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JAPAN AIR LINES COMPANY, LIMITED
BOEING 747-246, JA8122, ANCHORAGE, ALASKA, DECEMBER 16, 1975

NATIONAL TRANSPORTATION SAFETY BOARD

MARCH 31, 1976

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16.Abstract

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Of the 121 persons on board, 2 were injured seriously. The aircraft was damaged substantially by impact; there was no fire.

The National Transportation Safety Board determines that the probable cause of this accident was the loss of directional control during taxi as a result of ice on the taxiway and strong, direct crosswinds.

Contributing to the accident were (1) the captain's decision to take off from runway 6R after receiving reports that taxiing conditions were deteriorating, and (2) failure of airport management to anticipate predictable unsafe icing conditions on the airport. This failure to anticipate these conditions resulted in delayed and insufficient preventive action.

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

Adopted: March 31 1976

JAPAN AIR LINES CO., LTD.
BOEING 747-246, JA8122
ANCHORAGE, ALASKA
DECEMBER 16, 1975

SYNOPSIS

About 2055 Alaska standard time, December 16, 1975, Japan Air Lines Co., Ltd., Flight 422, slid off the north side of the east-west taxiway of Anchorage International Airport while taxiing out for a takeoff on runway 6R. The aircraft weathercocked about 70° to the left and slid backward down a snow-covered embankment with an average slope of -13°. The aircraft came to rest on a heading of 150° on a service road approximately 250 feet from, and 50 feet below, the taxiway surface.

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1. INVESTIGATION

1.1 History of the Flight

Japan Air Lines, Co., Ltd. (JAL) Flight 422, a Boeing 747-246, (JA8122) was a regularly scheduled international passenger and cargo flight from Charles DeGaulle International Airport, Paris, France, to Haneda International Airport, Tokyo, Japan. En route stops were scheduled at London, England, and Anchorage, Alaska.

When Flight 422 landed in Anchorage at 1742, 1/ light snow had been falling on the airport, and adding to residual accumulations of snow and ice. However, the airport was operational with fair to good braking action reported. Snow was being removed by airfield maintenance personnel. The crew was changed when the flight landed in Anchorage.

About 1757, 22 kn winds, with gusts to 29 kn developed from the south, southeast. Air temperatures averaged 40°F; however, surface temperatures were below freezing. About 1815, light rain began.

About 1904, after being briefed and dispatched, Flight 422 departed the terminal and taxied to runway 6R via the east-west taxiway which parallels runways 6/24.

The captain stated that he had received the latest weather information, with winds given from 120° to 130° at 15 kn, gusting to 32 kn. He stated that he was concerned that the 20-kn maximum crosswind component for takeoff would be exceeded.

The captain, who was at the controls, said that braking action was good during taxiout; the first officer stated, however, that the aircraft tended to slide on the taxiway.

As the captain began his takeoff roll, he heard a loud noise to his left which sounded to him like the noise of a compressor stall; he immediately aborted the takeoff. The first officer and flight engineer also heard the noise, and the first officer stated that he heard the noise as the engine pressure ratios (EPR) were advanced from 1.3 to 1.4. The flight engineer saw the needle on the No. 2 EPR gauge flicker. As the aircraft was being taxied back to the terminal and while it was still on the runway, the EPR for the No. 2 engine was advanced to 1.46, but nothing unusual was noted. The aircraft did not slip or slide on the runway at that time.

1/ All times herein are Alaska standard time, based on the 24-hour clock.

At 1942, the aircraft arrived back at the terminal and maintenace personnel checked the Nos. 1 and 2 engines. Fuel was added which increased the total fuel on board to 7,000 lbs over that planned for the flight. The extra fuel was added to compensate for anticipated waiting time at the end of the runway before the next takeoff.

While parked at the terminal, the cpatain remained in the aircraft and monitored both company and tower frequencies. During this time, the dispatcher received an urgent telex from the JAL Tokyo Head Office stating that the aircraft would not be permitted to land at Haneda International Airport after 2300 Japanese standard time because of curfew regulations. Therefore, Flight 422 had to depart Anchorage no later than 2100 A.s.t. to land in Tokyo before the curfew. This information was relayed to the captain and he decided to taxi out, when ready, and wait at the end of the taxiway for favorable winds.

At 2004, JAL Flight 1008, a DC-8, departed on runway 6L and reported, in detail, to the JAL dispatcher about taxi and takeoff conditions. The report was made on company frequency and was heard by the captain of Flight 422. One of Flight 1008's comments was that braking action was "nil" on txiout.

About 2020, State airport personnel were dispatched to evaluate the braking action that could be expected on the runways; however, the taxiways were not checked.

About 2030, Flight 422 was towed out from the terminal gate but the departure was delayed because the tractor slipped on ice and the ramp had to be sanded.

At 2030:30, the Federal Aviation Administration (FAA) ground controller in the tower advised Wien Air Alaska Flight 15 that the ramp area was slick and the taxiway to runways 6L and 6R were "very slick." At 2035:25, a field maintenance truck driver advised the tower that runway 6R was "slick" and that sand should be spread on it "right away."

About 2046, Flight 422 requested taxi instructions and the tower gave the flight the choice of using either runway 6L or 6R and reported the winds as 140° at 25 kn. The captain requested runway 6R.

At 2048:35, Flight 422 was cleared to cross runway 13/31 and it began to taxi on the east-west taxiway toward runway 6R. No sand or urea 2/ had been spread on the taxiway. The aircraft's taxi speed averaged about 9.9 kn. The captain stated that he taxied about 5 to 10 kns as indicated by his inertial navigation system (INS).

2/ A salt substitute to dissipate snow and ice.

At 2053, the tower requested that Flight 422 use caution on the taxiway past the runway 6L turnoff because it was "extremely slick."

The captain stated that he had not experienced any difficulty in taxiing; however, shortly after the tower advisory, the aircraft began to slide to the right. The captain stated that he used both nosewheel steering and brakes to correct the slide, and the aircraft responded satisfactorily after which he reduced his speed to 5 kn. He stated that immediately after the correction, the aircraft again began to slide and the nose swung left about 10° t to the taxiway's centerline. He applied full brakes and told the first officer to do the same; but the aircraft continued to slide. He applied a small amount of reverse power on all four engines, and the aircraft stopped. He felt that the landing gear was still on the paved surface and that perhaps he had hit a taxi light. He gave the order to shut down the engines and directed the first officer to call for a tractor to tow the aircraft back. He said that he believed it to be too risky to taxi further.

The aircraft then canted to the right and slowly changed its heading (counterclockwise) to about 70° to the taxiway, slid backward down the embankment, and came to rest 90° to the taxiway. The statements by the first officer and flight engineer essentially confirm the captain's account of the accident.

The emergency evacuation was executed efficiently by the cabin crew. All passengers had left the aircraft within 60 seconds.

The accident occurred during the hours of darkness at latitude 61° 10' 11" N and longitude 149° 59' 20" W.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Other
Fatal	0	0	0
Nonfatal	3	8	0
None	17	93	

1.3 Damage to Aircraft

The aircraft was damaged substantially.

1.4 Other Damage

Two taxiway lights were destroyed.

1.5 Crew Information

The crewmembers were qualified and properly certificated. (See Appendix B.)

1.6 Aircraft Information

The aircraft was certificated and maintained in accordance with applicable regulations.

The aircraft's gross weight for takeoff was 608,226 lbs and the center of gravity was 23.0 percent MAC. The gross weight and the center of gravity were within limits.

1.7 Meteorological Information

For the times indicated, surface weather observations for Anchorage International Airport were, in part, as follows:

1855, 1,900 feet scattered, ceiling--measured 3,800 feet overcast, visibility--10 miles, light rain, temperature--39°F, dew point--31°F, wind--150° 30 kn, gusts 38 kn, altimeter setting--28.95 inches, 4/10 of the sky covered by fractostratus clouds, pressure rising rapidly, rain began at 1830.

1955, 1,600 feet scattered, ceiling--measured 3,400 feet overcast, visibility--10 miles, light rain, temperature--40°F, dew point--29°F, wind--160° 22 kn, gusts 35 kn, altimeter setting--29.02 inches, 4/10 of the sky covered by fractostratus clouds, pressure rising rapidly.

2055, 3,500 feet scattered, ceiling--measured 6,000 feet overcast, visibility--10 miles, temperature--41°F, dew point--29°F, wind--190° 20 kn, gusts 33 kn, altimeter setting--29.10 inches, pressure rising rapidly, rain ended at 2020.

The record of surface weather observations shows that light rain began at 1830 and ended at 2020, a trace of rain was recorded from 1800 to 1900 and from 2000 to 2100, and 0.02 inch was recorded from 1900 to 2000.

The surface wind speed record for Anchorage International Airport shows that the speed reached 26 kn at 2055. These winds are recorded 30 feet above the runway from an F420 anemometer located between runways 6L and 6R.

A portion of the aviation area forecast that was issued by the National Weather Service Forecast Office at Anchorage at 1240, valid 1300 to 0700, was as follows:

Significant clouds and weather. Cook Inlet and Suitna Valley. Ceiling from 2,500 feet to (information garbled) and visibility 5 miles, light snow, except rain southern Inlet, and light rain and light snow spreading over northern Inlet by 2000. Areas light freezing rain along arctic front northern inlet, southern Valley. East to north wind to 45 kn, except southeast to 20 south of front. Area visibility below 3 miles in light snow, mainly along immediate arctic front and west side area.

The aviation terminal forecast for Anchorage International Airport that was issued by the National Weather Service Forecast Office at Anchorage at 1840, valid 1900 to 2100 was, in part, as follows:

> 1900 to 2100, 600 feet scattered, ceiling--4,000 feet broken, wind--170° 20 kn, gusts 30 kn, occasional light rain, 40 percent probability, ceiling--600 feet broken.

