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AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

**TRANSMILE AIR SERVICES (Malaysia)
McDonnell Douglas MD-11F, 9M-TGS
OVER THE SEA 30km SOUTHWEST OF CAPE ASHIZURI, KOCHI
PREFECTURE (Japan)
JANUARY 10, 2007**

February 29, 2008

**Aircraft and Railway Accidents Investigation Commission
Ministry of Land, Infrastructure and Transport**

The investigation for this report was conducted by Aircraft and Railway Accidents Investigation Commission, ARAIC, about the aircraft serious incident of Transmile Air Service(Malaysia) McDonnell Douglas MD-11F,9M-TGS in accordance with Aircraft and Railway Accidents Investigation Commission Establishment Law and Annex 13 to the Convention of International Civil Aviation for the purpose of determining cause of the aircraft accident and contributing to the prevention of accidents and not for the purpose of blaming responsibility of the accident.

This English version report has been published and translated by ARAIC to make its reading easier for English speaking people those who are not familiar with Japanese. Although efforts are made to translate as accurate as possible, only the Japanese version is authentic. If there is difference in meaning of the texts between the Japanese version and the English version, texts in the Japanese version are correct.

Norihiro Goto,
Chairman,
Aircraft and Railway Accidents Investigation Commission

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McDonnell Douglas MD-11F, 9M-TGS
OVER THE SEA 30km SOUTHWEST OF CAPE ASHIZURI, KOCHI
PREFECTURE (Japan)
JANUARY 10, 2007, APPROXIMATELY 11:45 JST

January 25, 2008
Aircraft and Railway Accident Investigation Commission
(Air-Sub Committee)

Chairman	Norihiro Gotou
Member	Yukio Kusuki
Member	Shinsuke Endo
Member	Noboru Toyooka
Member	Yuki Shutou
Member	Akiko Matsuo

1 Process and Progress of Serious Aircraft Incident Investigation

1.1 Summary of the Serious Incident

The event covered by this report falls under the category of “Flight Crew Incapacitation due to Illness” as stipulated in Clause 14, Article 166-4 of the Civil Aeronautics Regulations of Japan and, as such, is classified as an Aircraft Serious Incident.

The McDonnell Douglas MD-11F registered 9M-TGS, operated as Transmile Air Services scheduled Flight 8376(Cargo), took off from Anchorage International Airport (U.S.A.) on January 10, 2007 (Wednesday), bound for Hong Kong International Airport (China). At about 11:45JST, while flying at FL 380, over the sea 30km southwest of Cape Ashizuri in Kochi Prefecture, the Second in Command pilot seated in the right pilot seat fell unconscious, consequently the Pilot in Command and Cruise Captain took over the control of the aircraft, changed its destination to Kansai International Airport, and landed there at 12h19m JST.

Of the total five persons on board, consisting of three operating crewmembers and two company staffs, no one was injured.

1.2 Outline of the Serious Incident Investigation

1.2.1 Investigation Organization

On January 10, 2007, the aircraft and Railway Accident Investigation Commission appointed an Investigator-In-Charge and two Investigators for this Serious Incident investigation. Furthermore, on January 23, 2007, the Commission added an aeronautical medical doctor.

1.2.2 Foreign Representative

Malaysia, the state of the Operator and Registry, was informed of the occurrence of this incident. While no representative was appointed, assistance to the investigation was provided.

1.2.3 Implementation of Investigation

January 10 and 11, 2007	Aircraft investigation and Interviews
January 12 to March 16, 2007	Analysis of flight data recorder and cockpit voice recorder
January 16, 2007	Interviews

1.2.4 Comments from Parties Relevant to the Cause of the serious incident

Comments were taken from the parties relevant to the cause of the serious incident.

2 FACTUAL INFORMATION

2.1 History of the Flight

On January 10, 2007, the McDonnell Douglas MD-11F 9M-TGS (hereinafter called “the aircraft”) operated by Transmile Air Services of Malaysia (hereinafter called “the company”) took off from Anchorage International Airport (U.S.A) at 3:07 (Japan Standard Time (JST, UTC+9h, ditto hereinafter) to Hong Kong International Airport (China) as the company’s scheduled cargo Flight 8376.

The flight plan submitted to the Anchorage International Airport Office (FAA) is outlined below.

Flight rules: Instrument flight rules (IFR), Departure aerodrome: Anchorage International Airport, Off-block time: 2:20, Cruising speed: 472kt, Cruising altitude: FL330, Route: NODLE (Position Reporting Point) → R220 (airway) → NICH0(PRP) → NOLTI (PRP) → NIKLL (PRP) → NOGAL (PRP) → NUBDA(PRP) → NIKON(PRP) → GOC (Daigo VORTAC) → W18 (airway) →KCC (Nagoya VORTAC) → V52 (airway) → KEC (Kushimoto VORTAC) → A1 (airway) → ELATO (PRP) → The subsequent portion of the route is omitted. Destination aerodrome: Hong Kong International Airport; Estimated flight time: 12h and 07 min; Persons on board: Five

A total of five persons were on board the aircraft, of which the three were operating crewmembers consisted of a Pilot In Command (PIC), a Co-Pilot who was qualified as PIC (hereinafter called the Second In Command (SIC), and a Cruise Captain*¹ as a relief crew, and the two were Company Staffs (hereinafter called “CS-A” and “CS-B”). When the serious incident took place, Cruise Captain was at the left pilot seat as the Pilot Flying (PF) (crewmember primarily responsible for aircraft control), and SIC was at the right pilot seat as the Pilot-Not-Flying (PNF) (crewmember primarily responsible for other than control).

The flight history of the aircraft from the time of occurrence of the serious incident up to the landing at Kansai International Airport (hereinafter called “the airport”) are summarized below , based on the ATC communication records, statements made by the operating crewmembers and the company staffs and the radar tracking data

2.1.1 Flight History based on the ATC Communication Records

The communications conducted between the aircraft and the Area Control Facility of Fukuoka Air Traffic Control Center (hereinafter called “Fukuoka ACC”), the Terminal Control Facility (hereinafter called “the Approach”) and the Aerodrome Control Facility (of which the Aerodrome Controller is hereinafter referred to as “the Tower” whereas the Ground Controller as “the Ground”) of the Kansai Airport Office (hereinafter called “the Airport Office”) are outlined below.

11:45:22 The aircraft declared a medical emergency to Fukuoka ACC, requesting that the destination be changed to Nagoya.

11:49:09 The aircraft requested to Fukuoka ACC that the destination be changed to the

*¹ Cruise Captain in this report refers to a pilot certificated as cruise captain by the Malaysian Aviation Authority, and is qualified by the company to act as PIC during cruise only and who was engaged in the operation of the aircraft.

Kansai Airport, and Fukuoka ACC initiated radar vectoring of the aircraft.

11:52:36 The aircraft notified Fukuoka ACC that it needed a doctor after landing.

11:59:33 The aircraft requested to the Approach radar vector to RWY24 ILS approach.

12:00:04 The aircraft requested to the Approach medical assistance upon arrival.

12:01:39 The aircraft notified the Approach that the wind was confirmed and RWY24 ILS approach would be conducted.

12:16:25 The Tower issued the aircraft the landing clearance to RWY24, reporting wind direction was 300° and wind speed was 7kt.

12:21:44 The aircraft made a request to the Ground for medical assistance.

12:21:52 The Ground instructed the aircraft to taxi to Spot 36, and informed it that the ambulance be arriving shortly.

The aircraft landed at 12:19. The communication between the crewmembers and the air traffic controllers (hereinafter called “the Controllers”) did not include detailed information concerning the conditions and number of the patient.

