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**AIR ACCIDENT INVESTIGATION REPORT No: 08/97**

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**Dornier 228-212, 9M-MIA**

**Daimler-Benz Aerospace,**

**Merpati Intan Sdn. Bhd.**

**8.4 NM 174 Radial from Miri VOR**

**6th September, 1997.**

**(All time<sup>\*</sup> in this report are local time)**

This investigation was carried in accordance with The Civil Aviation  
(Investigation of Air Accident) and The Malaysian Civil Aviation  
Regulations 1969.

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## Air Accident Report No: 08/97

Hirer and Operator to be	Merpati Intan Sdn. Bhd.
Manufacturer	Daimler-Benz Aerospace
Aircraft	Dornier
Model	228-212
Nationality	Malaysian
Registration Marks	9M-MIA
Place of Accident	7.4 NM 174 Radial from Miri VOR
Date of Accident	6th September, 1997.

### Synopsis

The Regional Control Center at Kota Kinabalu notified the Chief Inspector of Air Accidents, that a Dornier 228-212 aircraft of Merpati Intan Sdn Bhd., (hirer to be permit holder) failed to arrive in Miri Airport. On the 7 September 1997, the Chief Inspector of Air Accidents notified the accident to the Brunei International Airline, as owner of the aircraft, Boskym Udara Sdn. Bhd as maintenance agency, Hornbill Skyways, as operation agency and Pelangi Air, as the employer of the aircraft Commander. The Chief Inspector of Air Accident also notified the Embassy of Germany as the state that manufactured the accident aircraft.

The Government of Malaysia identified its appointed Chief Inspector of Air Accidents as the investigation authority and recognised the Dornier Engineer that was based in Miri to Merpati Intan Sdn. Bhd., as accredited representative of aircraft state manufacturer. The Department of Civil Aviation Malaysia in response to the state of Brunei's request, as owner of the aircraft, approved several Brunei aviation personnel as accredited representatives.

The Chief Inspector of Air Accidents organised an investigation operation room at DCA's Air Traffic Control (ATC) premise and appointed a DCA Investigator as Inspector in Charge assisted by a DCA engineering personnel and another DCA pilot. The Operation group consisted of pilots from DCA, Hornbill Skyways Sdn.Bhd and Merpati Intan Sdn. Bhd. The Engineering group headed by a DCA's engineer was assisted by a Dornier Engineer and a licensed aircraft engineer from Merpati Intan Sdn. Bhd. The ATC group consisted of two Air Traffic Controllers from Miri Air Traffic Control Tower.

On early night of 6 September 1997, the Dornier aircraft on its last sector for the day, departed Brunei Darulsalam Airport to Miri Airport. Whilst under the Miri aerodrome control, the duty controller cleared the aircraft, after the commander had visually contacted Miri Airfield, to the east of the airfield, to let a few aircraft to land and depart. The Controller later cleared the aircraft to join final for Runway 02 but a few seconds later, failed to get any response from it. The Miri Control Tower requested several departing and landing aircraft to locate the Dornier but failed to sight it. Early morning on 7th September 1997, a search helicopter spotted the wreckage at the slope of Lambir Hill approximately 7.4 NM South of Miri Airport. In the mean time, the investigating team left Kuala Lumpur by flight and arrived Miri that morning. Recuers that took three hours to reach the crash site, found no survivors among the crew and passengers. Shortly after, another helicopter ferried and lowered the Chief Inspector of Air Accidents, two DCA investigators and several personnel, down to the crash site.

# 1 Factual Information

## 1.1 History Of Flight

On 6 September 1997, a Dornier 228-212 aircraft, flight number BI839, was engaged in a non schedule passenger flight. Its last point of departure was from Brunei International Airport. Its scheduled time arrival at Brunei from Labuan was 17:20 hrs. and its actual time of arrival was 18:50 hrs. Its next Time of departure from Brunei was 19:13 hrs. whereas its scheduled departure was 18:25 hrs. The next point of landing after departure from Brunei was to land in Miri at 19.38 hrs.

The following is a description of the BI839 Flight preparation and events leading to the accident, including reconstruction of the significant portion of the flight path:

Representatives of the Royal Brunei at Brunei Airport prepared, serviced and ground handled the BI839 for departure. They discharged 50 kg. of baggage and loaded 40 kg. for Miri. There were a total of 8 passengers (2 in zone A and 6 in Zone B) weighing 536 kg, and 909 kg of fuel. The total all up weight was 5405 kg. whilst the maximum take off weight (MTOW) was 6400Kg.