The above forecast was amended at 1950 and was, in part, as follows:

> 1950 to 2300, 600 feet scattered, ceiling--4,000 feet broken, wind--160° 30 kn, gusts 45 kn, occasional light rain, 40 percent probability, ceiling--600 feet broken, strong low-level windshear.

According to a meteorologist at the National Weather Service, Weather Forecast Office in Anchorage, the conditions on the day of the accident were "not unusual during the winter at Anchorage International Airport during a high wind situation."

Airport runway condition logs showed recordings of freezing ground temperatures.

1.8 Aids to Navigation

Not applicable.

1.9 Communications

There were no reported problems with communications.

1.10 Aerodrome and Ground Facilities

Anchorage International Airport is served by three runways -- 06L/24R, 06R/24L, and 13/31. Runway 13/31 is 4,742 feet long, runway 6L is 10,600 feet long, and runway 6R is 10,897 feet long. The surface of runway 6R is newer and smoother than that of runway 6L.

Runways 6L and 6R are served by the east-west taxiway which is 75 feet wide and about 15,400 feet long. The taxi lights are 99.4 feet apart, and the distance between the top edges of the embankments is 119 feet. The taxiway has a grade from its center to each side of 1° to 1-1/2° and its surface is asphalt. The terrain adjacent to both sides of the east-west taxiway from the entry to runway 6R (W-3) to the entry to runway 6L (W-4) is inclined; the incline on the north side of the taxiway where the accident occurred was about -13°.

When the east-west taxiway was constructed, the acceptance standard under the Federal-Aid Airport Program was a taxiway width of 75 feet. However, taxiways must now be 100 feet wide to qualify for Federal aid.

1.11 Flight Recorders

The aircraft was equipped with a Model 642C-1 Collins Radio, Inc., cockpit voice recorder (CVR) and a Sundstrand Data Control, Inc., digital flight data recorder (DFDR). Both instruments were removed from the aircraft; they were not damaged.

To expedite data collection, both the CVR and the DFDR were sent to Tokyo to be read out at the facilities of Japan Air Lines, Inc. Readouts were monitored by a member of the Japanese Government's Aircraft Accident Investigation Commission. After the initial data were made available to the investigation team, both instruments were sent to Safety Board Headquarters where the DFDR was read out.

Graphs of the most pertinent parameters of the total of 69 recorded parameters were prepared. (See Appendix E.) The graphs encompassed the last 3 minutes 2 seconds before engine shutdown. The time in the graph was GMT and was determined from the control tower voice tapes.

The following review of the parameters refers to seconds before engine shutdown:

At 62 seconds, the heading of the aircraft began to swing to the left. At 41 seconds, lateral acceleration began to show slight leftward aircraft acceleration and reversers began to operate and continued for 9 seconds. At 19 seconds, lateral acceleration to the left was recorded. About that same time, pitch attitude and angle of attack went from minus values (nose down) to plus values (nose up). This situation continued until the engines were shut down. At 17 seconds, maximum roll attitude showed that the right wing had lowered. This change in roll attitude began at a value of 1.4° to 16° right wing down and occurred within 5 seconds. At 13 seconds, there was a burst of forward thrust on the Nos. 3 and 4 engines with EPR indications from 1.02 to about 1.20. At 4 seconds, the magnetic heading reached its maximum heading to the left of 201.8°. Immediately thereafter, pitch position increased, and roll stabilized at 11.6° right wing down.

When the engines were shut down, the recorder ceased to operate; at that time the traces were as follows: Heading--202.6°, pitch -- 3.5° (nose up), and roll -- 11.6° (right wing down).

1.12 Wreckage

There was no evidence to indicate a failure of the aircraft's systems, structure, or powerplants before the aircraft left the taxiway. All tires had a rib-type tread and appeared to have been inflated and in serviceable condition before the accident. Their average tread depth was about .18 in. Tracks on the taxiway indicated that the aircraft was at the extreme north side of the taxiway before it rotated into the wind. The landing gear and structure of the aircraft were damaged extensively.

1.13 Medical and Pathological Information

The captain and one passenger received compression fractures of the second lumbar vertebra when the aircraft slid down the slope; both were hospitalized. The flight engineer, a flight attendant, and seven passengers received minor cuts and bruises during the accident and during the evacuation.

1.14 Fire

There was no fire.

1.15 Survival Aspects

This was a survivable accident. When the aircraft came to rest, all flight attendants heard the evacuation alarm system that was activated by the crew and immediately opened the exit doors.

Crew interviews indicated that when the aircraft slid down the embankment oxygen compartment doors opened and a life raft at exit L1 fell from a cabin ceiling compartment. Storage area doors opened in some galleys and the contents were spilled.

At exit L1, the evacuation slide inflated properly and about four passengers used the slide to exit. The slide then deflated and sagged to the left. The chief purser blocked the door and directed passengers to exit R1. (See Appendix F.)

The flight attendants had discussed previously the use of exits R3 and L3 in light of the possibility of engine problems. An assistant purser had told them not to use these exits in case of an emergency if there was any doubt of a successful evacuation. Therefore, both exits were left unopened.

At exit L4, a purser attempted to open the door. He stated that the handle would not rotate more than halfway and that the door remained closed. A flight attendant assisted him but they could not open the exit.

At exit L5, the door handle would not rotate more than two-thirds, but after putting all her weight on the handle, a flight attendant managed to open the door and the slide inflated. However, the slide encountered high ground after about 4 to 5 feet and bulged upward. The flight attendant tried the slide herself but decided it was not usable and directed passengers to exit R5.

At exit R5, two flight attendants had difficulties rotating the handle, but managed to open the door. The slide did not inflate; however, the door sill was only 20 inches from the ground and several passengers used the exit. At some point during the evacuation, one passenger stepped on part of the slide which caused it to inflate.

Anchorage International Airport possesses 11 firefighting vehicles. Firefighting equipment was called to the accident scene by the control tower upon receiving a transmission from JAL Flight 422 that an evacuation was in progress. All equipment responded and the first trucks were on scene within 1 minute. Airport dispatch also requested firefighting equipment from the city of Anchorage. Except for a few crewmembers, all passengers and flight attendants had evacuated the aircraft when the first firetrucks arrived. Buses were used to transport passengers to the terminal.

1.16 Tests and Research

None.

1.17 Other Information

1.17.1 Responsibilities and Functions of Airport Personnel

The Air Operations Manual for the State Department of Public Works' Division of Aviation gives responsibility to the airport manager for the direct and indirect supervision over snow removal; cleaning, maintenance, and repair of pavement; safety-area lighting; and other airport facilities. He also supervises the reporting and dissemination of information on airport facilities and safety conditions.

The airport operations officer assists the airport manager and performs the duties of the manager during his absence. One of the officer's duties is to "...insure that prompt and accurate corrective action is taken to eliminate unsafe conditions on the airport.... "

The Operations Manual states, in part, "Any item reported that cannot be immediately corrected or is a safety hazard will be brought to the attention of Airport Security. Airport Security initiates all NOTAMS and AIRADS to Flight Service through the Anchorage International Control Tower."

The Operations Manual also gives the following instructions regarding treatment of icing conditions, "When icing conditions are imminent, anti-icing is accomplished by spreading urea on runway/taxiway areas. This is backed up by a deicing fluid which is more effective at lower temperatures than urea."

Review of the Airport Regulations of the Alaska Administrative Code, Title 14, Chapter 10, Aviation, indicates that the airport manager has authority to regulate, control, and direct the use of all runways and taxiways.

The Safety Board interviewed several airport personnel who were on duty before and at the time of the accident. Personnel indicated that they were removing snow and cleaning the operational areas of the airport on the afternoon and evening of December 16. At 1930 all personnel who were cleaning took their 1/2-hour meal break.

The shift foreman stated that he made a routine check of the field after he came on duty at 1530 and found it to be in satisfactory condition. He directed the cleanup activities and stated that at dinnertime it was raining and the airfield conditions seemed to be improving. He said that about 2000, he received a call from the control tower saying that an aircraft which had landed on runway 13 had reported braking action to be poor. He dispatched a truck to sand runway 13 and the driver reported it to be slick. After checking runway 6R and also finding it to be slick, the shift foreman recalled all of the vehicles to the shop so that he could assign the most qualified drivers to sand and spread urea on the taxiways and runways. He stated that he had seven men on duty but they were not interchangeable in their jobs since some had been assigned recently. When the men were returning to the shop, the accident occurred. Four vehicles were made available the night of the accident; one truck was used to spread sand on the taxiways and runways, one to spread coarser sand on the roadways, and two trucks to spread urea.

The airport's field maintenance supervisor stated:

> "During the day the air and surface temperature started rising. The air temperature rose from 21° at mid shift to 23° at 1420 hours on day shift. Ground temperatures from 19° to 20°. Weather reports indicated that we could expect light snow or rain along with high winds from the south. As all the runways and taxiways were reported fair to good, normal snow removal priorities and procedures were continued."

He further stated that the swing shift continued the cleanup and with the warming temperatures the removal of compacted snow progressed satisfactorily. When he left for home at 1645, the field was in good condition, the air temperature was 26°, and the ground temperature 22°. Jet aircraft had been using runway 6R but when the wind increased most of the aircraft began using runway 13. He stated that when the entire crew 3/ went to the shop for their meal, all runways were drying in patches and in his opinion there was no reason, at that time, to spread sand or urea. He also stated that if it had been spread, it would have been blown off before it could have taken effect.

On the day of the accident, a safety inspection was accomplished prior to the formation of ice on the runways and taxiways. When icing conditions became apparent, the tower was notified to insure that advisory information was supplied to aircraft; however, neither a NOTAM nor an AIRAD was issued.

