAY OF JUNE 1972

HON. JOHN H. SHAFFER,
*Administrator, Federal Aviation Administration,
Washington, D.C.*

SAFETY RECOMMENDATIONS A-72-97 AND 98

The National Transportation Safety Board is investigating an accident involving an American Airlines McDonnell-Douglas DC-10-10, N103AA, which occurred shortly after takoff from Detroit Metropolitan-Wayne County Airport on June 12, 1972.

The aft left-hand cargo door opened while the aircraft was at approximately 12,000 feet. The cabin floor over this cargo compartment then failed as a result of depressurization loading, and the floor dropped partially into the cargo compartment. This displacement of the floor caused serious disruption of the control cables which are routed through the floor beams to the empennage control systems and the engine controls. With the exception of the right rudder pedal cable, all of the cables on the left side of the fuselage broke. The cable runs on the right side were also damaged—the cable guides tore from their attachments to the floor beams, and the cables were deflected downward by the floor structure.

Preliminary investigation has revealed that the door latches were not driven fully closed, and the lock-pins which should have prevented the latches from opening were not in place. The reason these door latches were not driven over center to the fully closed position has not yet been determined. However, although the Safety Board believes this was relevant and a contributing factor, we are more concerned over the failure of the door safety features to preclude dispatch with an unlocked door. The design of the door should have precluded the dispatch of the aircraft with this door improperly closed. With the lock-pins not engaged, a small vent door on the cargo door should have remained open, preventing normal pressurization of the aircraft. Also, the vent door handle should not have stowed.

However, tests conducted at Douglas Aircraft Company have demonstrated that the vent door can be closed, and the handle stowed, without the lock-pins engaged. Apparently, some combination of deflection of the operating mechanisms and tolerances permitted such

operation when a force of approximately 120 pounds was applied to the operating handle. During these tests our investigator observed bending of the sliding lock-tube which caused the cap end of the tube to make contact with the pilot indicator switch actuating arm. This arm moves through a very small arc to actuate the switch, and the Board believes that a similar contact on the accident aircraft door probably actuated the switch and gave the pilots a door safe indication on the annunciator light panel.

Finally, the Board believes that sudden loss of pressure in this cargo compartment for any reason should not jeopardize the safety of the flight. In this case, the loss of the door and resultant cabin floor failure caused an unwanted rudder input, severely restricted the elevator control available to the crew and disrupted the No. 2 engine controls.

We are aware of the inspection procedures currently in effect to ensure safety of operations of the DC-10 as well as the existing safety features of the door design. Nevertheless, in order to preclude the recurrence of similar accidents, the Safety Board recommends that the Federal Aviation Administration:

1. Require a modification to the DC-10 cargo door locking system to make it physically impossible to position the external locking handle and vent door to their normal door locked positions unless the locking pins are fully engaged.

2. Require the installation of relief vents between the cabin and aft cargo compartment to minimize the pressure loading on the cabin flooring in the event of sudden depressurization of the cargo compartment.

Members of our Bureau of Aviation Safety will be available for consultation in the above matter if desired.

The next day, July 7, 1972 the FAA Administrator replied as follows:

DEPARTMENT OF TRANSPORTATION,
FEDERAL AVIATION ADMINISTRATION,
Washington, D.C., July 7, 1972.

Hon. JOHN H. REED,
Chairman, National Transportation Safety Board, Department of Transportation, Washington, D.C.

DEAR MR. CHAIRMAN: This is to acknowledge your Safety Recommendations A-72-97 and 98 issued on 6 July 1972 which included recommendations resulting from an inadvertent cargo door opening reported on a Douglas DC-10-10 airplane.

All operators of DC-10-10 airplanes are currently performing 100 hour functional checks on the cargo door system and will incorporate necessary modifications in accordance with McDonnell Douglas Service Bulletins 52-27 and A52-35 within 300 hours. These modifications pertain to improvements in the inspection and operation of locking and vent mechanisms.