Eventually the crew prepared the aircraft for departure, started the engine and conducted the after start procedure. The Brunei tower cleared BI839 to taxi for Runway 21, to Miri direct, maintaining 4000 feet. When BI839 were ready for taxi, the crew obtained the QNH setting of 1009 mb, switched on taxi lights, completed taxi procedure. They departed with the wind velocity of 050°/less than 5 knots and maintained a heading 239°. The Commander did the take off, with flaps set at one and after the gears were up, he noticed that the flaps up trim coupling did not exist. The crew then experienced an aircraft sink when the flaps were retracted and were then transferred to Brunei radar control on frequency 127.1 MHz. The crew then initiated a right turn, did the take off checks and set the QNH to 1010 Mb. They adjusted the cockpit lights and compared their Horizontal Situation Indicator (HSI), and re-estimated their arrival time Miri by an additional of two minutes. At 44 NM. from Miri, BI839 was informed that Miri weather was fine. At abeam Anduki, the crew contacted Miri Approach on 123.3 Mhz and informed them that they were at 29 DME on radial 055° from VMI a VOR beacon located at Miri Airport. Miri Approach then cleared BI839 to VMI at 4000 feet and informed the crew that there would be no delay. The crew listened through the radio and noted that there were several aircraft in the vicinity of Miri airport including MH 2625 and 9DJ, where the later was turning left carrying out circuit work for touch and go landing. The crew planned to go for a wide circuit runway 02, and expected to join downwind leg in a Visual Meteorological Condition (VMC). When Miri Approach cleared MH 3728 for an ILS approach, the crew reckoned they had then to go to Bakam, a holding area to the south of Miri Airport. Meanwhile another aircraft, MH 2358 was turning in bound in Bakam hold.

At 19:31 hrs, BI839 was 18 DME Radial 055 from VMI, 4,029 ft, speed 185 kts. heading 246. At this position, the crew requested for a lower altitude (the minimum

sector altitude 10 NM from VMI is 1500 feet) whilst the minimum holding altitude at VMI for VOR/ILS/DME Approach is 3000 feet. ATC Miri then replied that BI839 was to maintain 4000 feet and cleared the aircraft to the east of the airfield for number three in sequence. The crew looked for the airport apron lights, but could not see them. Instead they were able to sight only Miri Town. They then set the VOR, looked for Miri airfield and again could not see the airport as it was hazy. The Commander listened to Air Traffic Information Service (ATIS) whilst the First Officer informed Miri Approach that it was east of the airfield. When the First Officer first sighted Miri airport below them, according to the cockpit voice recorder (CVR), he appeared unsure. At this moment, Miri Approach requested that they confirm whether they were visual with the field. The First Officer replied "Standby Brunei 839". However, Miri Approach instructed "Brunei 839 to hold east of the field and report visual with the field," and went further "Your distance from Victor Mike India DME?"

The First officer then replied "Currently 1.5 VMI." At 19:36:20 hrs. the Commander sighted the airfield and immediately the First officer advised Miri Approach "...BI839 is visual of the field at this time."

At 19:37:15 hrs. the First officer answered the Approach's request that he was "crossing radial 125°" and "maintaining 4000 feet." According to the CVR the aircraft was at 4163 feet; 144 kts. and 034° heading. At 19:37:25 hrs. the Approach Controller cleared "Brunei 839 descend to three thousand east of the field." Soon after, the Commander said to the First Officer that "We have the Boeing taking off." and confirmed he had the runway in sight. Then the Commander turned the aircraft to the right, and asked the First officer whether there were any high ground. The First officer replied that there were none within four miles. The Commander then went further to ask, if any, within eight miles. The First officer only said "Yah .... about eight miles".

At 19:38:45 hrs Miri Approach said "Brunei 839, cleared to track long final, runway 02 from right base." The aircraft at this juncture was descending through 3493 feet, 146 kts., turning right passing through 219° heading with the intention of joining downwind.

At 19:39:59 hrs. the Commander advised Miri Approach "839 downwind at three thousands feet". The aircraft was then 3151 feet, 146 kts, heading 194 degrees. Miri Approach then replied "Brunei 839 descend below three thousand feet, cleared final Runway 02. slow down to accommodate one Cessna 208 departure". The First officer then interjected "I still got the airfield visual". About 35 seconds later, the First officer said to the Commander "Airfield is at the back" to which the Commander replied "Okay, you just keep in contact". Shortly after, the Commander asked the First officer whether he still could see the runway in which the First officer replied "ya". Then the Commander added "Six miles we turn...ya? The First officer replied "Ah you can turn now is no problem." The Commander then responded "... we still high, so continue descend OK" and implied that one aircraft had not departed yet.

At, 19:41:30 hrs. the Commander said “Okay, six miles” to himself but Miri Approach prompted him “Brunei 839, report position? At this time he was 6 NM passing 2100 feet, 137 kts. and 194° heading.