Personnel statements and a review of the work logs indicate that the east-west taxiway had not been sanded nor had urea been spread on it on the day of the accident.

1.17.2 JAL Criteria for Operation Control

The JAL Operations Manual gives the pilot-in-command the responsibility for the operation and safety of his aircraft and for the safety of all persons and cargo on board during flight time. According to the manual, the dispatcher "shall be responsible for discharging his duties under the full knowledge of the flight, and is a key personnel in connection with Station Operation and Flight Movement Control."

The meteorology section of the JAL Air Navigation Manual lists the runway "go-no-go" criteria for operations. The manual directs that fair to good braking action must be available to operate with the maximum crosswind limit of 20 kn. There were no criteria for use of taxiways.

1.17.3 The Carriage of Hazardous Cargo

Flight 422 had a shipment of radioactive material aboard which was en route from Paris, France, to Tokyo, Japan. Review of the JAL's "Notification For Loading of Restricted Articles" and all pertinent documents indicated that the cargo was loaded properly and that all procedures were followed properly.

3/ If hazardous conditions prevail or are considered to be imminent, it is the airport's policy not to permit an entire crew to take a break at the same time.

Shortly after the accident, the airport police were notified by JAL Operations that the shipment of radioactive isotopes was aboard. The police immediately contacted their unit for the control and investigation of hazardous material. The hazardous material personnel inspected the cargo for radioactive leakage. Readings were normal and consituted no danger for personnel. They maintained guard for the detection of any hazardous radiation until the cargo, which was not damaged, was removed and sent to its destination.

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

The aircraft was certificated, equipped, and maintained according to applicable regulations. The gross weight and c.g. were within prescribed limits. The aircraft's powerplants, airframe, systems, and components were not factors in this accident. The flightcrew was properly certificated and each crewmember had received the training and off-duty time prescribed by applicable regulations. There was no evidence of medical or physiological problems that might have affected their performances.

Actions by Airfield Personnel

The weather on the day of the accident had been forecast, and airfield supervisory personnel were aware of it. They also knew that the high winds from the south and light snow and rain would affect field conditions. Airport management was also aware of the freezing ground temperatures; such weather phenomenon is not unusual in the Anchorage area, and the results are usually the same--the rain falls on the frozen ground and ice soon forms.

At 1835, the time rain began, the winds were from 150° to 160° at 22 kn and above. Air temperature was holding about 40°F while ground temperatures were at or below freezing.

When field maintenance personnel took their break (1930) no alert status was maintained nor were anti-icing precautions taken in the anticipation of icing conditions. This lack of preventive action was not consistent with the provisions of the airfield's operations manual.

When field maintenance personnel became aware that the surface had begun to ice up, they immediately made every effort to make the runways safe for operations. However, nothing was done to the east-west taxiway. In spite of the high wind velocity, the sand which was spread on the runways at this time did take effect. Consequently, the Board must conclude that had sand and deicing materials been spread earlier, it would have effectively reduced the slipperiness of the runways and taxiways.

Based on these facts, the Safety Board concludes that airport management personnel lacked alertness and, consequently, a predictable hazardous condition developed on the airport. All of the criteria for surface icing had been forecast and were present when rain began to fall; yet, no immediate preventive action was taken nor was an alert put into effect in anticipation of the ice.

Taxiway Standards

Although the taxiway met the FAA's certification criteria when it was constructed, its 75-foot width is 25 feet less than would be permitted under current Federal-aid regulations. In addition, the taxiway edges would also be correspondingly wider. The depth and grade of the bordering terrain of the taxiway also were factors. Normally, if a slow-moving aircraft slides off a taxiway, extensive damage and serious injuries are not incurred.

Airline and Crew Action

The flightcrew was informed of the conditions on the runway and taxiway before and during taxiout; therefore, they knew that the conditions had deteriorated since the previous taxiout. However, they also knew that other aircraft were operating successfully.

Even before the captain received the telex message from Tokyo, he knew that he must depart by 2100 or cancel the flight and remain in Anchorage overnight. He also knew that if the flight remained it would create many local logistics problems for JAL. Undoubtedly, he considered these factors when he decided to depart. Had an expedited departure not been required, he may have delayed at the terminal for more favorable wind conditions.

The information given to the pilot before and during taxiout should have alerted him that a dangerous situation could easily develop when he continued taxing toward runway 6R. Although the pilot preferred runway 6R, his judgment for not selecting 6L and the shorter taxi distance to it was questionable. Runway 6L is only 300 feet shorter than 6R and, although not as desirable because of its surface conditions, it is adequate for a B-747.

When the engines were shut down, the DFDR parameters show that the aircraft was aligned about 30° to the left of the correct taxiway heading, that the aircraft had rotated from a normal nosedown attitude to a noseup attitude, and that the right wing was noticeably down. The aircraft was, therefore, in an extremely precarious position. Undoubtedly, the right wing gear was in space and protruding over the edge of the embankment. Had the captain decided to retain idle power on his aircraft, he may have been better able to control the situation. On the other hand, the thrust developed by idle power also may have caused the aircraft to move. Since the aircraft had stopped, the captain probably believed that they were safe, and he did not want anything to disturb the aircraft's stability.

In summary, this accident resulted from a combination of the following factors: (1) High crosswinds and a slippery taxiway, (2) the failure of airport management to provide a safe surface on which to operate, and (3) the captain's motivation and determination to continue the flight according to schedule regardless of the hazardous taxi conditions.

The Board stresses that airport management must exercise its responsibilities to assure the highest degree of safety. The Board also stresses that pilots must not allow pressures to meet schedules to dilute or derogate their judgments under adverse conditions.

2.2 Conclusions

(a) Findings

1. The flightcrew were certificated properly and were qualified.

2. The aircraft had been maintained properly and was airworthy for the flight; its gross weight and c.g. were within the prescribed limits.

3. There was no evidence of a system malfunction, failure, or a defect in the aircraft.

4. The flightcrew had adequate weather and field condition information.

5. Weather conditions that were conducive to surface icing had been forecast.

6. Airfield supervisory personnel were aware of the forecast and actual weather; however, they did not initially assess it to be a threat to safe operation on the airfield.

7. Taxiway anti-icing measures were not taken before the onset of surface icing.

8. The width of the east-west taxiway is 25 feet less than the current standard.

9. The terrain adjacent to the taxiway area where the accident occurred has an incline of about -13°.

10. The captain was aware of the slippery conditions when he began his taxi out, and he was warned about slipperiness while taxiing.

11. When the captain left the gate area at 2046, winds velocities were exceeding the 20-kn maximum allowable crosswind component for takeoff.

12. The JAL office at Tokyo had informed the crew that the flight must depart Anchorage by 2100 because of a curfew at Toyko.

13. Because of the strong crosswinds and the slipperiness of the east-west taxiway, the captain lost control of his aircraft and the aircraft skidded to the north side of the taxiway.

14. The engines were shut down when the aircraft came to a stop and after it had weathercocked 38° to the left of the taxiway heading and had attained a noseup and right wingdown attitude. The aircraft then further weathercocked into the wind and slid backward down the embankment.

(b) Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the loss of directional control during taxi as a result of ice on the taxiway and strong, direct crosswinds.

Contributing to the accident were (1) the captain's decision to take off from runway 6R after receiving reports that taxiing conditions were deteriorating, and (2) failure of airport management to anticipate predictable unsafe icing conditions on the airport. This failure to anticipate these conditions resulted in delayed and insufficient preventive action.

3. RECOMMENDATIONS

Although the evacuation of Flight 422 was successful, some of problems identified in the Safety Board's Special Study, "Safety Aspects of Emergency Evacuations from Air Carrier Aircraft," were present in this accident. Under slightly different circumstances of a greater passenger load and a postcrash fire, lives may have been lost. Accordingly, the recommendations from that study and the Federal Aviation Administration's response of May 9, 1975, with updated information as of April 1, 1976, merits repeating. The recommendations and responses are as follows:

Recommendation:

"Require that air carriers report all emergency evacuation slide deployments, failures, and malfunctions to the FAA."

FAA Response:

"A rulemaking project (No. FS-74-47-R) is underway which will revise FAR 121.703 "Mechanical Reliability Reports." Reports of malfunctions or failures of all emergency and survival equipment will be required."

The results of this project are expected in May 1977.

Recommendation:

"Develop a maintenance surveillance program to insure greater reliability of emergency evacuation slide systems."

FAA Response:

"FAR 121.309(b) states, "Each item of emergency and flotation equipment listed in this section and in paragraphs 121.310, 121.339, 121.340, and .309(b)(1) continues: 'Must be inspected regularly in accordance with inspection periods established in the operations specifications to ensure its condition for continued serviceability and immediate readiness to perform its intended emergency purposes.'

"FAR 121.310 requires the installation of emergency evacuation equipment. In addition to the operator's responsibilities for the maintenance of the equipment, our inspectors are charged with similar responsibilities as they relate to each operator's total maintenance and inspection program. We cannot exert all of our efforts toward the surveillance of any one particular area or system. Our surveillance is normally overall with special emphasis directed to specific areas as needs arise.

"For your information, we have contracted for special training for our maintenance inspectors on the maintenance requirements, operation and inspection of emergency evacuation equipment."

A specific inspection program is expected to be developed by December 1977.

Recommendation:

"Amend 14 CFR 25.809 to require that the length of the emergency evacuation slides be such that the angle with the ground renders the slide safe and

usable after collapse of one leg, or more, of the landing gear, and amend 14 CFR 121.310 to require that these new slides be installed after a reasonable date."

FAA Response

"While the requirements contained in FAR 37.175 currently provide that evacuation slides be safe and useable with the collapse of any one or two landing gear legs, we believe that these should be reflected in FAR 25.809 and 121.310. Accordingly, we will initiate rulemaking action to amend FAR 25 and 121 which will cover the usability of evacuation slides during adverse gear collapse conditions."