2.1.2 History of the Flight based on the statements

(1) Cruise Captain

The SIC and I had been on the same duty schedule since January 2 (Tuesday), 2007, and we had three and a half days of rest period before departing Anchorage on board the aircraft. The SIC did not mention any physical anomalies, such as a headache, before the flight and during the flight.

We departed Anchorage International Airport, with the PIC taking the left seat as pilot flying (PF), and I taking the right seat as Pilot-Not- Flying (PNF), while the SIC took one of the rear seat in the cockpit. After the aircraft took off, the SIC entered his first rest.

Approximately four hours after takeoff, operating crew changed, by which I entered my rest, and the SIC took the right seat as PNF.

About eight hours after takeoff, operating crew changed for the second time, by which the PIC went to the rest compartment to take his rest and I took the left seat as PF. The CS-A was on one of the rear seat of the cockpit while the CS-B was still in the rest compartment.

After the PIC went for his rest, the aircraft entered under control of Fukuoka ACC. When we were flying on airway A1 at FL 380, I took over radio communications as the SIC looked somewhat tired. We talked a little, then I proposed to the SIC to consider climbing to FL 400. At once the SIC looked at me and smiled, but did not respond. I thought it a little strange but I assumed that he understood and agreed. Two or three minutes later, the SIC suddenly made a large voice. I felt that something quite abnormal happened to him, so I looked at him and found that his entire body got stiff. It was about 11:45, and the navigation display^{*2} was showing that our position was approximately 170 miles southwest of the airport. Unfortunately, his legs were on the rudder pedals, he extended his legs irregularly while trembling. As his movement became control input, the aircraft yawed left and right.

I made the CS-A in the rear seat of the cockpit goes and gets the PIC and at the same time I decided to quickly land at the nearest airport and to declare a medical emergency. I informed

^{*2} Navigation display is an electronic instrument that can display flight route on the horizontal plane, course and position of the aircraft, and position of airport, navigational aid facilities.

Fukuoka ACC as such and got a clearance to change the destination to Chubu International Airport, and then I set autopilot heading to the directed course by right turn. With the help of the CS-A who had returned to the cockpit, I moved the SIC's seat backwards and reclined the seatback to pull SIC's legs out of the rudder pedals. I requested the change of destination to Chubu International Airport because I had experience to land there before. However, the Kansai international airport was found nearer. I informed the PIC of it who had just entered the cockpit, and he took the left seat instead of me. Then, together with two company staffs, I removed the SIC from the seat and carried him to the rest compartment and laid him flat on the mat on the floor. The SIC vomited around there. After ensuring that his mouth was clear, I supplied oxygen to him. Leaving him in the care of two company staffs, I returned to the cockpit and took the right seat as PNF.

Because the occurrence was a medical emergency, the PIC took flight controls as usual and the flight continued completely normally, the ATC transponder was not set to emergency code. A clearance to descend had already been issued, and the aircraft was radar vectored to an approach course of the airport. Via MAYAH, then ILS approach, the aircraft landed onto RWY24 at 12:19. Although the shorter approach to RWY06 was recommended by the ATC, we did not take it because we were sufficiently close to the airport and we would have to land with strong tailwind, with a wind direction of 290° and a wind speed of 10kt. We requested the Approach for medical assistance for SIC while on the approach course and made the request again to the Ground after landing.

After landing, the engines were stopped on the parking spot, then a boarding bridge was connected and personals including the rescue squad came on board.

(2) PIC

I took the left seat as PF and made a takeoff from Anchorage International Airport. The weather was no problem, the aircraft climbed step by step from FL330 initially, and we were flying normally. During the flight, there were no signs to make us suspect SIC of health problem. After I gave PF role to Cruise Captain on the second operating crew change, and I was sleeping in the rest compartment.

Suddenly, I felt the fuselage sway, and again. So I thought something abnormal happened, and I got up, when CS-A came in from the cockpit to call me. Entering the cockpit, I found that SIC was unable to speak and pushing the rudder pedals with his both legs, and that Cruise Captain and CS-A were moving SIC's seat aft ward and making seatback to recline backwards.

Cruise Captain had already declared a medical emergency to Fukuoka ACC, and the aircraft had started turning into the instructed course. I took over the controls from Cruise Captain, requested and was permitted to change destination to the airport and made descent at high speed by radar vector. Runway 06 was closer but with a tailwind, we made an ILS approach and landed onto RWY24, with a head wind.

(3) CS-A

CS-B and I had finished training in Los Angeles and were on our way home to Malaysia.

On the second operating crew change, PIC take his rest in the rest compartment. I went to and was taking rest on the right rear seat in the cockpit. As Cruise Captain told me, "Wake up, wake up" while pushing the back of my seat, I woke up. I saw that SIC was badly trembled with his whole body and pushing the rudder pedals with his both legs. Cruise Captain had me call PIC, who immediately came into the cockpit and took over the seat from Cruise Captain.

Cruise Captain, CS-B and I carried SIC into the rest compartment and laid him on the mat, where he vomited. Three of us cleared his mouth, made him breathe oxygen. Though still unconscious and trembling, SIC began to breathe normally, and seemed got out of danger of life. 15 to 20 minutes after fallen unconsciousness, SIC regained consciousness, became able to walk, went to the lavatory, washed his shirt by himself, and stayed sat on seat in the rest compartment.

(4) SIC

I have taken semi-annual aviation medical examination and also annual health check, in which nothing wrong was found. I have taken the aviation medical examination in my home country, Brazil, where mental and neurological checks were conducted with mere questions about my health over the previous six months, and CT^{*3} scans or MRI^{*4} scans are never used.

A year and a half ago, I staggered and fell down while shopping in Brazil, so I took a CT scan which resulted in nothing abnormal.

I had had three-and-half day off-duty time before this flight, in which I had slept for seven hours the day before, got up at about 5:30 local time (23:30 JST, January 9) that day. I went to the airport without having breakfast, but I felt nothing unusual about my health.

Of the three operating crewmembers on this flight, I was the first to take rest, so sitting on a rear seat of the cockpit, trying to get some sleep, but could not actually sleep. At about two hours after takeoff, I ate some fruit for breakfast. At about four hours after takeoff, I took the right seat as PNF. At about eight hours after takeoff, as a result of the second operating crewmember change, PIC started his rest, I stayed in the right seat as PNF, and Cruise Captain took the left seat as PF.

I had a light lunch, and although I had felt no physical irregularities up to that point, I suddenly felt a headache. I clearly remembered what happened after landing, but my memory up to the landing was not clear.

(5) Chief Air Traffic Controller of Kansai Airport Office

The information of diversion (destination change) of the aircraft due to a medical emergency was received by Fukuoka ACC and the Fukuoka ACC controller informed the tower controller of the airport office by telephone. No details on the medical emergency were provided.

At 12:20, the tower controller notified the fire station of Izumisano city via a 119 emergency call on the public phone line.

The aircraft again asked the Ground confirmation of the arrangement of an ambulance, and the ground controller replied, "We have called an ambulance, and are waiting for its arrival". In cases of medical emergencies, the information is usually received by the approach controller, then forwarded to the tower controller, from the tower controller to the Airport Operations Department (hereinafter "the KIAC Operation") of Operation Headquarters of Kansai International Airport Co., Ltd. (hereinafter called "the KIAC"), further forwarded to a company which provides ground handling service, and the company prepares acceptance of

^{*3} CT stands for Computed Tomography, an examination method which uses medical instruments for taking sectional X-ray photographs to find abnormalities inside the body.