At 19:41:45 hrs. the Commander said to the First officer, “Long extended runway” and made the First officer to transmit “839 extending downwind”. Miri Approach then cleared the aircraft to join five miles final runway 02.

At 19:42:27 hrs. the aircraft altitude was passing 1682 feet, 131 kts. and heading towards 187°. Fifteen seconds later, the Commander said to the First officer “ Speed below 140, flap one”. The CVR recorded that the aircraft was passing 1551 feet, 129 kts. heading of 216°. Eleven seconds later the CVR, disclosed that the aircraft had hit the slope of Lambir Hill, whose elevation was 1540 feet above mean sea level (AMSL), latitude and longitude is (N0412.27 E11400.07). The time of the accident was 19:42:57 hrs. and the night was without moon.

## 1.2 Injuries To Persons

Following are in numbers the injuries to the crew and passengers:-

Injuries	Crew	Passengers	Others
Fatal	2	8	
Serious			
Minor/None			

Note - Fatal injuries include all deaths determined to be a direct result of injuries sustained in the accident.

## 1.3 Damage To Aircraft.

The aircraft was destroyed. Its nose was severely damaged, as the fuselage pushed itself up against the hill slope and twisted towards the right to leading edge of wings. The left wing suffered less damage than the right that was detached from the fuselage before the final impact. The right engine embedded itself in the ground. Top of fuselage and wings appeared intact but the lower surfaces of the wings and fuselage had marks and where tree stumps penetrated it.

At the point of initial impact, the plane right wing that was lower than the right, hit the densely grown tree tops. It then moved on its momentum striking and breaking all the trees ahead, for about twenty meters, and hit the inclining surface of the hill. The tail plane did not fully reached the hill surface as the broken tree stumps supported and prevented it from reaching the ground. The investigator estimated that the hill slope was approximately 80 degrees.

#### 1.4 Other Damages

As the area was uninhabitable, the aircraft did not damage any other man made objects, except some tropical hardwood trees that grew on the steep hill slope.

#### 1.5 Personnel Information

a) Following are pertinent information concerning each of the flight crew members including the age, validity of licences, ratings, mandatory checks flying experience (total and on type) and relevant information on duty time:-

The Commander	
Age:	40 years
Validity of Licences	Commercial Pilot Licence re certification on 30.04.1998.
Ratings	Skyvan SC7 as of 08.10.93 Dornier 228-202 K as of 13.09.96
Mandatory checks: Medical Check up:	As Commander of Dornier 228-202 on 26.07.1997.
Flying experience: Total Military Service Military Commander at CPL Commander at On type Total	1,288.10 hours on Bulldog B100, Cessna 402B and DHC-4 525.50 hours 1924.55 hours (Skyvan SC7 ) 783 hours (Dornier 228-202) 3,497 hours
Duty Time: Daily Weekly Monthly Yearly	08.00 hours 11 hours 71 hours 783 hours

b) Following is a brief statement of qualifications and experience of other crew members, his age, validity of licences, ratings, mandatory checks, flying experience (total and on type) and relevant information on duty time:

The First Officer	
Age:	29 years
Validity of Licenses	Commercial Pilot Licence re certification on 31 May 1998
Ratings	Skyvan SC7 as of 29 October, 1996 Dornier 228-212 as of 14 August 1997

Mandatory checks: Medical checkup:	As First officer of Dornier 228-202 on 14 August, 1997
Flying Experience Total On Type	1120:50 hours 22.30 hours
Flying duty time Daily 7 Days 30 Days 360 Days	8:00 hours 13:05 hours 22:30 hours

c) Following are pertinent information regarding air traffic controller, age, validity of licences, ratings, mandatory checks, experience (total and on type) and relevant information on duty time.

Duty Air Traffic Controller	
Age:	29 years
Validity of licences	
Current ratings	Aerodrome, Approach, Area
Mandatory checks	
Controlling experience	6 years

Supervising Air Traffic Controller	
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Age	31 years.
Validity of licences	
Current ratings	Aerodrome, Approach, Area
Mandatory checks	
Controlling experience	7 years.

## 1.6 Aircraft Information:

Following is a brief statement on airworthiness and maintenance of the aircraft (indication of deficiencies known prior to and during the flight to be included, if having any bearing on the accident).

### 1.6.1 General Description



The Dornier 228 airplane is a commuter airplane with two engines, high wing, has a rectangular fuselage with retractable landing gear. The cockpit was designed to accommodate one or two crew members. The aircraft had two baggage compartments, one in the nose and one aft of the cabin.

The aircraft is powered by two Garrett turboprop engines, that drives two propellers that full feathering, constant speed, reversible pitch hydraulically actuated. The engine control and instruments included engine speed lever, power lever, over speed fuel Governor, start locks, enrich button, RPM indicator, Interstate Turbine Temperature Indicator, and Torque Indicator.