The FAA plans to complete this project by December 1977.

Recommendation:

"Amend 14 CFR 121.310 to require, after a reasonable date, that emergency evacuation slides on all floor-level exits be automatically inflated upon deployment."

FAA Response:

"FAR Part 25 presently requires each floor level exit more than six feet above ground to be equipped with a slide which automatically deploys and inflates when the exit is opened. FAR 121 requires automatic slides for exits in airplanes currently in service with the exception of passenger entry and service doors. Automatic deployment at opening is required for these doors, but inflation can be accomplished by pulling an inflation lanyard. The fully automatic slide has not been developed to the extent that the time saving for evacuation would justify retrofitting."

Recommendation:

"Amend 14 CFR 25.812 to require that exterior emergency lighting be activated automatically when exits are opened in the emergency mode, and amend 14 CFR 121.310 to require such automatic activation after some reasonable date."

FAA Response:

"We agree with this recommendation and will initiate a rulemaking action under FAR Part 25 to require that exterior emergency lighting be activated when the assist means are erected. We will initiate rulemaking action to amend FAR 121.310, as appropriate, when FAR Part 25 has been amended."

The FAA estimates that the project completion date will be May 1976.

Recommendation:

"Require that the air carriers designate the flight attendant(s) who will be responsible for use of the megaphone(s) during an evacuation, and relocate the megaphone(s) so they are within easy reach of that flight attendant(s)' seat. Consideration should be given to the installation of new, light and compact megaphones to facilitate stowage and use."

FAA Response:

"We agree that air carriers should designate the flight attendants who will be responsible for use of the megaphone(s) during evacuations and relocate the megaphones. We are considering the means by which this can be implemented.

"The present rule is within the scope and intent and provides the authority. We will implement the requirement in the near future and advise."

The FAA expects to complete this project by May 1977.

Recommendation:

"Amend 14 CFR 121.318 to require after a reasonable date, that public address systems be capable of operating on a power source independent of the main aircraft power supply."

FAA Response:

"We will establish a project to amend FAR 121.318, as appropriate, when the proposed revisions to FAR Part 25 have been adopted."

The FAA expects to complete this project by December 1977.

Recommendation:

"Require that air carrier passengers be alerted, during pretakeoff briefings, of the need to familiarize themselves with the procedures involved in the operation of emergency exits."

FAA Response:

"We concur and will issue an air carrier operations bulletin."

The FAA has taken action on this project in its Operations Review and it is expected to be completed by May 1977.

Recommendation:

"Issue an Advisory Circular which would provide standardized guidance to the air transport industry on effective methods and techniques for conveying safety information to passengers."

FAA Response:

"An advisory circular is being prepared which will publicize the FAR's pertaining to cabin and passenger safety in air carrier operations."

The completion date on this project was March 1976.

Recommendation:

"Amend 14 CFR 121.417(c)(4) to eliminate the provision which permits carriers to use demonstrations alone to train crewmembers for certain emergency situations, thus requiring performance of drills in the operation and use of emergency exits."

FAA Response:

"A regulatory project on cabin attendant training has been initiated. It will include the items in the recommendation."

The FAA has taken action on this project in its Operations Review and it is expected to be completed by February 1977.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ WEBSTER B. TODD, JR.
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

March 31, 1976

APPENDIX A

INVESTIGATION AND HEARING

1. Investigation

At 2110 A.s.t. on December 16, 1975, the National Transportation Safety Board was notified of the accident by the Federal Aviation Administration. An investigation team was sent to the scene of the accident, and working groups were established for operations, weather, air traffic control, witnesses, airworthiness, and human factors.

Parties to the investigation were the Government of Japan, Japan Air Lines, Co., Ltd., Federal Aviation Administration, the Boeing Company, and the Division of Aviation of the State of Alaska.

2. Hearing

A public hearing was not held.

APPENDIX B

CREW INFORMATION

Captain Noboru Kaneda

Captain Kaneda, 53, holds Airline Transport Pilot Certificate No. 00102, with type ratings in DC-4, DC-6B, DC-7, CV-880, DC-8, and B-747 aircraft. As of November 30, 1975, he had accumulated about 17,305 flight hours, including 3,252 in the B-747. He had flown about 163 hours within the last 90 days. His last proficiency check was completed on December 2, 1975, and his first-class medical certificate was issued on September 25, 1975.

First Officer Tomoji Tokii

First Officer Tokii, 40, holds Airline Transport Pilot Certificate No. 01373, with type ratings in DC-8 and B-747 aircraft. As of November 30, 1975, he had accumulated about 5,764 flight-hours, including 1,629 hours in the B-747. He had flown 152 hours within the last 90 days. His last proficiency check was completed on November 30, 1975, and his first-class medical certificate was issued on June 23, 1975, with no limitations.

Flight Engineer Jun Nakagawa

Flight Engineer Nakagawa, 25, holds Flight Engineer Certifcate No. 00816 with ratings in DC-8 and B-747 aircraft. As of November 30, 1975, he had accumulated a total of about 1,832 flight-hours, 323 of which were in B-747 aircraft. He had flown 107 hours within the last 90 days. His last proficiency check was completed on September 30, 1975, and his second-class medical certificate was issued on February 10, 1975, with no limitations.

Pursers and Flight Attendants

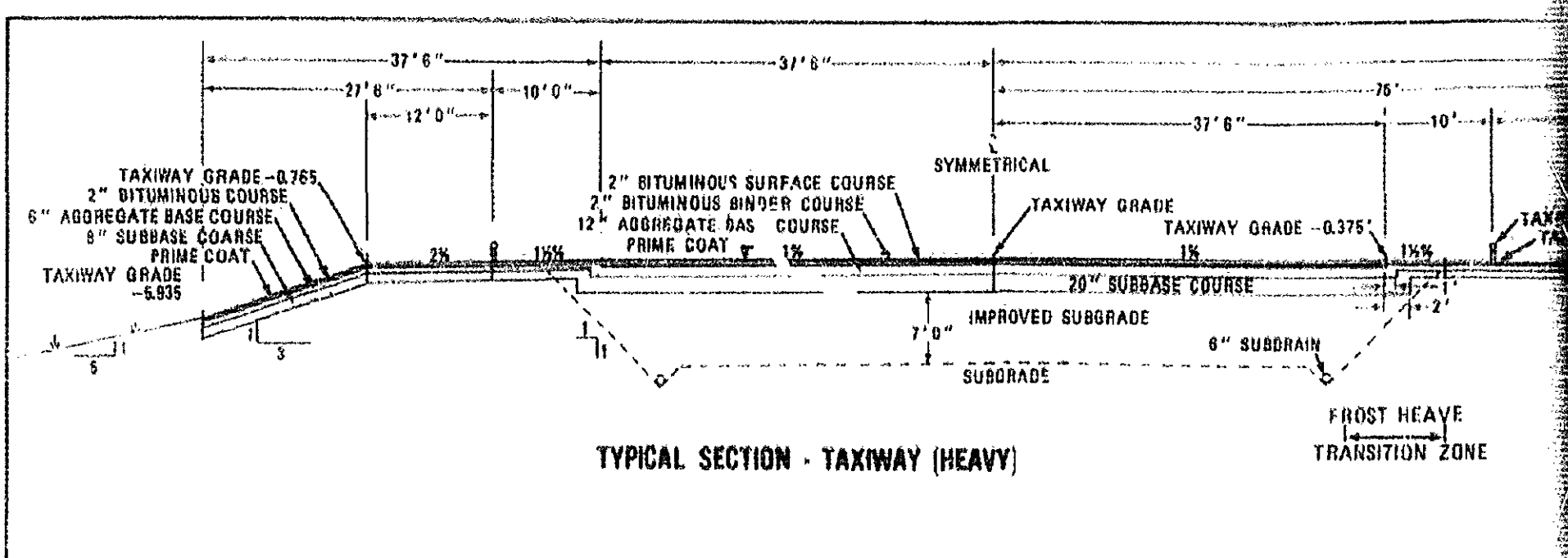
The 17 cabin crewmembers were qualified, and had received recurrent training in 1975. Cabin crewmembers had an adequate rest period prior to the flight.

APPENDIX C

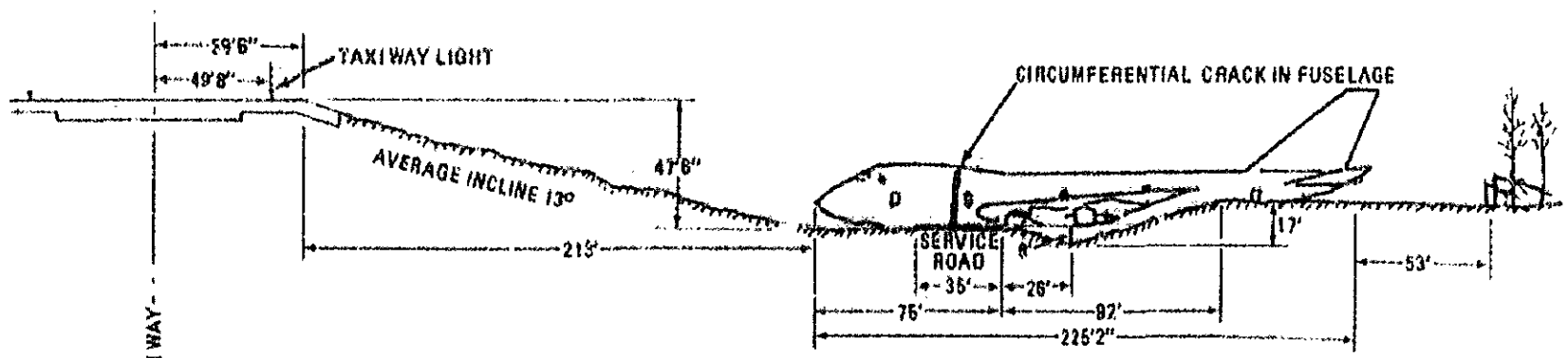
AIRCRAFT INFORMATION

JA 8122, a Boeing 747-246, Serial No. 20924, was manufactured on March 22, 1974, and purchased by Japan Air Lines, Co., Ltd. It had been flown 5,569:16 hours as of December 15, 1975. The last major inspection phase service check "C" was accomplished at about 907 hours. Four Pratt & Whitney JT9D-7 engines were installed as follows:

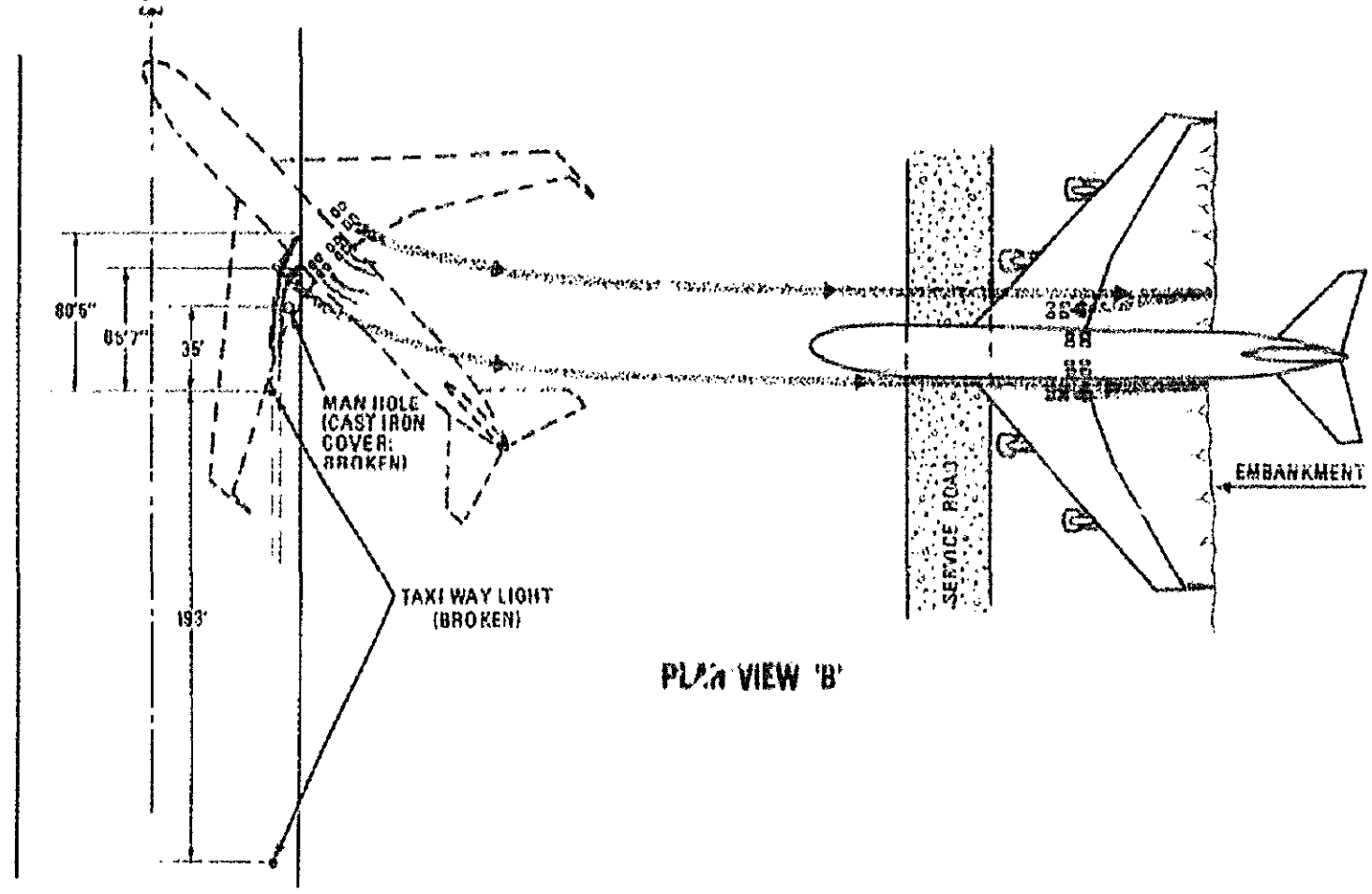
Position	Serial No.	Total Time as of Dec. 15, 1975	Time Since Overhaul
1	662395	12,475:42	On Condition Maintenance
2	685799	8,291:43	"
3	685777	7,920:11	"
4	685766	9,908:22	"



TYPICAL SECTION - TAXIWAY (HEAVY)

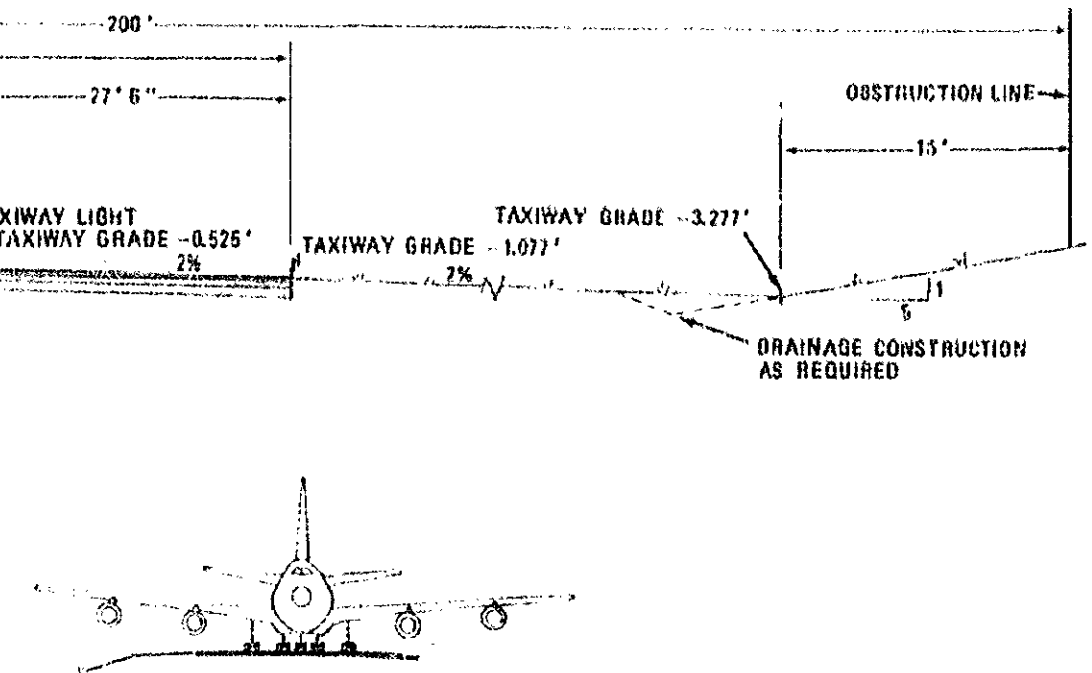


ELEVATION VIEW 'A'

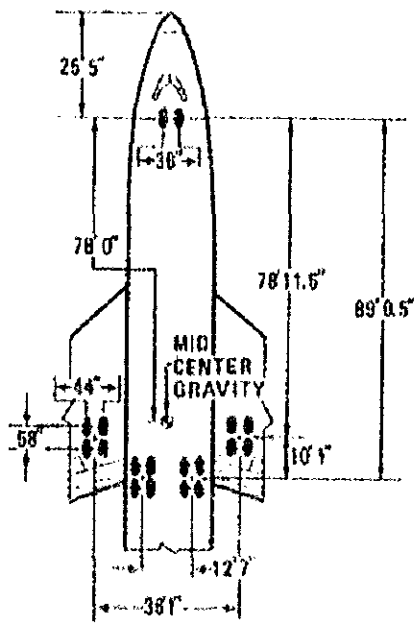


PLAN VIEW 'B'