Additional modifications to the cargo door locking and pressurization systems are being considered as part of a continued investigation effort. While a preliminary investigation indicates that it may not be feasible to provide complete venting between cabin and cargo compartments, your recommendations will be considered with respect to further action taken.

Sincerely,

J. H. SHAFFER, *Administrator.*

The letter of Mr. Shaffer to Chairman Reed raises further evidence of a lack of follow through by FAA on the cargo door problem fol-

lowing the decision to proceed by voluntary agreement between Douglas and the FAA to fix the rear cargo door problem.

Inasmuch as the Safety Board's number one recommendation; that is "to require a modification to the DC-10 cargo door locking system to make it physically impossible to position the external locking handle and vent door to their normal door locked positions unless the locking pins are fully engaged," it is odd that Mr. Shaffer in his letter did not inform the Board of the contents of Service Bulletin 52-37 issued on July 3rd and which had been approved by the FAA. Obviously Service Bulletin 52-37 was directly responsive to the Board's recommendation.

It must be assumed that July 7, 1972, Mr. Shaffer was not aware of the development of Service Bulletin 52-37 by Douglas or he would have certainly informed NTSB of this development. As we noted from testimony earlier, FAA even in August of 1972 was unaware that the airlines had yet to comply with Service Bulletin 52-37.

The Committee is disturbed by this obvious failure of the FAA to follow up and monitor more closely the progress being made on the problem by Douglas inasmuch as the Agency was relying on Douglas to proceed, via service bulletins, to correct an unsafe condition.

However, the Safety Board itself did not adequately follow up its own recommendations to see whether adequate compliance with them had been effected.

The following excerpt from the Board's prepared statement to the Committee is illustrative of the failure of the NTSB to fully follow up its recommendations:

On August 1, 1972, the Bureau Staff completed our in-house Form 6100.4 (National Transportation Safety Board Recommendation Response Evaluation) with respect to Recommendation A-72-97, evaluated the FAA response by checking off a series of multiple choice boxes as "Complies in Part/Alternate Action," classified its acceptability to the Bureau as "Essentially takes care of the problem," and checked the box "Status of Activities" as "Closed." The report was signed by the Director of the Bureau on August 8, 1972, and forwarded to the Chairman with copies distributed to Board Members, the General Counsel, General Manager and Public Affairs Officer. The Board accepted responsibility for this evaluation.

However, I should point out that both of the Board's recommendations of July 6, 1972 to the FAA employ the word "require"— "require a modification of the DC-10 cargo door" and "require the installation of relief vents . . ." which means mandatory compliance as opposed to voluntary compliance. It is the Board position that to carry out these recommendations, the FAA should have either proposed regulations through rule-making or issued Airworthiness Directives.

In a follow-up letter to the FAA on February 23, 1973, the Board inquired into the progress being made on its recommendation in venting between cabin and cargo compartments:

"With respect to Recommendation A-72-98, you observed that a preliminary investigation indicated that it may not be feasible to provide complete venting between cabin and cargo compartments.

"When your investigation is complete, the Board would appreciate knowing if the installation of vents similar to those on other DC-10 cargo compartments is feasible in the aft cargo compartment.

"If complete venting is not possible, partial venting would be beneficial. Such venting could prevent the collapse of the aft cabin floor, or it could reduce the amount of floor deflection, and attendant control cable damage in a DC-10."

On March 15, 1973, the FAA replied to the Board's request of February 23, 1973, and advised that the FAA has:

"Requested that the manufacturer reassess the DC-10 with regard to the effects on safety of probable openings in the pressurized fuselage. The manufacturer is to consider rerouting of vital systems, reinforcement of the floor as well as incorporation of additional venting between compartments. These alternatives will include consideration of various degrees of venting as recommended in your letter."

This reply indicated that a design study was to be made with respect to our recommendation which would require a number of months to complete.

In September 1973 and in November 1973 the Board's staff contacted the FAA concerning the status of the McDonnell-Douglas Study and received no new information.