^{*4} MRI stands for Magnetic Resonance Imaging, an examination which uses medical instruments that obtain pictures using nuclear magnetic resonance to find abnormalities inside the body.

aircraft. Because the ground handling company is to arrange an ambulance, the tower controller has not done it before. The agreement with the KIAC and Kansai Airport Office states that the tower controller, when requested an ambulance and the like, should notify the KIAC Operation.

This time in accordance with the agreement, the tower controller made a request for an ambulance to the KIAC Operation, but was told to notify the Fire Station. Therefore, he notified the Communication Room of the KIAC Fire Station (hereinafter called “the KIAC Fire Station”) , but was told “As we don’t have any ambulance, make the request directly” He therefore once again asked the KIAC Operation, and was once again told “Make the request to the KIAC Fire Station” from the tower controller. Once again, via a direct line, the tower controller called up the KIAC Fire Station, and was told “Make 119 emergency call”. Finally, the tower controller made the 119 call.

2.1.3 Radar Tracking Records including the Occurrence of the Serious Incident

The aircraft was in level flight on air route A1 at FL 380 to the southwest. At around 11h46m, over the sea approximately 47 km to the southwest of Cape Ashizuri, the aircraft made a right turn, passed KARIN (PRP: Position Reporting Point), and MAYAH (PRP), and landed at the airport. (See Figure 1)

This serious incident occurred over the sea approximately 30 km southwest of Cape Ashizuri in Kochi Prefecture (Latitude 32° 37′ North and Longitude 132° 42′ East) at an altitude of FL 380, at approximately 11:45. The aircraft was later operated by the PIC and Cruise Captain, and landed at the airport at 12:19.

The aircraft parked at Spot 36 at 12:24, and SIC was carried to a hospital by an ambulance. (See Figure 4)

2.2 Crew Information

(1) PIC	Male, Age 56 years
Certificate validation ^{*5}	(Issued by Malaysia)
	Airline transport pilot, Captain, for MD-11 operated by Transmile Air Services
Validity	February 28, 2007
	Transport pilot competence certificate (airplane) (issued by the Republic of Korea)
	May 22, 1993
Type rating for MD-11	November 20, 1991
	1 st class aviation medical examination certificate (issued by the Republic of Korea)
Validity	February 28, 2007
Total flight time	Approximately 12,000 hours 00 minutes
Flight time for previous 30 days	27 h and 13 min.
Flight time on the aircraft type	Approximately 7,000 h and 00 min.

^{*5} “Certificate validation”, according to Annex 1 to the Convention of International Civil Aviation, means that concerning a license issued by a contracting state of the Convention, another states validates the license having the equivalent effect to its own license and issues its own certificate as to a certain matter in accordance with its own laws and regulations.

Flight time for previous 30 days (Flight time is according to self-declaration)	27 h and 13 min.
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(2) SIC	Male, Age 47 years	
Certificate validation	(issued by Malaysia)	
Airline transport pilot, Captain, for MD-11 operated by Transmile Air Service		
Validity		February 28, 2007
	Transport pilot competence certificate (airplane)	(issued by Brazil) February 7, 1996
Type rating for MD-11		February 7, 1996
	1 st class aviation medical examination certificate	(issued by Brazil) February 28, 2007
Validity		February 28, 2007
Total flight time		14,865 h and 52 min.
Flight time for previous 30 days		57 h and 41 min.
Flight time on the aircraft type		2,415 h and 40 min.
Flight time for previous 30 days		57 h and 41 min.

	(3) Cruise Captain	Male, Age 35 years
Airline transport pilot certificate (airline)	(issued by Malaysia)	February 13, 2004
Type rating for MD-11	Cruise Captain	March 30, 2004
	1 st class aviation medical examination certificate	(issued by Malaysia) January 31, 2007
Validity		January 31, 2007
Total flight time		4,673 h and 24 min.
Flight time for previous 30 days		90 h and 54 min.
Flight time on The aircraft type		589 h and 24 min.
Flight time for previous 30 days		90 h and 54 min.

2.3 Aircraft Information

Type	McDonnell Douglas MD-11F
Serial Number	48486
Date of manufacture	August 21, 1992
Airworthiness certificate	M.1056
Validity	September 27, 2007
Total flight time	44,492 h and 00 min.
Flight time since periodical inspection	(1A+2A+5A check on November 27, 2006) 472 h

(See Figure 2)

2.4 Meteorological Information

(1) High altitude weather conditions

According to the “Asia 200 hPa Altitude/Temperature/Wind/Tropopause weather chart” issued at 09:00 on January 10, wind was from west-southwest at about 150 kt, temperature was minus 54°C, at an altitude of 39,700 ft near the place where this serious incident occurred.

(2) Aviation routine weather report at the airport

The aviation routine weather report prior to landing of the aircraft was as follows,

12h00m Direction of wind... 270°, Velocity of wind... 9 kt, Prevailing visibility... 40 km,
Clouds: amount... ¼, type...cumulus, ceiling... 2,000 ft,
Temperature...10°C, Dew point...-2°C, Altimeter setting (QNH)... 30.27 inHg

2.5 Information on Flight Data Recorder and Cockpit Voice Recorder

2.5.1 The aircraft was equipped with a digital flight data recorder (part number: S800-2000-00, hereinafter called “the DFDR”) manufactured by Fairchild Co. of the USA, and a cockpit voice recorder (part number:93-A100-80, hereinafter called “the CVR”) manufactured by Fairchild Co. of the USA.

The records when this serious incident occurred were retained in the DFDR. The VHF transmitter keying signals recorded in the DFDR were compared with the NTT time signals and the communications in the ATC records, thereby DFDR time was corrected.

The CVR is capable of recording for 30 minutes and the records on the serious incident were overwritten and not retained.

2.5.2 DFDR records including the Occurrence of the Serious Incident

The aircraft was flying by autopilot when the serious incident took place, and the data recorded during the period from 11:44:56 to 11:45:10 indicates rudder movement of approximately 4° at the maximum to the right and 5° at the maximum to the left, roll attitude change of approximately 8° at the maximum to the right and 11° at the maximum to the left, and heading change of approximately 3° at the maximum to the right and 2° at the maximum to the left. The cabin altitude at that time was recorded as approximately 7,000 ft. (See Figure 3)

2.6 Medical Information

The doctor in charge of the hospital where SIC was carried, stated as follows.

Persons concerned had informed us that SIC had lost consciousness during the flight and his entire body has got stiff and been convulsing, but he regained consciousness when arrived at the hospital. As a result of CT scan and MRI scan, we diagnosed that brain tumor was suspected. The tumor was pressing the brain considerably, so we treated him with a drip transfusion to lower the brain pressure. If nothing is done, the condition will aggravate up to the possibility of loss of life, so we recommended him to undergo an operation as early as possible. The tumor was relatively large, but the period in which it took to grow to this size, cannot be estimated. If no treatment is given, it is highly possible for him to suffer trembling, spasms or other symptoms suddenly, and it is considered that changes in air pressure are not good to suffer such symptoms.

Concerning his collapse about a year and a half ago, he said to have undergone CT scan and that no problems were found as a result. Diseases such as anemia are quite common, so, the collapse cannot be determined linked to the brain tumor.

Brain tumors rarely show apparent symptoms until the condition aggravates, making it hard to diagnose without a profound examination with CT or MRI scan. MRI scan can spot them if they are as large as 5 mm in size in my opinion. There is no prevention measure against tumor itself, but it is considered that undergoing periodical examinations including CT scan make it possible to find tumors at their early stage.