The registered owner of the aircraft is Royal Brunei Airlines Sdn. Bhd. at address: 6th Floor RB&A Plaza, Jalan Sultan, Bandar Seri Begawan, Brunei Darussalam. The aircraft was chartered to Merpati Intan Sdn. Bhd. Level 5, The Oil Town, Lot 684, Miri-Pujut Road, 98000 Miri, Sarawak.

#### 1.6.2 Variants

The type of aircraft is Dornier 228-212 with Garrett TPE 33-5A-252D. The manufacturer is Dornier Luftfahrt GmbH.

#### 1.6.3 9M-MIA History

The aircraft was manufactured in 1997 and serialised as No: 8217. The last scheduled maintenance was performed at 100 flying hours / 2 months on 26/8/1997 at Boskym Udara hangar in Miri. From the aircraft log book, the scheduled maintenance was carried out within the limit stated in the Approved Maintenance Schedule. There were no evidence of outstanding defect recorded in the aircraft, engines and propellers log books.

#### 1.6.4 Weight and Center of Gravity

The maximum certificated weight and center of gravity limits for maximum take off weight of 6400 kg is 27.4 % forward and 40 % to rear of the C.G. Limits, for maximum Landing weight of 6100 kg is 25.3 % forward 40 % rear of C.G. Limits. The maximum weight in the front baggage compartment is 120 kg whist it varies from 150 kg to 210 kg for the rear compartment.

The Load Factor Limits for the aircraft for flaps up position is 3.10 g and for any other position the limit is 2.0g. However, pilot induced negative g is prohibited.

The Boskym Udara Sdn. Bhd was responsible for aircraft maintenance.

The performance of the aircraft was as the published charts in the Flight Manual and the mass and center of gravity of the aircraft were within the prescribed limits from take off to point of impact of the related accident. Type of fuel used was Jet A1.

**1.7 Meteorological Information:**

a) Following is the meteorological conditions appropriate to the circumstances including both forecast and actual conditions and the availability of meteorological information to the crew.

forecast conditions:-

METAR	Metar	METAR	Metar	METAR	Metar
WBGR	Miri	WBGR	Miri	WBGR	Miri
061000Z	06:1000Z	061100Z	06:1100Z	061200Z	06:1200Z
31005KT	100 5kts	32005KT	200 5kts	33003KT	300 3kts
9999		9,999		9,999	
(05)		(05)		(05)	
FEW014	FEW 1400ft	FEW014	FEW 1400ft	FEW014	FEW 1400ft
BKN150	BKN 15,000ft	BKN150	BKN15,000ft	BKN150	BKN 15,000ft
30/25	30/25 degrees Celsius	29/25	29 25 degrees Celsius	29/25	29 25
Q1008	1,008	Q1009	1,009	Q1010	QNH 1010

Actual conditions:-

Actual	AAXX	AAXX	AAXX		AAXX	
Wx						
Date Time	06064	06:06:00 Z	06094	06:09:00 Z	06124	06:12:00 Z
Station	96449	Miri	96449	Miri	96449	Miri
Visibility	31468	6 km	41468	6 km	32465	
Wind	62710	270 10kts	63108	310 8 kts	73303	330 3 kts
Temperature	10320	32 degrees	10300	30 degrees	10286	28 degrees
Dew point	20254	25 degrees	20249	24 degrees	20252	25 degrees
QFE	30075	1007.5	30063	1006.3	30087	1008.7

QNH	40095	1009.5	40083	1008.3	40108	1010.8
Weather	70522	Haze	70522		8247/	
Clouds:	83141		82241		333	
	333		333		10325	
	83814	3 cu 014	82814	2 cu 014	82614	
	85080	5 cl 300	85080	5 cl	86365	

b) There were no Natural light conditions at the time of the accident.

### 1.8 Navigation Aids:

Following are Aids to navigation information including ILS, NDB, VOR, visual ground aids, etc., and their effectiveness at the time:

The accident aircraft was equipped with several radio navigational aids including VHF Omni Range (VOR), Distance Measuring Equipment (DME) and Automatic Direction Finding (ADF) receivers that can be tuned to receive ground beacons.

The navigation system receives and processes VOR bearing and course deviation, localizer and glideslope deviation to - from information, flag signals. The system consists of a VOR receiver, a VOR/LOC/GS antenna, a panel mounted control unit, HSI, a radio magnetic indicator (RMI) and a marker lamp panel. The automatic direction finding system receives radio signals and consists of a control unit, a receiver, a control adapter and an antenna. In ADF mode, the system provides relative bearing information that is indicated on the RMI as well as an audio output. The RMI uses magnetic heading information from the slaved directional gyro system and provides relative bearing information from the two VHF navigation receivers that is displayed on the RMI.