Given the fact that the NTSB does not believe that the FAA had complied with its safety recommendation, A-72-97 we do not understand why the Board "closed" the file on this recommendation indicating that it had been complied with. Again, this action, indicates a less-than-thorough follow up by the Board and a failure by the Board to continue to press with FAA its view of the advisability of requiring mandatory modifications to ensure the future safety of the aft cargo door on the DC-10 aircraft.

It should be noted that the Board did follow up continually on its second recommendation relating to a requirement for more adequate venting between the aircraft cabin and the cargo compartment on the DC-10. However neither the FAA nor the manufacturer took any action of any kind regarding modification or retrofit which would have been in compliance with Safety Board recommendation A-72-98.

Parenthetically, we do not feel competent to enter the debate between FAA and NTSB as to whether more venting between cargo and passenger cabin should be required. Obviously, there are other alternatives to the same goal; namely the continuous safe operation of the aircraft even though the cabin floor should fail or be deflected. Rerouting of control cables through different parts of the aircraft, redundancy in flight controls and strengthening of cabin flooring are all methods to achieve a greater margin of safety. However, if a system exists which provides fail safe doors that cannot in any way come open in flight, then obviously there is less need to protect flight control cables from damage which might occur should the floor fail due to decompression.

Nonetheless, without making a judgment as to whether NTSB recommendation A-72-98 should be required, we hope that all parties concerned will give the matter further attention and study.

THE ACCIDENT NEAR PARIS ON MARCH 3, 1974

During the Committee's hearings on the DC-10 situation we had not been advised by the French investigators of any determinations reached as a result of that investigation. However on April 30, 1974, the Committee received the following report from the French Embassy in Washington:

*Ambassade de France
aux Etats-Unis*

Le Conseiller aux Transports

REF : 72/C.T.

1001 Connecticut Avenue, N. W.

Washington, D. C. 20036

Tel. 347-6669—Telex 440090 Feto.ui

APRIL 30th, 1974

Mr GINTHER

AVIATION SUB-COMMITTEE
U.S. SENATE

Dear Mr GINTHER,

I am authorised to give you the following preliminary conclusions regarding the crash of the Turkish Airlines DC 10 near PARIS.

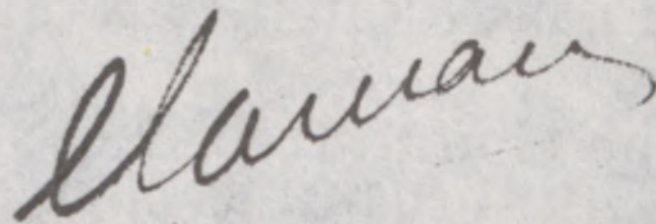
The immediate cause of the accident is known, that is to say the loss of the left rear cargo door and the sudden depressurization that followed have provoked the ejection of part of the cabin floor together with seats and six passengers, as well as damage to the flight controls which led to a loss of control of the airplane.

All the findings (examination of the flight recorders, examination of the wreck, specially the door and its locking system, examination on the bodies of the ejected passengers, including X-rays) positively eliminate the hypothesis of an accidental or criminal explosion.

The exact process which led to the loss of this cargo door is not yet clear, as well as the exact damage which was made to the flight controls and the precise conditions which the crew had to face in the last 70 seconds.

I hope these indications will be helpful to you in concluding your present analysis of this matter.

Very sincerely yours,



L. LANSALOT-BASOU

Ironically, the Turkish Airlines DC-10 which crashed near Paris, would not have been subject to in-service modifications contained in Service Bulletins 52-29, 52-35 and 52-37 as the aircraft was still on the Douglas assembly line at Long Beach and had yet to be delivered to the Turkish Airlines in the June 1972 period following the American Airlines incident.

One would assume therefore, that the modifications and changes recommended by Douglas which resulted from the June 12 incident, would have been incorporated into the airplane by Douglas prior to delivery to the airline, which took place in December of 1972.