2.7 Rescue Information

2.7.1 Responses to the aircraft on the Ground

(1) History

Based on the records of the Airport Office, the KIAC Operation and the ground handling company, responses to the aircraft on the ground, are outlined as follows.

Approx. 11:50 The tower controller of the Airport Office informed the KIAC Operation that the aircraft had changed its destination to the airport due to a medical emergency.

Approx. 11:58 The tower controller of the Airport Office made a request to the KIAC Operation for an ambulance, but the KIAC Operation responded to ask the tower controller to make the request to the KIAC Fire Station.

Approx.12:00 The Airport Office and the KIAC made inquiries to the ground handling company as to whether it would handle the aircraft.

Approx. 12:10 The ground handling company decided internally to accept the ground handling of the aircraft, and the information was internally distributed and the work was ordered.

Approx. 12:20 The tower controller made a 119 call to ask for an ambulance. Parking spot 36 was assigned.

(2) Response of the KIAC Operation

The KIAC Operation is in charge of the services such as entry permissions, parking spot operations. It was notified at 11:58 of a medical emergency from the tower controller, and it asked ATC Operation Information Officer of the Airport Office about which company would provide ground handling service for the company(Trasmile), but was told that it was not clear at that time. Then it asked each airline operating at the airport, but none knew which company is providing ground handling service to the company (Trasmile). Shortly thereafter, it found a company that had been providing such service at Chubu International Airport when the company (transmile) was operating there, and that company was asked to accept the ground handling. It took about ten minutes for communication with each airline, and then about eight minutes for asking the ground handling company for the service. It was about 12h16m when we finally confirmed to choose a ground handling company. Furthermore, it took another three minutes to provide the information to the company.

Parking spot 36 was chosen because of its proximity to the ground handling company and because it could be connected with the Passenger Terminal, and also because of its planned length of vacancy time.

At about 12:19, almost the same time as the aircraft's landing, it called the tower controller of the Airport Office and told him that Spot 36 had been assigned for the aircraft.

In usual cases, the ground handling company is in charge of the arrangement for ambulance and CIQ*⁶ procedures, while the KIAC Operation is in charge of calling the KIAC Fire Station for arranging fire fighting service.

2.7.2 Response of the Fire Station (Ambulance)

(1) History

At 12:20, the command office of the Izumisano City Fire Station was notified by 119 call from

*⁶ CIQ is an acronym for Custom, Immigration, and Quarantine, meaning procedures and formalities required for all sorts of transnational traffic.

the control tower of the airport, “An ambulance is requested because a crewmember of an arriving aircraft needs medical assistance but the details of his symptoms are not yet known. The aircraft has just arrived, there’s no time, so please come quickly. It is a Malaysian airplane which belongs to Transmile. The parking spot has just been assigned, it’s 36.”

The operation continued as follows:

12:20 Upon receiving the phone call, the ambulance set out with the rescue team.

12:23 The ambulance arrived at parking spot 36.

12:24 The aircraft arrived at parking spot 36.

12:28 A boarding bridge was connected to the aircraft and the rescue team made contact with the emergency patient. They observed that the SIC was clearly conscious and able to walk, and that he refused to be carried by an ambulance. PIC and other crewmembers persuaded him undergo a medical examination at the hospital as he had been unconscious for about 15 minutes and was suffering from a headache and nausea. SIC agreed with their advice, whereupon, we were told by a staff of the ground handling company to wait for the arrival of a doctor from quarantine, so we had to wait. The quarantine doctor arrived and got permission to carry him to the hospital, but the ground handling company took time to confirm his credit cards and identification documents.

13:13 Only SIC rode on the ambulance, the hospital was notified.

13:15 A crewmember and a staff of the ground handling company were searched and asked to accompany SIC.

13:20 The ambulance became ready and headed for the hospital.

13:28 The ambulance arrived at the hospital.

It took 56 minutes from the time of aircraft’s arrival at the parking spot until the ambulance’s departure for the hospital.

(2) Response to This Serious Incident

According to the oral statements by the Fire Station personnel, the Ground organization’s ambulance related response to this serious incident was as follows:

As the company was not an airline which served at the airport, the tower controller requested for the ambulance himself, the parking spot was not initially assigned, and the CIQ had not yet arrived. Usually the ground handling company notifies medical emergencies to the Fire Station via 119 call and the like, and officers of quarantine and custom are already standing by at the entrance of the airplane by the time the rescue team carries the patient to a hospital.

2.8 Miscellaneous

2.8.1 The Company Procedures in case of Flight Crew Incapacitation

The “Flight Operation Policy Manual” of the company describes as follows.

3.2.4 FLIGHT CREW INCAPACITATION

Assuming that two pilots are carried the recovery from a detected incapacitation of the handling pilot shall follow the sequences below.

a. The fit pilot must assume control and return The aircraft to a safe flight path;

b. The fit pilot must take whatever steps are possible to ensure that the incapacitated pilot cannot interfere with the handling of The aircraft. These steps may include involving the Flight Engineer or non-crew member restrain the incapacitated pilot;

c. *The fit pilot must land the aircraft as soon as practicable to ensure safety of the occupants.*

The Two Communication' rule of thumb should be invoked to assist in detecting incapacitation. The Two Communication' rule of thumb states that a flight crew member should suspect the onset of incapacitation any time when a pilot does not respond appropriately to a second verbal communication associated with a significant deviation from a standard operating procedure or flight profile.

2.8.2 Response of the Controller to the Medical Emergency

“The Air Traffic Control Procedure Standards” set forth by the Civil Aviation Bureau, Ministry of Land, Infrastructure, and Transport outlines the procedures, minimum standards and terms with which a controller has to comply in performing ATC service, flight information service, and security & rescue service in a correct and assured manner. Although there is no description for the term ‘medical emergency’, there is the following description: (extract, tentative translation)

(I) General Rules

1 Purpose and Application

(2)e The Controller, in case of encountering the situation not defined in the Standards while on duty, shall handle the case based on the best possible judgment.

(V) Emergency Procedures

3 Control Procedures

(1) An airplane is handled with priority in ATC service in a following situation:

e When an aircraft reports a serious or unexpected patient on board, and requests for a priority handling.

Note that there is not definition for the term “medical emergency” in ICAO.

2.8.3 Agreement on the Operation and Management of Kansai International Airport

“The Supplement to the Agreement on the Operation and Management of the Kansai International Airport” between the Airport Office and the KIAC includes the following:

Note that the “Operations & Management Department” here refers to the Airport Operations Department, Operations Headquarters of the KIAC, whereas the “Control Facility” refers to the Air Traffic Control Facility of the Kansai Airport Office. (Tentative translation)

9. Operation Information of Aircraft

(1) The Operations & Management Department shall in advance coordinate with the Control Facility for parking a diverted aircraft on the movement area.

(2) The Control Facility shall, in case that an aircraft has an emergency such as unexpected patient on board, and if the aircraft requested such as an ambulance to stand by, inform the Operation & Management Department of such a request.