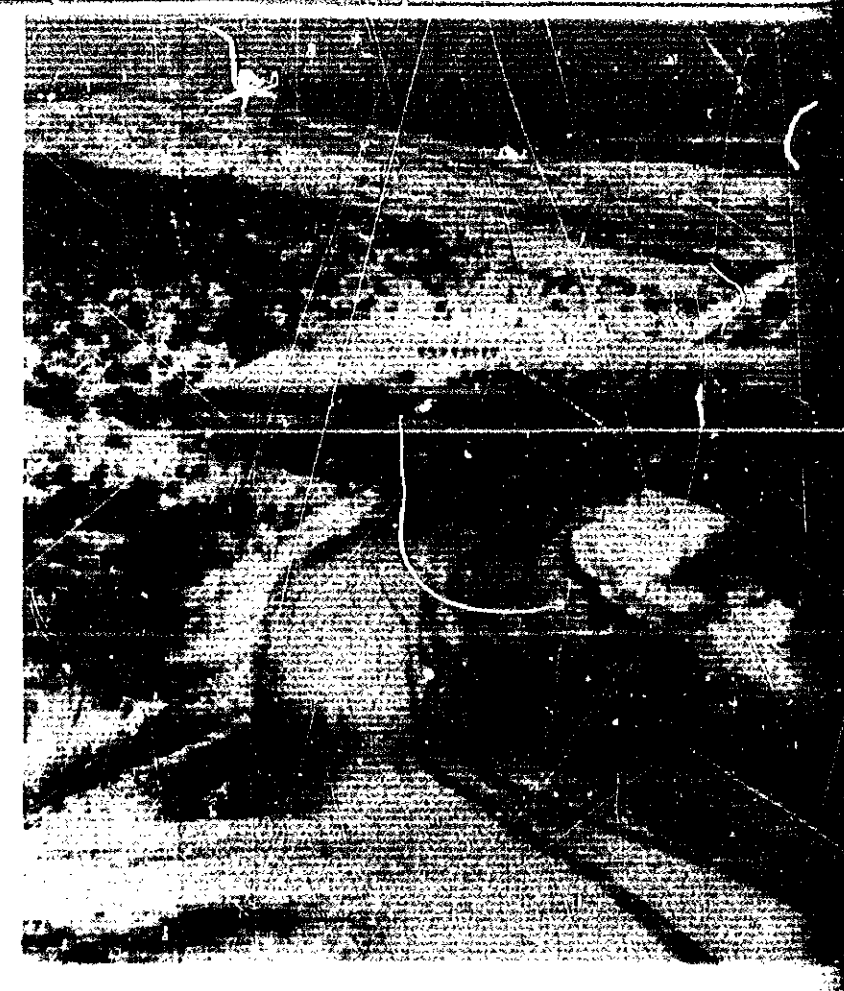
A

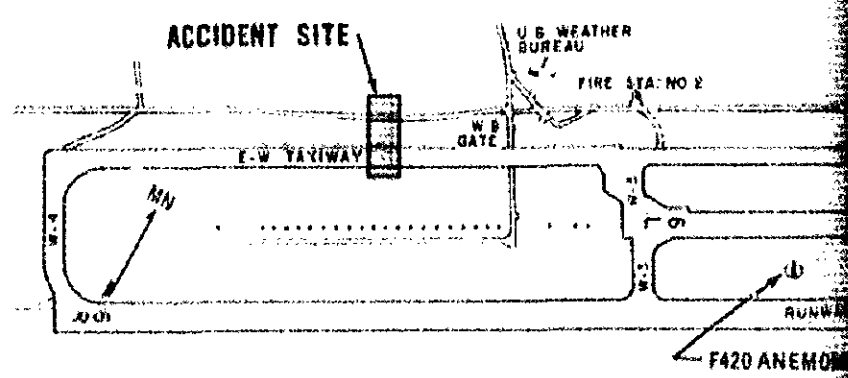


B-747



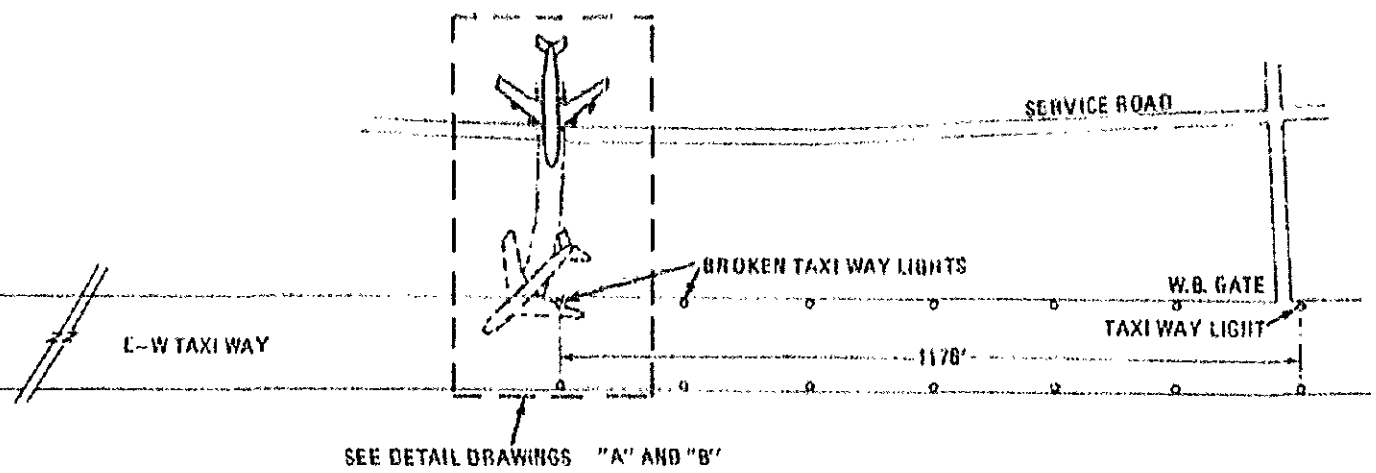
LANDING GEAR GEOMENTRY





F420 ANEMOMETER

PLAN VIEW - RUNWAY



ACCIDENT SITE (SEE DRAWINGS 'A' & 'B')

B

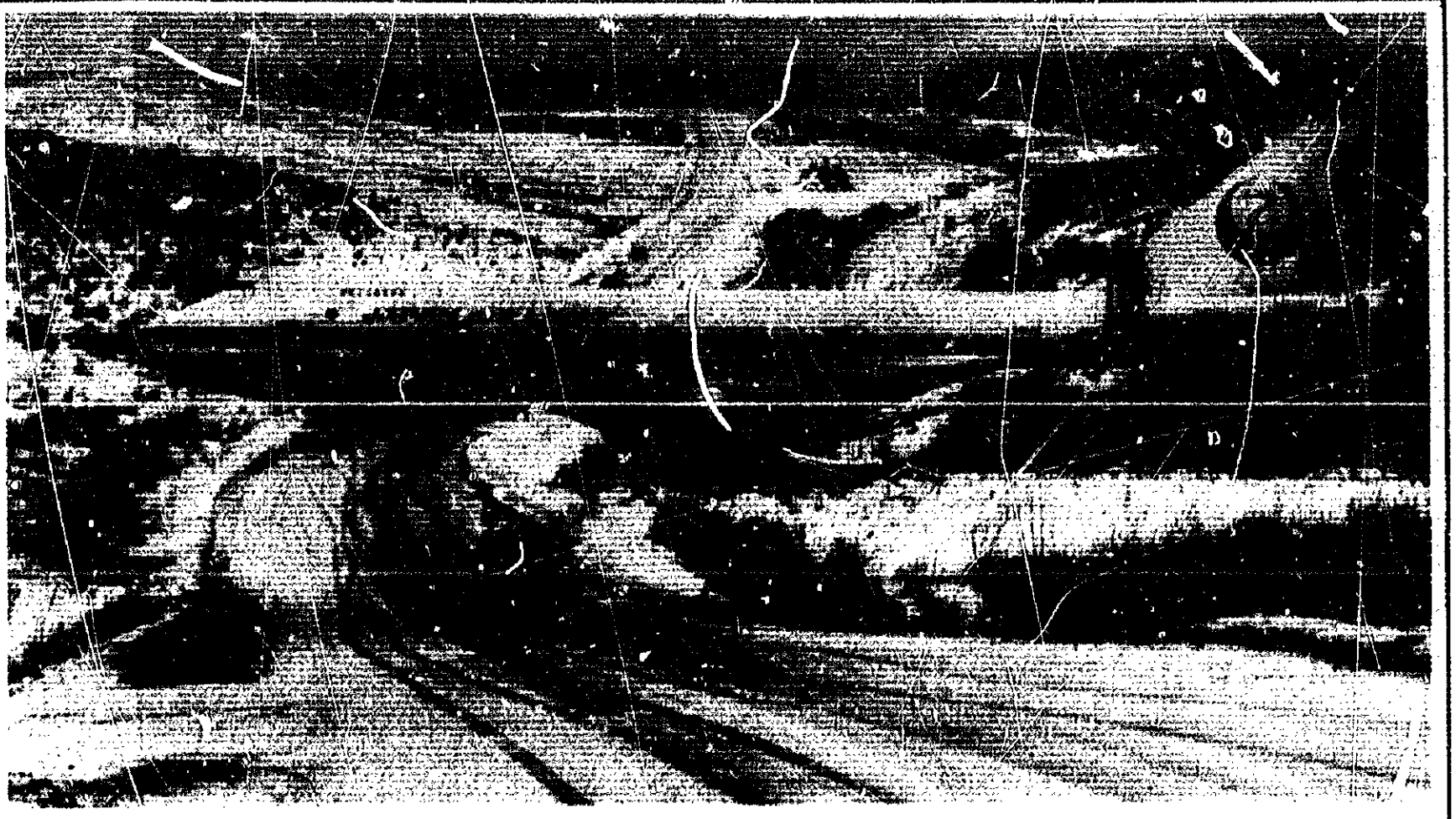
STRUCTION LINE

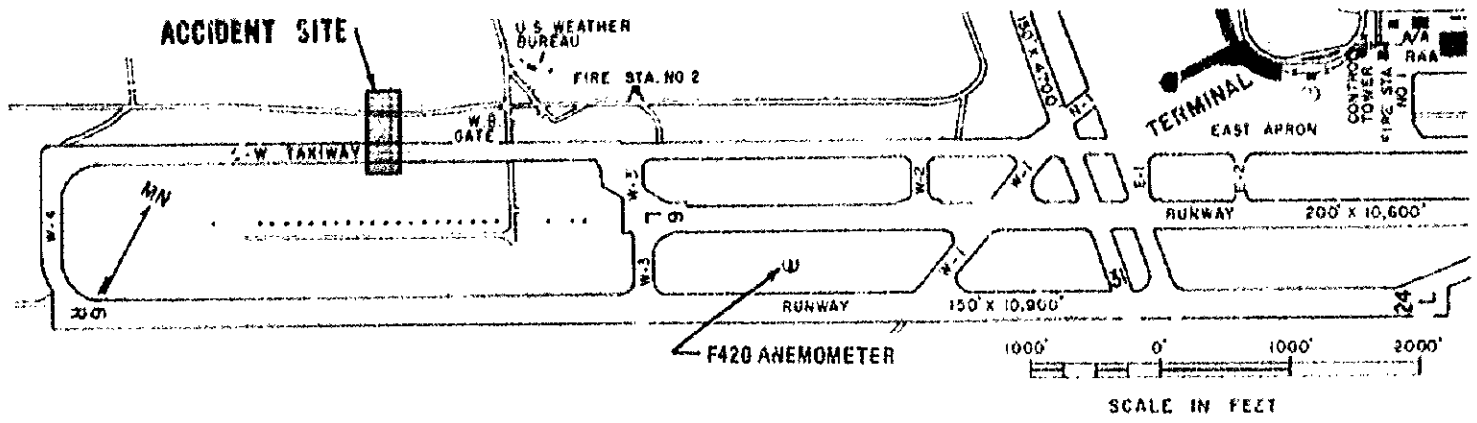
16'