However, the testimony of the NTSB, the FAA and the McDonnell-Douglas Corporation all indicated that inspection of the aft cargo door which was on the Turkish airliner revealed that it had not been equipped with the plate recommended in Douglas Service Bulletin 52-37 of July 3, 1972.

Mr. John Brizendine of Douglas explained it this way:

It has been reported from Paris that a key part of one of the modifications to the cargo door, which I will discuss later, was found missing upon inspection of the aft cargo door located at the accident site.

According to our manufacturing records, all service bulletins that had been issued to improve the cargo door latching mechanism had been incorporated in the Turkish Airlines aircraft prior to its delivery. At this time we are unable to satisfactorily explain this discrepancy, but we are continuing to investigate this matter. The same discrepancy was also found as to another aircraft and the part has since been installed on that aircraft.

It must be remembered that the door on the Turkish DC-10 would have been perfectly secure if it had been properly latched and locked. I would like to insert here, Mr. Chairman, as testified yesterday, that the other aircraft belonged to the Laker Airways in Britain. When inspecting that aircraft, it was determined that the balance of Service Bulletin 52-37, on which the subject part was a part, had been installed in that airplane.

In other words, the adjustment of the latching lock pin mechanism, the adjustment of a switch plate, these things had all been accomplished in that aircraft.

When those things were done, the force required to close the vent door without the latch pins in position would have been 250 pounds rather than the 150 pounds or 120 pounds prior to any work on the part the Bulletin 37 called for. Also the parts on the Turkish airplane indicated that parts of Bulletin 52-37 had been accomplished on the Turkish airplane, although the part in question was not present at that time.

I think then it must be recognized that the door on the Turkish airplane would have been perfectly secure if it had been properly latched.

* * * * *

Senator CANNON. The committee is troubled with the information that we have received, indicating that the Turkish DC-10, and at least one other, being the Lakers plane, left the Douglas plant in December of 1972, for delivery to the operators, with Douglas certifying that its own service bulletin 52-37, had been accomplished, when in fact it had not.

Now, I am sure that you have investigated this matter thoroughly, you referred to it somewhat, but could you tell us how this—how such an incident could happen?

Mr. BRIZENDINE. We are having a lot of trouble with that question, too, Mr. Chairman. Our system is so arranged and organized as to prevent this. We have a rigid system of work authorization, work compliance, and work verification, and how this happened, I do not know yet, but it is one of the things that absolutely must be determined and will be determined. The investigation is not complete in this regard, sir.

* * * * *

The Turkish airplane and the Lakers airplane were side by side, not in production, as was indicated yesterday, but in our predelivery modification. The work was accomplished at about the same time, and by the same people, according to the inspection stamps on our records.

Now, the Lakers airplane, the rigging had been accomplished, thereby making the force required to close the door about 250 pounds.

It is logical to speculate at least that the same thing was the condition of that on the Turkish airplane.

Senator CANNON. The modification work on both those aircraft would have been performed by the same mechanics at about the same point in time?

Mr. BRIZENDINE. The manufacturing records are stamped with the stamps of both individuals for the aircraft, yes, sir.

Senator CANNON. It would appear, then, that this was a problem of quality control, if in fact that is what happened. What steps have you taken at the plant to avoid a recurrence of this type of thing.

Mr. BRIZENDINE. The particular people involved have been removed from their positions, from having any inspection or work accomplishment verification responsibility. An investigation is under way by our security organization, and I have a special investigatory team that has been formed that is also working on the problem. I will personally be involved in the problem as the investigation continues.

Mr. Chairman, I might add for the record that normally operating that door handle requires about 30 pounds if the door is properly latched. It only takes about 30 pounds to close that handle and push the pins in, so anyone who is at all familiar with the door knows that if the force is high, or greater than approximately 30 pounds, something is wrong and should be investigated.

Senator CANNON. So that any operator who was familiar with the normal operation, if he found difficulty in forcing the door to lock, should have known that there was something wrong with it?