(3) The Control Facility shall inform the Operations & Management Department of the following items concerning emergency aircraft (In absolute eminence, known facts only);

a. Aircraft radio call sign and its type

b. Nature of emergency conditions

c. Remaining fuel (in terms of time)

d. Latest position, estimated landing time and landing runway

e. The number of persons on board

f. Other relevant information

2.8.4 KIAC Work Assignment

The KIAC Operations Headquarters has the Security Department and the Airport Operations Department and their work assignment is indicated on the table hereunder. The table shows only works relevant to this serious incident. The work relating to ambulance service is assigned to the KIAC Security. (Extract, tentative translation)

<i>Division</i>		<i>Assignments</i>
<i>Operations Headquarters</i>	<i>Security Department</i>	<p>1 Overall coordination of Operations Headquarters</p> <p>2 (omitted)</p> <p>3 Fire fighting, rescue and emergency medical service in case of aircraft accident at and around the airport *</p> <p>4 Overall management of responses in abnormal or emergency situations at and around the airport</p> <p>5 to 10 (omitted)</p>
	<i>Airport Operations Department</i>	<p>1 Research and planning of operation service</p> <p>2 Handling of landing strip, taxiway, apron and helipad operations (including in emergency situations)</p> <p>3 Spot assignment</p> <p>4 Entry into and vehicle usage in restricted areas</p> <p>5 to 10 (omitted)</p>

* Note that the KIAC Fire Station, which belongs to the KIAC Security, is responsible only for fire fighting service and does not possess any ambulance and does not provide service for carrying unexpected patients to a hospital.

2.8.5 Information on Aviation Medical Examination

(1) Annex 1 to the Convention of International Civil Aviation

Annex 1 to the Convention of the International Civil Aviation (common to both 1st Class and 2nd Class Medical Examination) includes the following description concerning the medical history of the flight crew at the time of the aviation medical examination.

6.3.2.3 *The applicant must not have a history of any of the following medical conditions or clinical diagnosis.*

- (a) *Progressive or non-progressive neurological disorders predicted, based on reliable medical conclusion, to have the potential to adversely affect an applicant's performance of his/her license and hinder the safety of services*
- (b) *Epilepsy*
- (c) *Disturbances of consciousness whose causes cannot be medically determined satisfactorily*

(2) Aviation Medical Examination Standards of Brazil

The Standard of Aviation Medical Examination of Brazil contains the following description concerning serious incidents: (Excerpt, tentative translation)

Examination is required to prove that any of the following is not applicable by means of a medical history or a medical diagnosis.

- ① *Total or partial loss of consciousness whose cause cannot be fully explained medically, and/or occurrence of loss of neurological functions, or irreversible neurological*

disturbances

② *Brain tumors*

- (2) Application Form of Aviation Medical Examination of Japan (Civil Aeronautics Regulations, form No. 22)

When a flight crewmember undergoes an aviation medical examination at a designated medical institution for aviation medical examination, there are the following symptoms related to this serious incident, which are listed in the application form of the aviation medical examination, to be declared as subjective symptoms by the flight crew. (Excerpt)

Dizziness or vertigo

Syncope or consciousness disturbances

Epilepsy or spasms

Mental or neurological disorders

Note that Aviation Medical Examination Manual, which is to be observed by designated aviation medical examiners, describes that the examiners shall confirm whether an applicant has a medical history such as sudden disturbances of consciousness of unknown causes, consider the necessity of such as a CT or MRI scan, or confirmation by diagnosis of specialized doctors.

2.8.6 Information of Ground Handling Services Contracts

A company undertaking air transport business concludes contracts with other companies that offer assistance at the airport such as ground handling service, usually based on the form specified by the International Aviation Transport Association (IATA). These contracts describe in detail for each airport where its aircraft lands. When, in emergency for example, its aircraft needs assistance such as ground handling service from other companies at an airport other than those where its aircraft planned to land, IATA Standard Contract stipulates that “Handling company shall take all reasonable and possible measures to assist” within its capacity.

2.8.7 Validation of Non-Malaysian Professional Pilot’s License

A notification of the Malaysian Civil Aviation Authority describes on validation of a non-Malaysian professional pilot’s license describes as follows:

- 1 *The Certificate of Validation is issued by DCA (Department of Civil Aviation) in accordance with the provisions of the 1996 Civil Aviation Regulation 42 (Revised) which renders valid license of a member of a flight crew of aircraft granted under the law of any state other than Malaysia. A pilot’s license issued by an ICAO Contracting State is considered to have the same validity as if the license has been granted under the Malaysian Regulation. The holder is also considered to have satisfied the medical standards appropriate to the class of the foreign pilot license held.*

3 ANALYSIS

3.1 Qualifications of the Flight Crew

The PIC and SIC held proper airman competence certificates and valid aviation medical examination certificates, which were validated in Malaysia. And, Cruise Captain held a proper Malaysian aviation airman competence certificate and a valid Malaysian aviation medical examination certificate.

3.2 Airworthiness of The aircraft

The aircraft had valid certificate of airworthiness and had been properly maintained and checked.

3.3 Contribution of Weather

It is recognized that the weather prevailing at the time of this serious incident was not a contributory factor to the incident.

3.4 History of Medical Condition of SIC

(1) Condition before the incident flight

SIC stated that he had suddenly fallen about a year and a half before, but the CT scan revealed no abnormality. Even by CT scans, tumors smaller than its scanning interval, may not be found. It is considered possible that his collapse was due to a thrombus clogging his cerebral vessels, but it was transient and he regained consciousness in a short time. Consequently, it is difficult to identify the cause of his collapse, and its relation with his spasm in this incident could not be identified. Furthermore, at the aviation medical examination he underwent in Brazil, the doctor had only asked him questions concerning his mental and nervous systems, consequently it is estimated that there were no findings showing any signs of existence of a brain tumor.

(2) Condition just before the incident flight

SIC has passed the bi-annual aviation medical examination. He had taken enough rest before boarding the aircraft. He was not feeling any physical disorders. Based on those that he boarded the aircraft without knowing that he had a brain tumor.

(3) Condition during the incident flight

This serious incident occurred when about 12 hours and 15 minutes passed after SIC got up, and about 8 hours and 40 minutes passed after the aircraft took off, and about 4 hours and 40 minutes passed after SIC commenced duty as PNF. When the aircraft was cruising at FL 380 with cabin altitude of approximately 7,000 ft and he was performing duty as PNF, it is considered that he suffered headache followed by loss of consciousness, stiffing of entire body, and convulsions, all of which are symptoms of intracranial hypertension caused by a brain tumor, and fits, thereby prevented him from performing his duty normally.

(4) Condition after landing

After landing, as described in 2.6, SIC was carried to a hospital, and diagnosed to have suspected brain tumor, as his brain was considerably pressed.

3.5 Aviation Medical Examination

As described in 2.8.5(2), the aviation medical examinations in Brazil includes the examination of brain tumors and the like. The symptoms of brain tumors, however, rarely surface until the tumor grows to a certain size. In the examination, he was asked questions about health problems during the previous six months, and because there were no apparent symptoms that would have required him to take a CT scan or an MRI scan, it is estimated that detecting a brain tumor was difficult at the time when the SIC himself had no subjective symptoms.

As described in 2.8.5(3), concerning the mental or nervous systems, a close examination is to be conducted when a flight crew reports subjective symptoms or the aviation medical examiner so diagnoses by checking inspection data of the applicant or asking questions. However, if a flight crew has no subjective symptoms or if there are no objective symptoms that suggest the existence of brain tumor, it is estimated difficult to find a brain tumor.

Consequently as it is difficult to find the brain tumor, it is estimated to have been difficult to predict the appearance of his brain tumor symptoms.

Note that if a flight crew reports subjective symptoms, detailed diagnosis such as CT or MRI scans will be implemented, so it is considered that possibility to find a brain tumor would become higher.

3.6 Response to Flight Crew Incapacitation

3.6.1 Response of the Flight Crew

As described in the ATC Communication Record in 2.1.1 and in the statements of 2.1.2(1), (2) and (3), observing SIC's spasm, Cruise Captain immediately recognized that operation of the aircraft would be seriously affected by that, checked the time and position, and decided to land at an appropriate airport, requesting Fukuoka ACC for radar vectors. In order to ensure normal control of the aircraft, he passed the control of the aircraft to PIC, asked assistance of other persons on board and pulled SIC out of the pilot seat. They laid him on the mat of the rest compartment, and gave him oxygen as a first aid.