The RMI displays, located on the pilot's panel, consists of a rotating compass card, a fixed heading index (lubber line), single bar pointer, double bar pointer and a warning flag. The compass card is slaved to the magnetic heading signal and rotates as the airplane turns so that the magnetic heading of the airplane is continuously displayed under the lubber line.

**Radio Altimeter System:** The altimeter gives a continuous visual indication of airplane height above ground level from 0 feet to 2000 ft. It provides a continuous selection of decision height (DH) and annunciation of the selected height. The system consists of a transceiver, two antennas and the radio altimeter indicator.

The Aerodrome navigation aids available at Miri Aerodrome, includes landing aids such as ILS Glide Path and Localizer, DVOR, DME (DVOR), DME (ILS) and NDB. They were all serviceable at the time of the accident. The flight inspectorate certified them on 13 August 1997. The visual ground aids including PAPI, Runway, Approach, Taxiway Center line, Windssocks Lights, Beacon, Obstacles Lights and Standby

Generator Set, were all in serviceable conditions. All relevant approach and airways charts were available at the Miri ATC.

#### 1.8.1 Navigation Charts.

The Commander's and the First Officer Navigation bags were recovered from the wreckage, although they were damaged but most of the items were quite intact. Among the items that were recovered from the bags were personal items, manuals, several forms, a folded Jefferson FE(H/L)2 and FE(H/L)3 charts; a book of enlarged Jefferson Terminal Approach Charts of all airports in Sarawak and Sabah areas; a cut out topographical chart of Kuching area; a cut out topographical chart covering south of Miri to Sibiu; a book of Aeronautical Information Publication 1992 edition with Date of Amendment of 02.3.95; a copy of AIP Supplement Malaysia Vol.III 17/94 of 10th November relating to Establishment of West Hold & VFR lane system; Instrument Approach and Landing Procedures Labuan Airport; a book of Jefferson Airway Manual.

#### 1.9 Communication.

The Miri Airport aeronautical mobile and fixed service communications equipment including Aerodrome, Approach, SMC, Distress, ATIS, VHF's and HF SSB. They were serviceable and effective at the time of the accident.

The Aircraft Communication System included HF Com, Transponder, VHF Nav 1, VHF Nav2, VHF NAV COM 1, VHF COM 2, ICS (Intercommunication System), ADF1, ADF2, Passenger Address System.

#### 1.10 Aerodrome Information

There was no Pertineat information associated with the Miri aerodrome, its facilities and condition. However, the site where the aircraft crashed had no obstruction light and the road, east and parallel with the runway, has a row of bright lights that looks very similar to runway edge lights when sighted from the air. General Aviation Pilots (helicopters and light aircraft) have sometimes mistaken it as for the Miri runway lights.

#### 1.11 Flight Recorders

Following is a description of the location of the flight recorder installations in the aircraft, their condition on recovery and the pertinent data available therefrom:

The manufacturer installed the Flight Data Recorder (FDR), part number 980-4100-GMUN and Cockpit voice Recorder (CVR), part number S200-0012-00 in the aircraft. Both recorders, found after the crash, were in good condition and Chief Investigator of Air Accidents sent them to Air Accidents Investigation Branch (AAIB UK at Farnborough), for replay. The data available from the FDR tape that was capable to maintain 25 hours basic data were: barometric attitude (1013 mb), indicated airspeed, magnetic heading, normal acceleration, radio push-to-talk and a

time date stamp. The investigator made three plots from the data, showing accident data and previous flight, an expanded view before the accident, and air track based on heading and airspeed. The CVR retained last 2 hours of aircraft audio (last 30 minutes at high quality) and recorded the channels of Commander, First Officer, cockpit area microphone and public address. The recorder did not record the public address and the radio transmission though recorded were not readily audible.

From the FDR data, the investigator determined the aircraft positions, conditions of flight (take off, climb, cruise, descend) and the last second increase of 1.23g. The investigator noted that the crew became aware of ground proximity and initiated the pull up but impact the ground was imminent.

The crew made two positive positions transmission, thus indicating his track. Using these fixes and crash site as another, the investigator together with the approximate wind direction determined the most probable track of the aircraft before the accident.

## 1.12 Wreckage and Impact Information

The site of the accident was on the side of a hill whose slope exceeded 75 degrees from the horizontal. The slope was covered by 100 feet tall hard woods, thick bushes and saplings on the surface. The wreckage distribution pattern was confined to one area. The investigating crew could not find any parts of the aircraft other than at the crash sited. They did not find nor detected material failures or a component mulfunctions at the location. The investigator noted the states of the different pieces of the wreckage were at their normal positions that indicated a breakup of the aircraft prior to impact did not occur.