Mr. BRIZENDINE. Absolutely. The man has it in his hand, and it closes with 30 pounds. If it takes more than that, he should be alerted.

Senator CANNON. I have had staff provide you with what purports to be a copy of the inspection report from Douglas showing—bearing the stamp—that the work had been in fact accomplished. Will you examine that and state whether that is a correct copy?

Mr. BRIZENDINE. To the best of my knowledge, this is a correct copy. It indicates the work that we are discussing; it indicates the No. 29 airplane, which was the Turkish airplane; to the best of my knowledge, I would say this is a true copy of our production paper.

While the Committee certainly accepts the proposition advanced by Douglas that had the door been properly closed pursuant to standard procedures, it would not have separated in flight, nonetheless it seems to us that previous difficulty experienced with the aft cargo door by other airlines raises the question of whether it was possible at all times to easily affect a proper door closure. Incorporation of all of the modifications contained in Douglas Service Bulletin 52-37 would have made it humanly impossible to effect an improper door closure even by an untrained operator. The failure of the Company to completely modify the subject airplane is disturbing. All the relevant testimony before the Committee indicates that had the modification been incorporated in this DC-10, then the aft cargo door could not have been improperly closed.

Following our hearings we followed up this key question with Douglas officials to ascertain whether the Company investigation had reached any conclusions on why this particular aircraft and a sister ship operated by Lakers Airways of London had not been completely modified prior to their delivery to the airlines.

The following report has been received by the Committee from Douglas Aircraft Co.:

DOUGLAS AIRCRAFT Co.,
Long Beach, Calif.,
May 3, 1974.

C1-JCB-107.

Hon. HOWARD W. CANNON,
Chairman, Subcommittee on Aviation, Committee on Commerce, U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: During the hearings conducted by your Subcommittee on March 27, 1974, I testified that Douglas Aircraft Company was investigating the question of how our records could indicate that a support plate was installed on the aft cargo door of the Turkish DC-10 aircraft which crashed near Paris on March 3, 1974, when physical examination of that door indicated that the support plate was not installed. Our investigation regarding this discrepancy commenced on March 11, 1974, and is still continuing. However, the investigation has progressed to a point where some pertinent findings have been made and certain actions have been taken by Douglas Aircraft Company. At this time I would like to submit to you information regarding these findings and the actions we have taken to date.

We have been able to identify the Quality and Reliability Assurance Inspector and the Manufacturing Assistant Foreman whose stamps appeared on the paper work indicating that the support plate had been installed on the THY DC-10 aircraft. We have been unable to identify the Manufacturing Mechanic who was assigned to install the support plate on the aircraft. From our investigation to date, it appears that the absence of the support plate was not discovered in the inspection of the modification work by either the Manufacturing Assistant Foreman or the Quality and Reliability Assurance Inspector. These two individuals have been removed from any work involving inspection and they have been given reprimands.

Also, we have had our manufacturing and inspection control system audited by independent agencies and while we are satisfied it is basically sound, we are taking steps to further improve the system. For example, we have reviewed the number of outstanding stamps in both Manufacturing and Quality and Reliability Assurance and as a result have reduced the number of outstanding stamps and have restricted the usage of such stamps. Each individual in either Manufacturing or Quality and Reliability Assurance who possesses a stamp has signed an accountability record which identifies the stamps issued to him and sets forth the conditions under which the employee agrees to use the stamps. A copy of the signature form is attached hereto. A new stamp agreement will be required from each of these employees every six months. In addition, we have revised our manufacturing and inspection work instructions as they relate to "out-of-position" work to be more consistent with the similar type instructions utilized in our production line. All of our supervisory personnel have been re-instructed in the application of our work procedures.

At the present time the FAA is conducting its regular, periodic QASAR audit of our manufacturing and quality control system, which action our company certainly welcomes.

We want to be responsive and cooperative to the requests of your Subcommittee and trust that the foregoing information will be helpful to you in your investigation.

Very truly yours,

JOHN C. BRIZENDINE.

Attachment.