1

6

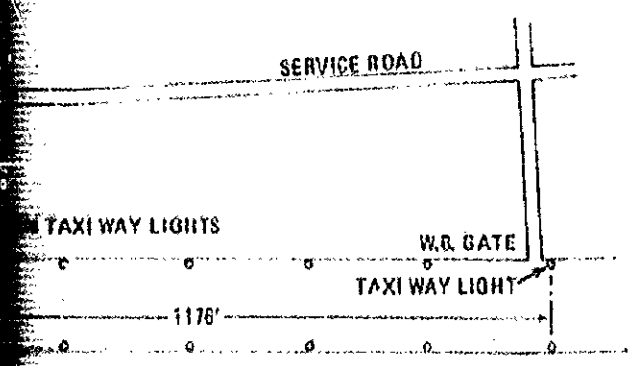
CONSTRUCTION
ED





F420 ANEMOMETER

PLAN VIEW - RUNWAY 6R & E-W TAXIWAY



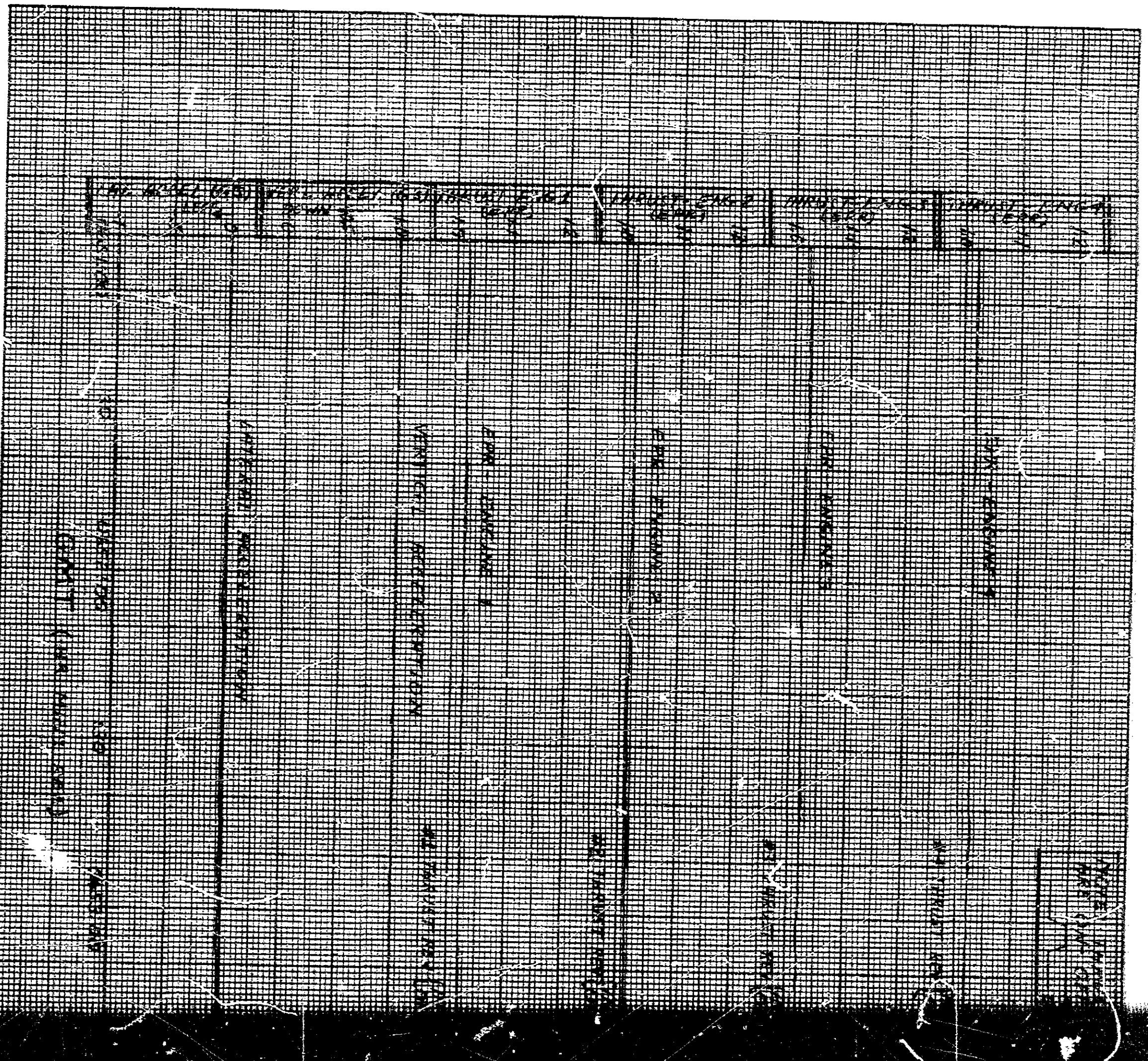
'A' & 'B')

APPENDIX D

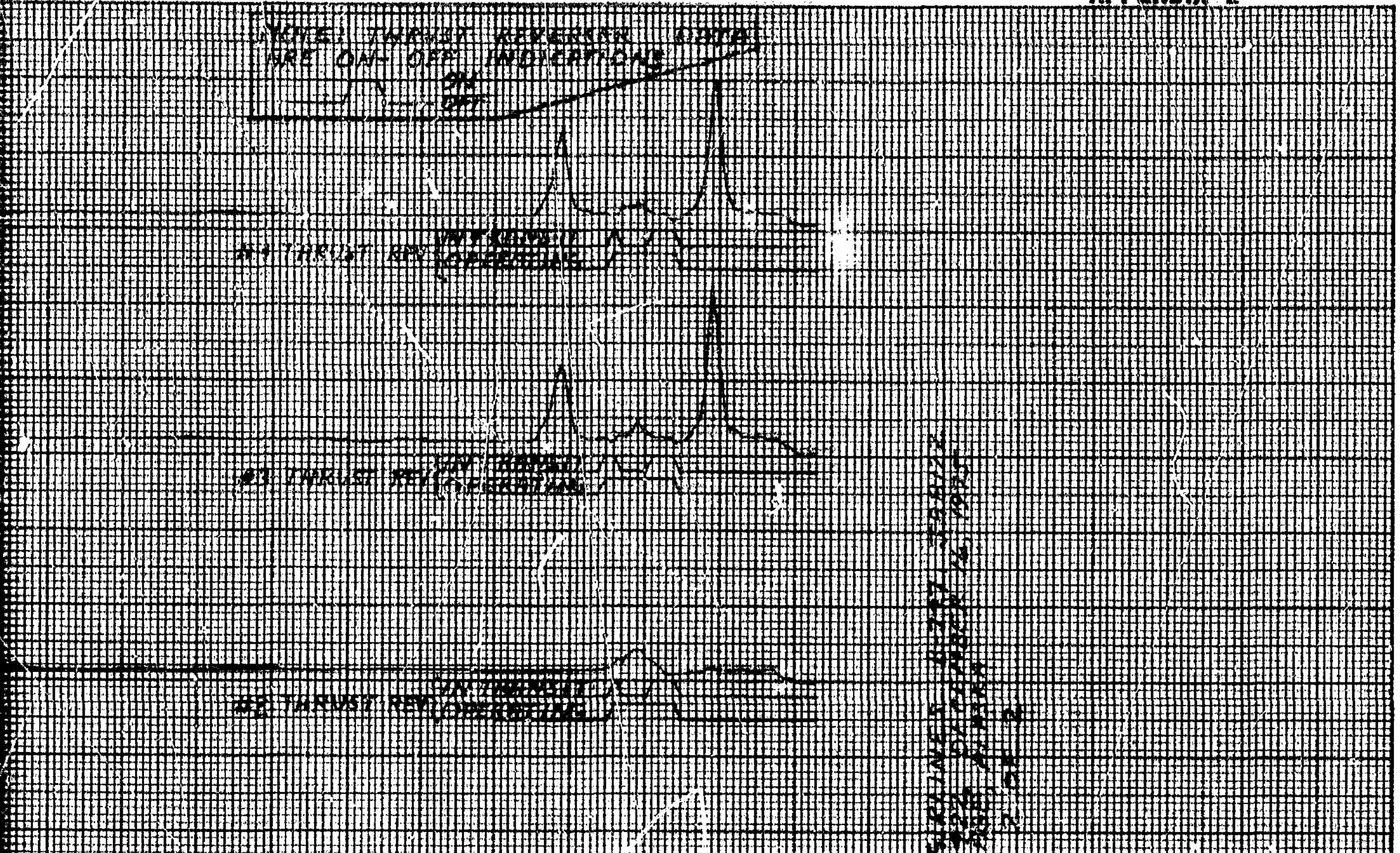
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