### 1.12.1 Impact Sequence and Parameters:

In general, the aircraft impacted the hill whilst it was in nose-up position. The aircraft suffered severe damage on its bottom fuselage while its top portion suffered less damage.

The aircraft structure was badly damaged beyond repair. Its right hand wing was cut by the rescue team to remove one of the deceased passengers.

Flight Control: Due to the severe damage on the aircraft during impact, the flight control integrity check could not be carried out. The small amount of intact component on the left hand wing showed no evidence of pre impact failure.

Fuel system: Fuel system component was severely damaged, and visual external inspection did not reveal pre impact failure. There was also no evidence of fuel contamination.

Electrical Power: There was no evidence to suggest that there were any abnormalities in the electrical power supply, this was evident in the FDR and CVR reports.

Engines: Right hand engine was embedded in the ground, whilst both engines were badly damaged during impact. All the engine systems warning caption bulbs that were examined showed that they were not illuminated at the time of impact.

Cockpit Instrumentation and Avionics: The majority of the instruments, warning lights and avionics equipment were inspected at site and there were no evidences of any damage prior to impact. This was later confirmed by the FDR and CVR.

Interior And Exterior Lighting: The interior and exterior lighting were all working properly before impact as evident in the recorders.

The distribution pattern of the wreckage: The wreckage distribution pattern showed that the aircraft was in its proper flight condition as there were no parts recovered in the flight path, and furthermore, the impact area was confined to a 35 meter x 25 meter area.

Detected component malfunctions: the search helicopter received very faint distress beacon transmission whilst directly above the location. The beacon however functioned satisfactorily when engineers tested it. Engineer's examination on the antenna connection, revealed some signs of possible dislocation probably when the aircraft impacted the hill.

#### **1.13 Medical and Pathological Information.**

Following a post-mortem on the crew and passengers of the fatal aircraft that Miri General Hospital conducted, their investigation results on the causes of death were mainly due to severe injuries associated with the aircraft crash.

#### **1.14 Fire.**

There were no signs of fire that have occurred before or after the accident.

#### **1.15 Survival Aspects**

Following is a Brief description of search, evacuation and rescue, location of crew and passengers in relation to injuries sustained, failure of structures such as seats and seat-belt attachments.

Two search helicopters, Bell 206, 9MBBC became airborne at 06:28 hrs and 9MBEE at 06:38 hrs. The Bell 206, 9M-BBC crew found the wreckage at 07.20 hrs on the next morning. He spotted the plane on a hill at Lambir Hills National Park, 7.4 NM, on radial of 174° from Miri Airport.

At 07:32 hrs. the rescue party comprising of Bomba Malaysia, Medical, Rescue Team, Army and Command Post immediately proceeded on land transport and then tracked up on foot through thick jungle. Although close to the crash site, rescuers could not see the wreckage, however a hovering helicopter above the wreckage, gave them the direction to the location. They reached the crash site (approximately 1500 feet above sea level) and found that none of the two crews and eight passengers survived the crash.

The aircraft, engaged in the rescue operation were Bell 206 9M-BBC, Bell 206 9M-BEE, Kencana 624, a RMAF Beechcraft. RBAB Bell 212 (TX), RBAB Bell 212 (TW) and a Nuri helicopter..

#### 1.15.1 Bodies

On the next day, 7 September 1997, at 17:15 hrs., the RMAF Nuri helicopter lifted and flew one body from the aircraft wreckage and at 18:01hrs. another four more bodies were airlifted to Miri Hospital.

On 8 September at 10:57 hrs. the helicopter lifted and delivered one body and at 15:36 hrs. another three more bodies were airlifted. At 17:42 hrs. it delivered the last victim that was outside the aircraft but located underneath the left aircraft engine.

At 13:19 hrs. on the same day, the investigator collected the Flight Data Recorder from rescue helicopter at Miri airport.

Search and Rescue terminated at 20:29 hrs.

#### 1.16 Tests and Research

The investigator did not perform any test or research.

#### 1.17 Organisational and Management Information

Following are Pertinent information concerning the organisations and their management involved in influencing the operation of the aircraft. The organisations, include, the operator, the air traffic services, maintenance facility, and the regulatory authority. The information shall include where appropriate, organisational structure and functions, resources, status of economics, management policies and practices and regulatory framework.

The operator's organisational structure included a chairman, Board of Directors, Managing Director who managed the Acting Chief Pilot/Training Captain, Operation Executive and Maintenance Executive. The Acting Chief Pilot/Training Captain was responsible for company pilots consisting of two captains (not including the fatal Commander), two Copilots and two Second Officers. The Operation Executive was responsible for Operation Assistant, Finance/Administration and Accounting, whilst the Maintenance Executive an Aircraft Licensed Engineer was responsible for Maintenance Contract with Boskym Udara. The operational, technical and management policies had been ascertained when the company submitted its Operations Manual in the course of application. The detail economic status of the company could not be ascertained.