These responses are deemed suitable and compliant with the measures for Flight Crew Incapacitation outlined in the company's manual as described in 2.8.1.

3.6.2 Response of the Controller

As described in 2.1.1, 2.1.2 (1), (2), and (5), the aircraft notified medical emergency but did not request priority handling to ATC. Therefore, it was not placed in a condition suitable for priority ATC handling described in 2.8.2. The tower controller, however, upon notified of the medical emergency, confirmed with the aircraft as to whether it would prefer a shorter-than-usual visual approach to RWY24 or an ILS approach to RW06. Positively offering information with multiple options to the aircraft, which was unfamiliar to the airport, is considered to have been an appropriate response.

Notifying the KIAC Operation of the medical emergency is considered to have been compliant with the emergency response procedure between the Airport Office and the KIAC.

Note, however, that it is estimated that number of the patients and their conditions had to be obtained in order to make the necessary preparations of ground assistance.

3.6.3 Response of the Ground Organization

(1) Assignment of parking spot and ground handling company

As described in 2.7.1, it took 30 minutes from the time the KIAC Operation was informed

of the medical emergency to the assignment of the ground handling company and parking spot, and the assignment of the spot was at the same time with the landing of the aircraft.

Moreover, it took 56 minutes from the arrival of the aircraft at the parking spot to the departure of the ambulance for the hospital.

It is estimated that this delay was due to taking time in assigning a ground handling company, that company did not have enough time for preparation, and immigration process was not done smoothly, which otherwise would have been performed swiftly.

(2) Request for Ambulance

A ground handling company usually is responsible for requesting an ambulance to a fire station. This time, however, it is estimated that because the ground handling company was not assigned until the aircraft landed, arranging an ambulance was delayed.

The tower controller of the Airport Office notified the KIAC Operation in accordance with the emergency response procedures. As described in 2.8.4, the KIAC Security is in charge of emergency medical service, so the KIAC side has to arrange an ambulance. Despite those, the KIAC Operation notified the tower controller to contact the KIAC Fire Station which is not responsible and organized for emergency medical transportation service. The KIAC Fire Station, which has to place 119 calls itself, requested that the tower controller arrange an ambulance.

Moreover, the KIAC Operation made a wrong request again without confirmation which should be done by its self, even after the tower controller inquired for confirmation.

For the above-outlined reasons, it is estimated that for those reasons about 30 minutes passed since the receipt of the information until the ambulance was called.

3.7 Measures for Damage Mitigation

Although there was no actual damage in this serious incident, the following measures can be considered to reduce the possibility of damage under similar circumstances.

(1) Responses of flight crewmembers other than SIC

The responses of the flight crewmembers other than SIC were considered to be appropriate in view of aircraft operation and emergency medical response. However, it is worth noting that after they conducted first aid to SIC, it was important to have reported, to the best of their medical knowledge, the conditions of the patient to the ground via the ATC organization, so that the flight crew and the ground support staffs could have shared the information to ensure the appropriate and swift assistance.

(2) Controller's handling

Although the controller actively and appropriately carried out his duties, he did not take the trouble of asking about the conditions of the patient. The aircraft, having no regular flights into the airport, had no other way but to exchange information via the ATC organization. If the controller had acquired the information necessary for medical assistance, such as the number of patients, more appropriate medical support would have been provided after landing.

(3) Ground support

① Assignment of the ground handling company

The KIAC would have implemented smooth ground support had it beforehand considered measures to arrange the ambulance or CIQ without such troubles as caused by the delays in assignment of a ground handling company in case of emergency landing.

② Request for ambulance

Prompt and smooth emergency medical transportation would have been possible, if the KIAC had beforehand prepared procedures to quickly arrange an ambulance for patient not only in case of emergency landing but also in all possible cases.

4 PROBABLE CAUSE

It is estimated that this serious incident was caused, when the aircraft was cruising, the Second In Command (SIC) in duty of pilot flying became incapable of performing his duty normally by a loss of consciousness, which followed a sudden headache as a symptom of intracranial hypertension.

Concerning that the appearance of these symptoms was not predicted, it is estimated to contribute the SIC did not have any subjective symptoms of brain tumors, and detecting brain tumors under current aviation medical examinations is difficult if no subjective or objective symptoms are observed.

5 SAFETY OPINION

In this serious incident, a situation was observed in which response was delayed with ground support at Kansai International Airport. The number of aircraft flying over Japanese airspace has been increasing. Among those includes operators who do not have arrangement of ground support for their aircraft, it is well expected that such aircraft makes an emergency landing. Consequently, all related parties including airport operation should consider beforehand to prepare for the best and prompt response in case of such situations.