Employee Number _____

CONTROLLED STAMP AGREEMENT

I have in my possession Control Stamp(s) as noted for which I am responsible.

1. I will use my stamp(s) *ONLY* when I have personally inspected the work accomplished and have satisfied myself to the best of my ability that the work is complete and meets the standards required by Douglas policies.
2. I will exercise the necessary precaution to prevent loss or damage to this stamp and will immediately report to my Leadman or Supervisor should either occur.
3. I will not loan my stamp to, or borrow a stamp from, any other employee.

I have read and understand the above statements. I understand that failure to comply with them will result in the loss of the stamp and could result in severe disciplinary action, up to and including discharge.

Date: Employee signature:

Stamp code	Stamp type	Employee's signature	Stamp impression
DAL	Quality assurance acceptance		
DAP	do		
DAS	do		
DCP	Component test		
DEP	Equipment calibration and certification		
DFP	Fluorescent or dye penetrant inspection		
DHP	Hardness test inspection		
DMP	Magnetic particle inspection		
DPP	Proof-load inspection		
DRP	Douglas customer representative		
DSP	Quality assurance star		
DTP	Tooling quality assurance acceptance		
DTS	do		
DTL	do		
DUP	Ultrasonic inspection		
DXP	Radiographic inspection		
DZP	Conductivity		
CTP	Conditional tooling acceptance		
CTS	do		
MRC	Material review central control		
SQA	Quality assurance accountability		
SQP	Quality planning		
SSS	Material review scrap		
SDV	Special data verification		

Date Supervisor

From the information provided the Committee by Douglas it appears the quality control program broke down in this particular instance and that human failure is involved in the fact that the modification provided for in Service Bulletin 52-37 was not fully adopted to ship #29. One might speculate that had Douglas itself or the FAA shown more concern with the aft cargo door problem, the human failure might have been avoided.

For example, if the Douglas manufacturing and inspection personnel had been aware that the aft cargo door problem had been the subject of an FAA Airworthiness Directive which required retrofit or modification to airplanes still within the Long Beach facility, possibly that knowledge might have resulted in greater diligence in seeing that the aircraft was properly and completely modified with the required changes. Similarly, FAA inspectors who are permanently assigned to the Douglas plant might have made personal inspections of the DC-10's then in the plant to check on compliance with an airworthiness directive had one been issued and had the Agency ordered an inspection program similar to that begun in March of 1974 following the Paris crash.

Had Douglas made Service Bulletin 52-37 an "alert" service bulletin rather than a routine service bulletin, one might have expected that the Douglas quality assurance inspectors, knowing that a safety factor was involved, would have been more diligent in making sure that the required modifications were in fact made.

While one will never be able to answer these intriguing questions, it certainly seems reasonable that a greater sense of urgency on behalf of the manufacturer and the FAA would have resulted in a similar sense of urgency at the Douglas facility where the modifications were to be performed. If such a sense of urgency had resulted in the air-

craft being completely modified in conformance with Service Bulletin 52-37 then the Paris crash might well have been avoided.

It should be noted that following the Paris disaster, firm forceful and effective regulatory action was immediately initiated by the FAA in seeking to preclude such an occurrence from happening again. Airworthiness directives were issued, compliance was required, and FAA field inspectors in the various states were immediately sent out to check each DC-10 in United States registry to ascertain whether the proper modifications were made. Similarly, foreign governments were immediately notified of the FAA's action, and the British government, as a result, took immediate action pertaining to Lakers Airways operation of a DC-10 which we later learned had not been completely modified in conformance with Service Bulletin 52-37.

These events, of course, occurred after the crash. They represent the kind of FAA action and initiative which we and the public should expect once unsafe conditions or equipment come to the Agency's attention.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The Committee finds that the FAA, in dealing with the problem of the aft cargo door on the DC-10 following the June 12, 1972 incident, failed to take the proper regulatory action in seeking to ensure that a repeat of the near catastrophic door failure did not occur.