The Air Traffic Services (ATS) is part of the DCA Malaysia's organisational structure and functions. The resources, management policies, finance and practices are subject to the Government of Malaysia Orders and circulars.

The regulatory framework of DCA is conducted through the Malaysian Civil Aviation Regulations 1996, ICAO Annexes, and Manuals. The organisation is headed by

Director of Air Traffic Services who is responsible to all air traffic management, control, training, search and rescue operation in Malaysian Flight Information Regions, and Aerodrome Information Services.

Miri Aerodrome Control organisation is headed by a Manager (A3) supported two sections (Operation and Administration). The (Operation group) is headed by one Senior Air Traffic Controller (A3) who is responsible for three Aerodrome/ Approach Controllers (one A3 and two A4), eight posts of Surface Movement Controllers (A5), and three Aerodrome Flight Data Controllers (A7). The administration office is supported by four clerical staffs.

The maintenance organisational structure, functions, resources, economic status, management policies and practices and regulatory framework could not be ascertained as the organisation has not been inspected by DCA Air worthiness Division. However at the time of accident, the company had entered into an agreement with a maintenance facility to conduct the Scheduled Maintenance Inspection - Certificate of Release to Service. The Boskym Udara Sdn. Bhd. conducted above inspection using the Air Tech Malaysia format.

The regulatory framework of Civil Aviation is conducted by the Department of Civil Aviation (DCA) Malaysia that is responsible to the Minister of Transport Malaysia who established the civil aviation regulations to be enforced by the Director General Civil Aviation Malaysia. The Malaysian Civil Aviation Regulations 1996, encompass all activities of civil aviation including: Airworthiness, Flight Safety; Airports Standards; Air Transport; Administration and Finance; and Air Traffic Services. Each of said activities is headed by a director that are assisted by various aviation personnel specific for their functions. However, the resources, management policies, finance and practices are subject to the Government of Malaysia General Orders and circulars.

**1.18 Additional Information**

Nil.

**1.19 Useful or Effective Investigation Techniques.**

The investigator did not conduct any useful or effective investigation techniques during the investigation.



## **2 Analysis**

Following narration analyse the information as listed in paragraph 1 concerning factual information that is relevant to the determination of conclusions and causes:

### **2.1 Overview**

The Flight Data Recorder and Cockpit Voice Recorder (FDR and CVR) revealed most of the clues to the causes of this accident that arise from the commander's acceptance to hold east of the airfield and the Air Traffic Controller's instruction that the aircraft was to hold at that position to facilitate other aircraft departure and arrival. The investigator concluded in this analysis that the Commander did not react to the changing in flight condition and the existence of obstacles.

The accident might have been avoided if the Commander had realised the existence of obstacles, react suitably to the in-flight condition he was in and if the Approach Controller had not held the aircraft east of the airfield.

### **2.2 Unpublished Holding Area**

After the initial radio contact, the Approach Controller replied that they were cleared direct to VMI VOR and no delay was expected. As the flight progressed to a position about 18 NM from VMI, the Controller instructed the crew to maintain 4000 feet and cleared it to the east of the airfield. The Commander then complied with the Controller's instruction to hold at 4000 feet and proceeded to east of the airfield. The crew then declared visual with the airfield and was cleared to descend to 3000 feet. Subsequently, the commander made right turn, maintained reciprocal heading and then turned right for 270° change of heading. The Commander saw the very dim airfield lights when they were passing 3478 feet from a position 3 NM east of the airfield. The crew identified the airfield and turned left, received ATC instructions to descend below 3000 feet and the Approach Controller cleared them for final Runway 02. The Approach Controller added they were to accommodate one Cessna 208, TSE504 departure.

ATC clearance to hold BI839 east of the airfield was not a published procedure. The hold would pose many difficulties to discerning pilots especially during night and poor weather such as haze or thunderstorm. ATIS weather information as the Commander received it, reported as 2 NM visibility, present weather fine, cloud base 1400 feet, broken 1500 feet. At 4000 feet, as evidenced, the crew experienced great difficulty in recognising the airfield even though they were almost overhead. ATIS information had been quite correct. Therefore, at night and in a condition stated above, BI839 should have been instructed by ATC to hold over VMI which is a published holding pattern. Further more, when ATC gave clearance for BI839 to hold, the aircraft was still under IFR flight plan which rightfully required the aircraft to hold at a published holding pattern.

The Miri Control Area as published in Aeronautical Information Publication RAC1 -- 211 extends 25NM to the south of Miri from ground level to 7000 feet. As is published in the Aeronautical Information Publication Malaysia, the Rules of the Air and Air Traffic Services Procedures (Applicable in Malaysia, Differences from ICAO Regulatory Material, (Para 1 a) 2.2 1), state that all flights shall be conducted in accordance with IFR during the hours between sunset and sunrise.