Figure 1 Estimated Flight Route

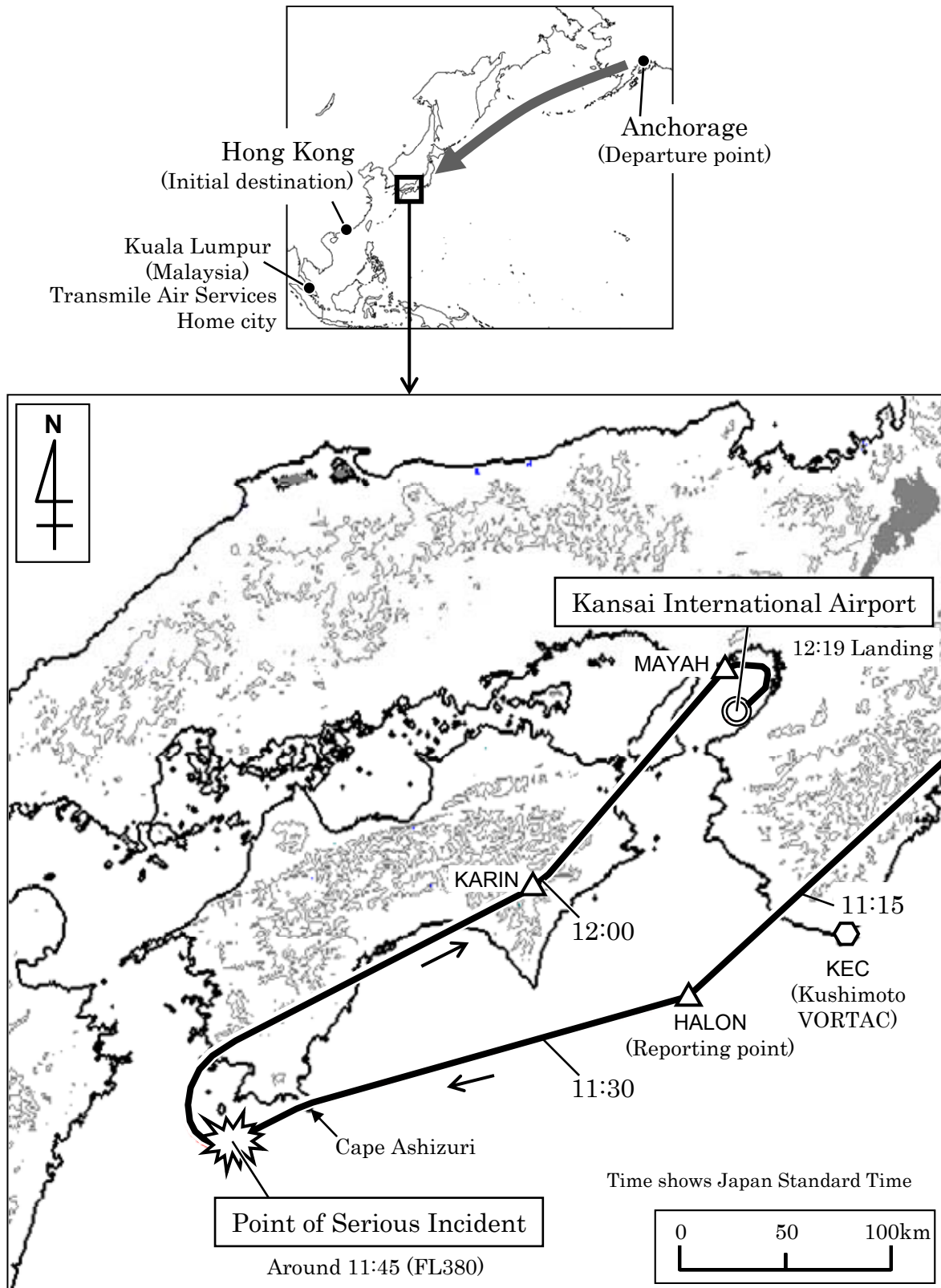


Figure 2 Three views of McDonnell Douglas MD-11F

Unit : m

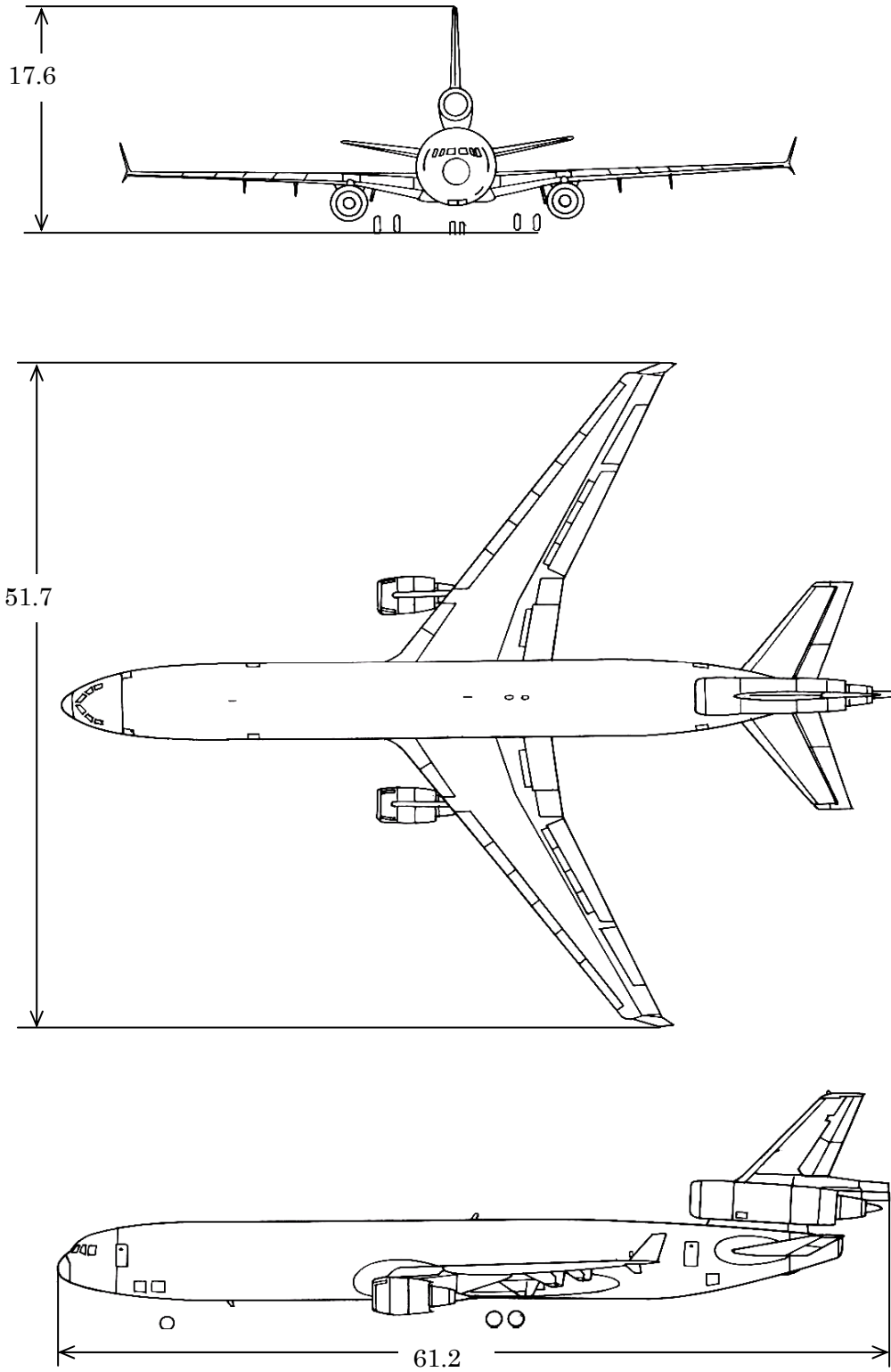


Figure 3 DFDR Data

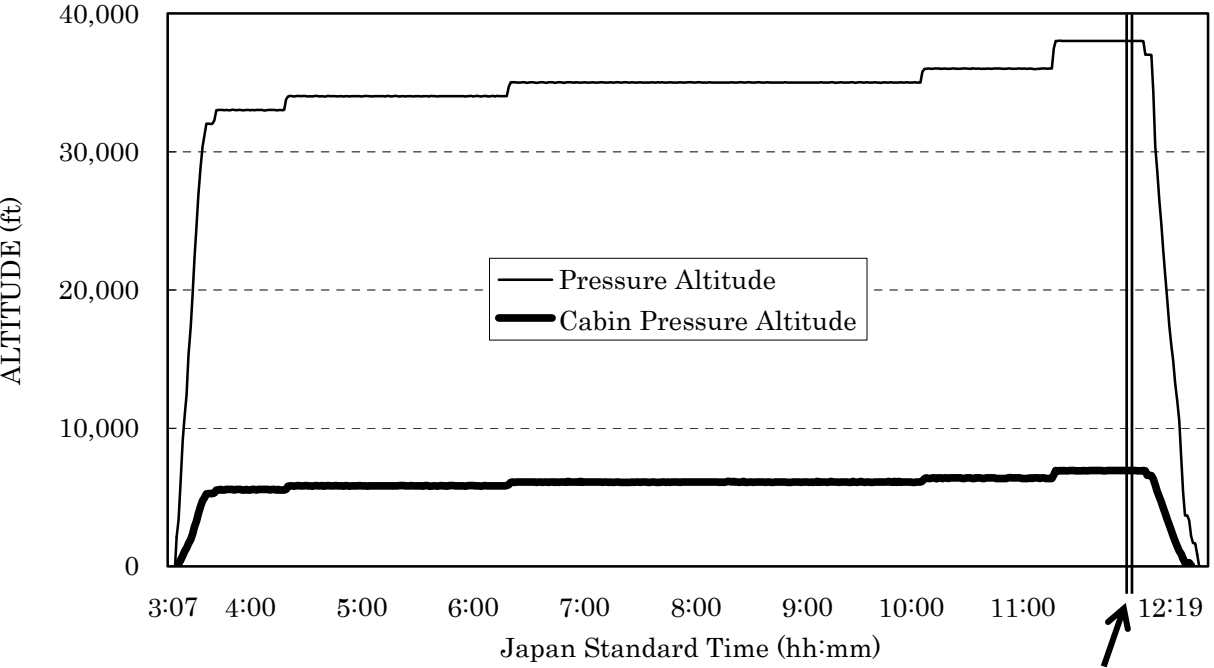