While the FAA's Western Region, the Flight Standards Service and the Deputy Administrator of the Agency had all agreed that the seriousness of the door problem warranted issuance of an airworthiness directive on the DC-10, the Administrator, pursuant to an oral agreement with the president of Douglas Aircraft, decided to address the problem with a company service bulletin, followed up by a telegraphic communication from the FAA to the airlines operating the DC-10. Testimony from the committee's hearings indicates that there was less than total compliance with all Douglas service bulletins dealing with the rear cargo door and that in at least one instance a U.S. registered aircraft was not modified pursuant to Service Bulletin 52-37 until after the Paris accident.

The Committee however believes that the Administrator was acting honestly and in good faith in dealing with the DC-10 problem and truly believed that the serious danger posed by the problem could be alleviated through the service bulletin process.

Nonetheless, we believe that when a serious or potentially catastrophic problem develops in a transport category aircraft, the public interest and safety requires strong regulatory action on the part of the Federal Aviation Administration. Issuance of airworthiness directives is the only proper way to proceed for several reasons. First, the AD has the force and effect of law and requires modifications or fixes be made by certain time deadlines if the operator wishes to continue to operate the aircraft. On the other hand, compliance with service bulletins is voluntary on the part of the operator and may be ignored if the operator chooses. Second, the AD is transmitted to all foreign governments by the United States notifying those governments whose airlines operate U.S. manufactured aircraft that an unsafe condition

exists. Service bulletins, issued by a manufacturer, do not go to government officials and can result in governments being uniformed regarding potential safety problems. Third, the AD is a method by which the public becomes aware of safety problems in aircraft and focuses attention on the methods by which the Government, the manufacturers, and the operators seek to alleviate the problem. In effect, the AD puts the Government's action on the public record and can have a reassuring impact on the public which is anxious to see that the Government is doing all possible to make air transport as safe as it can be.

On the other hand, the service bulletin process takes place quietly without public knowledge and in the DC-10 instance, communications between the FAA and the operators were given "for official use only" status, thus seeking to ensure that word of the safety problem did not become a matter of general public knowledge. We believe that subconsciously or otherwise, the manufacturer and the FAA sought, in dealing with this problem, to keep the bad news from the public in hopes of not blemishing the reputation of the DC-10 aircraft. While we share the concern that the DC-10 enjoy a high reputation for safety and reliability, we believe it is more important to deal with safety defects in an open and above board manner. If dealt with that way, then public confidence will be bolstered in the regulatory process and in the FAA which the public is entitled to believe exists to insure the highest safety standards in air transportation. Actions taken behind closed doors or actions which are kept off the public record only serve to create an impression of the regulator being unduly influenced by those he regulates. The regulatory process, particularly where public safety is concerned, should be totally above any suspicion that the Government is compromising safety standards to accommodate industry. Confidence in government in general will not be bolstered by governmental actions which give the appearance of succumbing to private interests.

Fourth, and very importantly, the AD connotes a sense of urgency regarding a safety problem which might not attach to the issuance of service bulletins. The AD puts Government inspectors on notice that a serious safety problem exists and that diligent oversight is required to make sure that the appropriate fixes and modifications are completed by manufacturer or operator. At the same time, the operators of aircraft, the airlines, are put on notice by an AD that quick and effective action are required and that delay or procrastination will not be tolerated. In effect, the AD is a red flag indicating that all is not well and that the Government is requiring strong, affirmative, and public action to deal with the problem.

We note with approval a recent statement to the Committee by the FAA Administrator following our hearings that the Agency is changing the methods by which it deals with these problems.

As part of the regulatory policy review, I have directed offices concerned to utilize Airworthiness Directive procedures in all future situations when a design change is needed to correct an unsafe condition. An agency order will formalize this directive and will emphasize that the use of General Notices or other non-regulatory means should be discontinued for such a purpose.