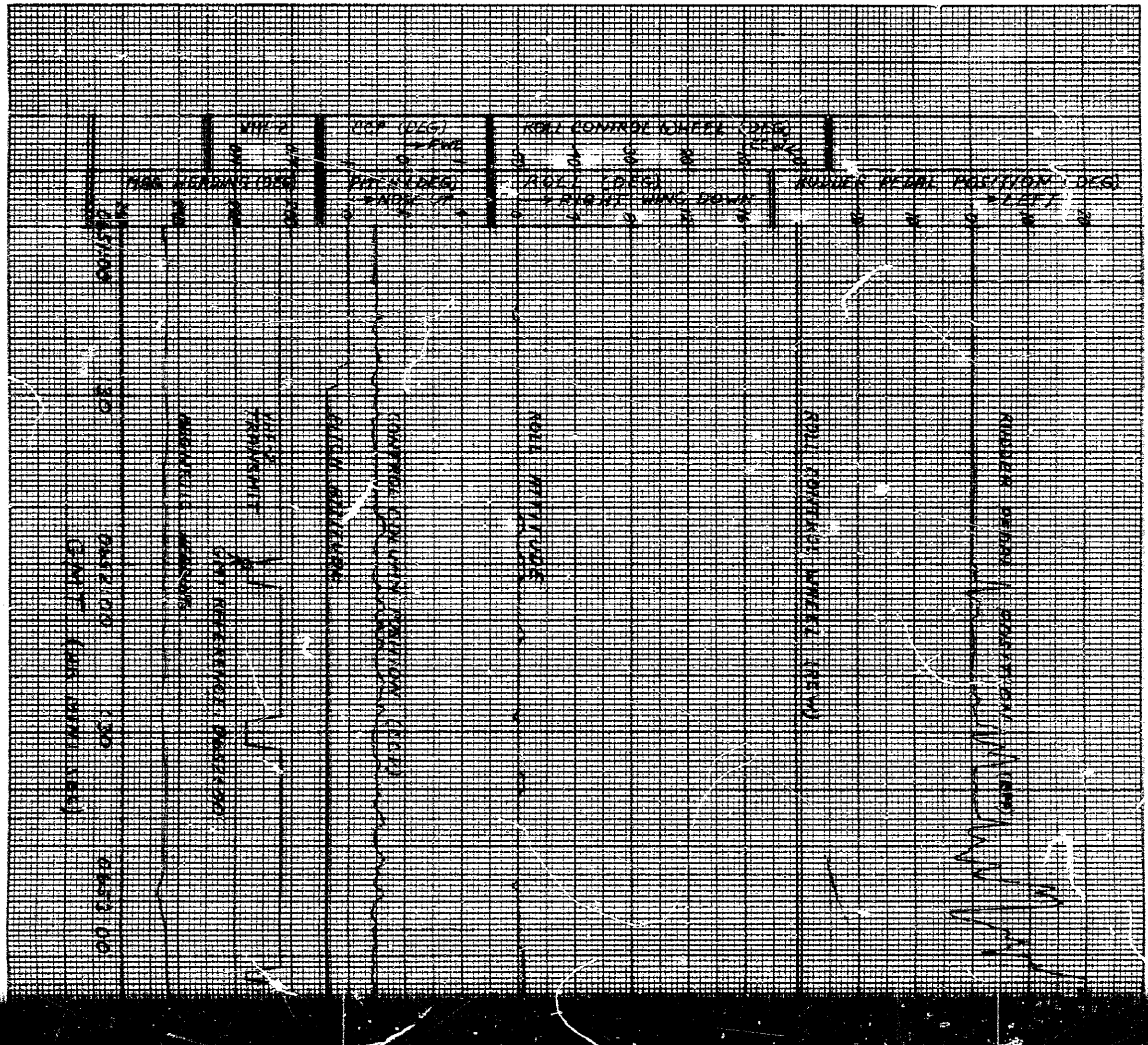
WRECKAGE DISTRIBUTION CHART
JAPAN AIRLINES BOEING 747, JA8122
ANCHORAGE INTERNATIONAL AIRPORT
ANCHORAGE, ALASKA
DECEMBER 16, 1975
ANC 76-A-A052

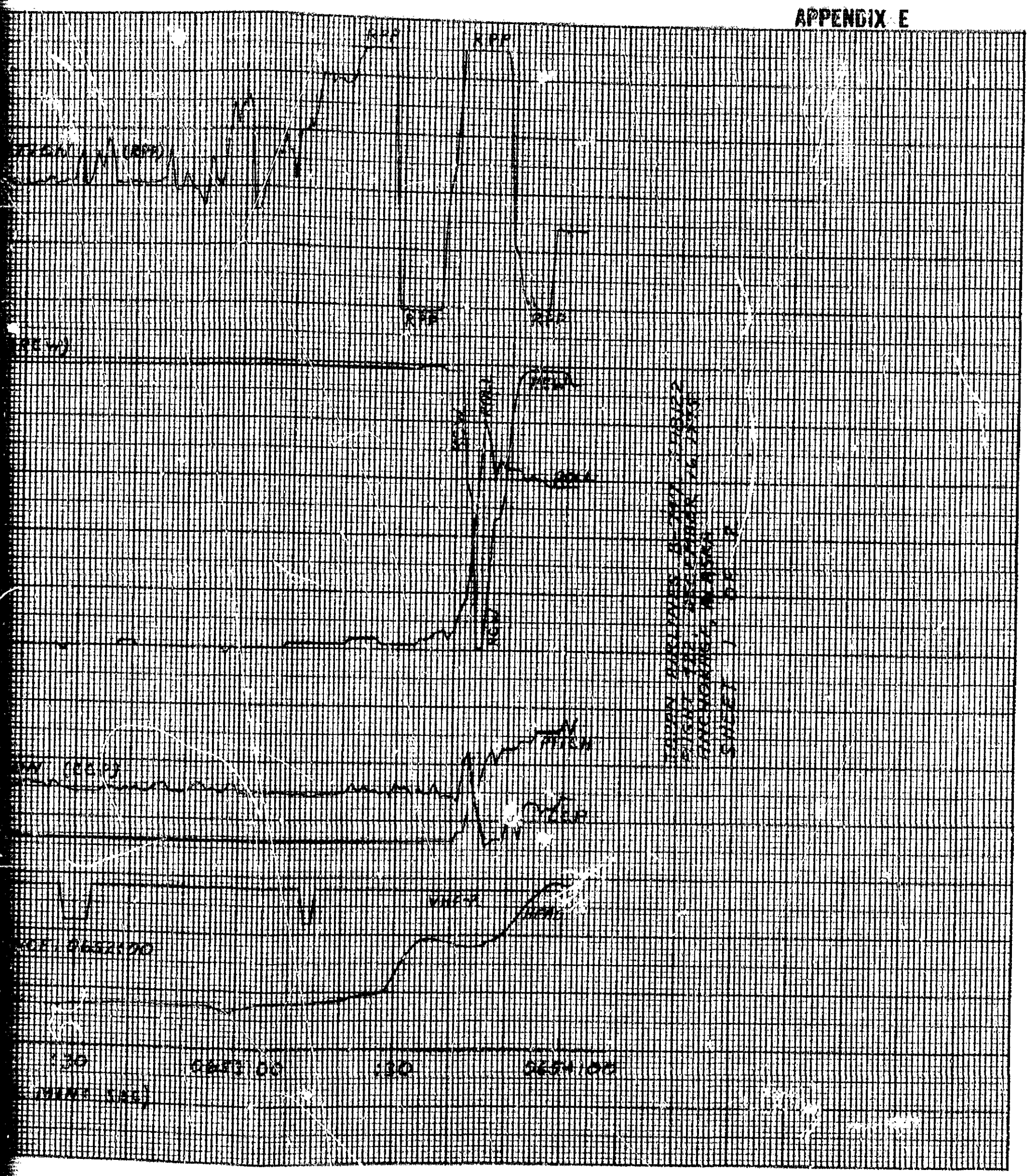
D



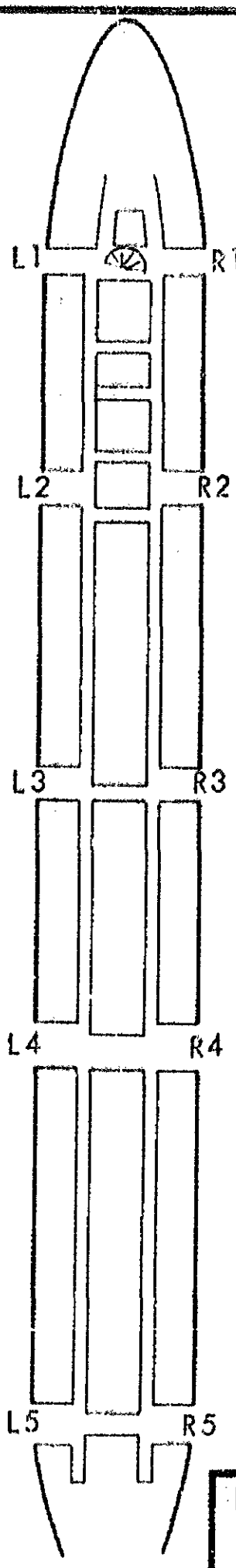
APPENDIX E


NOTE: THRUST REVERSER DATA ARE ON-OFF INDICATIONS
ON
OFF
#4 THRUST REV
IN TRANSIT
OPERATING
#3 THRUST REV
IN TRANSIT
OPERATING
#2 THRUST REV
IN TRANSIT
OPERATING
#1 THRUST REV
IN TRANSIT
OPERATING
130





APPENDIX F



NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

EXIT DIAGRAM
JAPAN AIRLINES ROEING 747, JA8122
ANCHORAGE INTERNATIONAL AIRPORT
ANCHORAGE, ALASKA
DECEMBER 16, 1975
ANC 76-AA-052