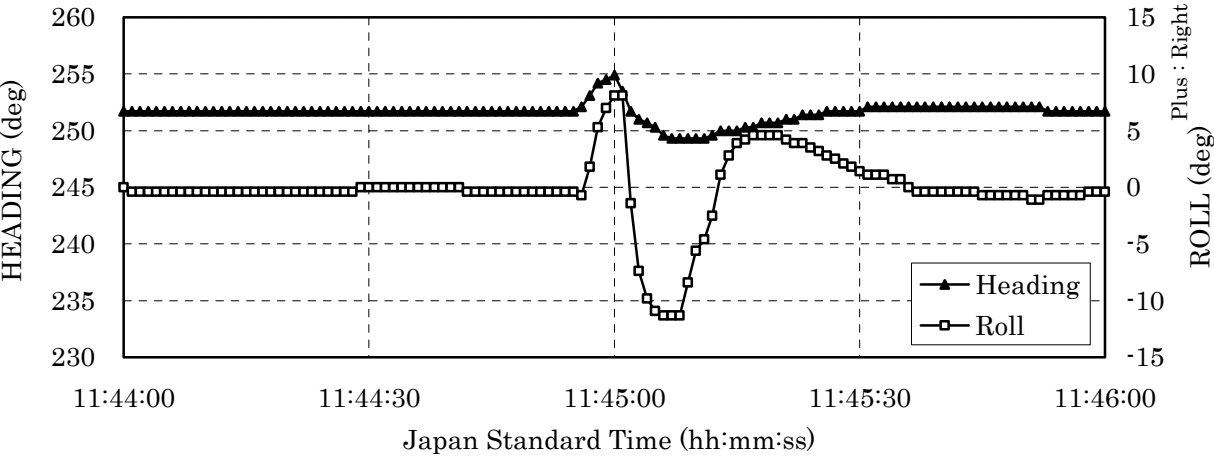
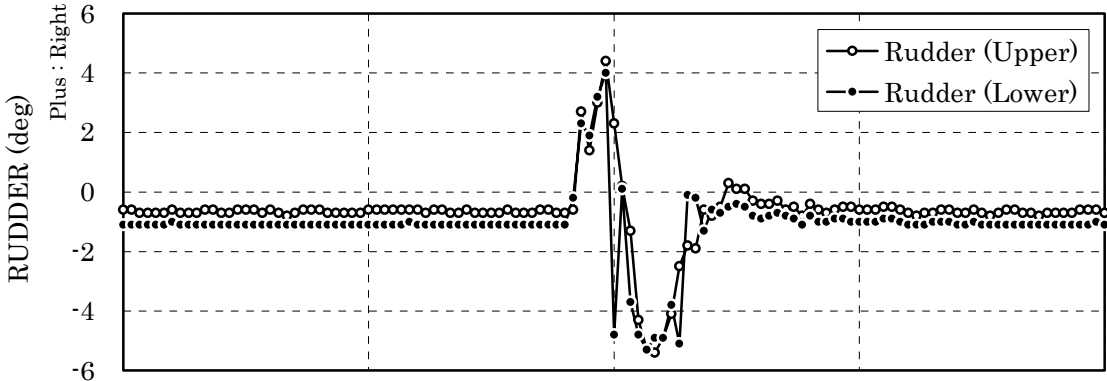


Figure 4 Taxing Route

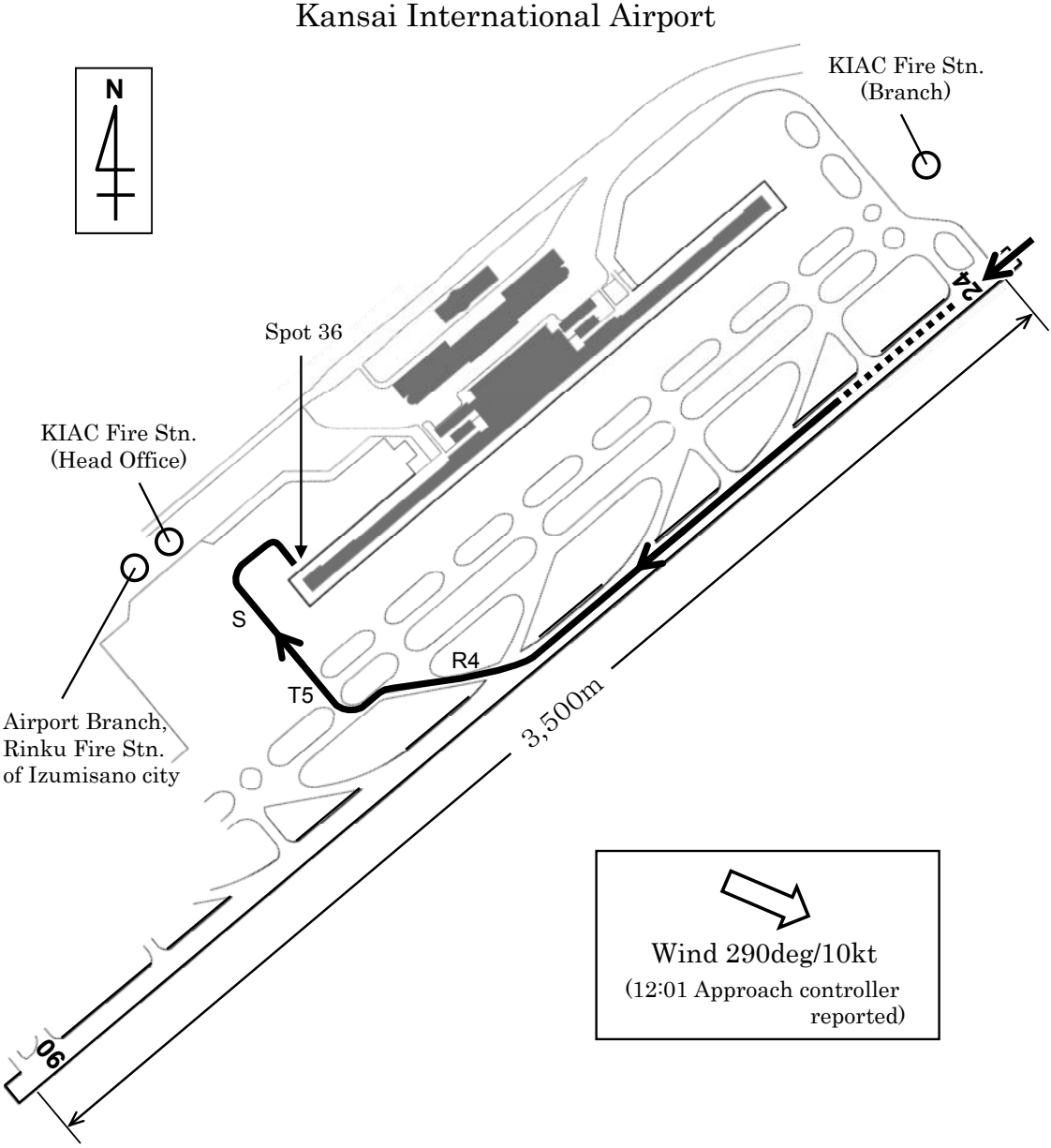


Photo 1 The Aircraft of Serious Incident



Photo 2 Left seat where "SIC" seated
(Pulled backward, leaned back support)