We are also concerned by the FAA's failure to adequately follow up what action it did take in June of 1972 after the American Air-

lines incident. Following the agreement to proceed with service bulletins rather than airworthiness directives, the FAA, on its own initiative, failed to take action to ascertain whether the airlines were in fact providing the modifications called for in the Douglas service bulletins. We believe that under the circumstances and because of the urgency of the problem, that at the very least, FAA flight standards inspectors across the Nation should have been checking to see if the airlines were properly incorporating the modifications pursuant to the service bulletins. This did not occur. In fact, the only followup was done by Douglas, which in August of 1972, informed the Agency of the status of the modification program. Further, failure to follow up is noted in the July 7 letter from the Administrator to the NTSB in which the Administrator fails to inform the Board of the issuance of Douglas Service Bulletin 52-37, the one the testimony indicates is the most important. Mr. Shaffer's letter adds strong weight to the proposition that he and/or the Agency did not have adequate and thorough knowledge of the continuing steps being taken by Douglas to provide a fix that was human error-proof.

Based on the testimony presented to us, the Committee believes that the Douglas Aircraft Company did not take the kind of remedial action on the cargo door situation which circumstances warranted. While the Company was quick to come up with the first fix and to notify the airlines via an "alert" notice of the fix, later and more comprehensive fixes were dealt with in a routine manner.

For example, when the modification contained in Service Bulletin 52-37 was arrived at on July 3, 1972, Douglas notified the airlines through a routine rather than an "alert" service bulletin. Yet, the modification called for in 52-37 was exactly what the Safety Board had earlier recommended in the way of a complete fix to the door problem. We do not understand why Douglas did not treat this service bulletin more urgently and can't help but wonder if whether this routine treatment was partially responsible for the failure of Douglas personnel to completely modify the THY and Lakers DC-10s which were then in the final stages of production prior to delivery.

Nonetheless, we feel compelled to point out, as did Douglas during the hearings, that proper door closure on the aft cargo door eliminates the possibility that the door would inadvertently come open in flight.

If proper procedures are followed by the airline employees charged with the responsibility of closing the doors, then the locking mechanism may be properly seated and the latch pins properly secured in place making it impossible for inadvertent door opening. While installation of Service Bulletin 52-37 makes it humanly impossible to improperly close the door, the trained, competent and conscientious employee would hopefully never force the door closed with undue pressure, thus providing an appearance of proper closure when in fact the door was not completely closed. While we do not know the circumstances, human and otherwise, involving door closure prior to the fatal Paris crash, we do point out that proper and secure closure was possible without the modifications provided for in Service Bulletin 52-37.

While there still exists much difference of opinion regarding the fix recommended by the Safety Board dealing with venting between the

cargo compartment and the passenger cabin, we do not understand why this recommendation was given such low priority within the Company and why it took more than a year before the Company and the FAA dealt with the recommendation in an exchange of letters.

Finally, we find fault with the National Transportation Safety Board for failure to adequately follow up its recommendations on the DC-10 door problem and for its closing of the file on Safety recommendation A-72-97 even though the FAA had not taken action initiating the proposed recommendation. The situation clearly indicates a lack of basic follow through to keep after FAA until the Agency had met the objectives of the Safety Board's recommendations.

We hope that in the future, the Board will be more persevering in pressing its recommendations with the FAA, if only in hopes that such pressure will vitalize the FAA with a sense of urgency when safety problems arise and will provide a force upon FAA which will keep the Agency from letting problems drift.

The Committee will shortly consider S. 2401, a bill which would reorganize the NTSB and which contains a provision requiring some written FAA action either affirmative or negative on NTSB recommendations within 90 days of their issuance. We believe that this requirement will assist NTSB in following up its recommendations and will require that the FAA deal with them in a public manner.

In summation, while it is a matter of sheer speculation whether different action by the FAA by Douglas and by the Safety Board could have prevented the March 3 accident near Paris, we believe that the regulatory process designed to protect the public from unsafe conditions which could lead to air transportation disasters was circumvented in the DC-10 cargo door problem instance. We expect a better pattern of performance in the future.