Any crew, if required by ATC to hold east of the airfield will encounter difficulties particularly in positions fixing. As in the case of BI839, the crew had difficulties in estimating their precise distance from the runway, thus they were unable to orientate their position to join a proper downwind leg.

If the crew rejected the controller's east of the field instruction and instead proceeded to VMI holding pattern, all departing aircraft proceeding north of the Miri airfield would be height restricted. This would create inconvenience to departing traffic but would guarantee an efficient and safe hold for any aircraft required to hold. It would also make it easier for the controller to know the aircraft position.

### 2.3 Circuit

After the crew had positively identified the airfield, before they received the instruction to descend to 3000 feet, the Commander indicated to his First Officer that he wanted to go back to early downwind position Runway 20. The First Officer replied that the airfield was at the back (the aircraft was heading 188°). The Commander then said "Okay, you keep in contact". The Commander stopped the turn and maintained heading between 201° and 187° for another 4 NM for late downwind position. Had the commander continued his turn to join early downwind, the aircraft would again end up east of the airfield. This would probably be a better choice as the crew could easily lose height and joined a normal circuit whilst keeping the airfield and Miri town in sight. The lights from the airfield and Miri town would also provide a better visible horizon thus improving a visual judgment of any obstacles.

As the flight progressed, the aircraft descended lower. The Commander asked several times whether the First Officer could still see the airfield lights. At this stage, there was no evidence to indicate that the First Officer had lost visual contact with the runway lights.

When the Approach Controller requested the aircraft's position, the First Officer replied that they were extending their downwind leg. The Approach Controller wanted the aircraft position to ensure that the aircraft had not turned onto base leg yet, as TSE 504 was taxiing to take off position Runway 02. The controller did not specifically ask for the aircraft position from the crew as he was very busy communicating with other aircraft, namely, from 9M-MDJ, MH 2358, an unidentified good night greeting transmissions and TSE 504. The Controller should have been aware that extending downwind leg by BI839 brought the aircraft closer to the high grounds. A sound situational awareness on the part of the controller could have assisted and alerted the crew that they were in close proximity of high ground.

When The First Officer requested confirmation for clearance to final position, the Approach Controller said "... mmm clear to join aaaa.. five miles, final runway". The Controller was not quite ready to clear the aircraft to join final as TSE 504 was still back tracking and took them 20 seconds later to depart. It was determined that had BI839 were to turn final when the First Officer made the first request, a 5 minutes 20 seconds separation from the two aircraft would exist. This would have averted the aircraft from encroaching into an area of high ground.

#### **2.4 Visual Flight at Night**

When the aircraft was on the down wind leg, the Commander depended upon the First Officer to maintain visual contact with the airfield. Although the First Officer had visual contact with the airfield, the Commander had no visible horizon, nor lights from the ground to indicate any shadow of obstacles. As the area south Miri is a plain of primary and patches of secondary jungle, with high grounds to the east, there were no towns, villages, street lights nor houses that could be visible. In moonless night, if one is flying in this area, he is flying in total IMC, nor were there useful horizon. The lack of visible horizon was most likely after the aircraft set out for the downwind leg, especially after passing the abeam end of runway.

#### **2.5 Traffic Situation**

The aircraft in the Approach Control, when the BI 839 joined in from Brunei Airport, included MH 2358 holding at Bakam; MH 3728 landing on Runway 02, 9M-MDJ and MH 2625 in circuit and TSE 504, about to take off. In Miri, the Approach Controller practices procedural control where each aircraft maintains safe separation either laterally or vertically. In this procedure the Controller directs every pilot to pre designated air routes and altitude that each aircraft shall maintain.

In Miri, the controlling system is divided into Approach Control that sequence the aircraft after taking over from Area Control Center and hand them over to Tower for visual landing. On ground, aircraft would be transferred to Ground Control who direct them to parking apron. For departing aircraft, however, the Controllers apply the reverse procedures.

In the eleven minutes, the Approach Controller had to direct 6 aircraft including BI839. All aircraft except BI839 were departing or arriving via west of Miri. BI 839 entered Miri Approach Control from the North East at 4000 feet. As the other aircraft would be gone or had landed, BI839 was the last flight of the night. So if the crew could approach the airfield on Visual Flight Rules (VFR) instead of Instrument Flight Rules (IFR), this would relieve some of the Controller's responsibilities and work loads and at the same time allowed the aircraft to land within a shorter period. Therefore, these could be the reason as to why BI839 was planned and asked to hold east of the airfield.

## 2.6 The Flight Crew

The Commander had the appropriate licence and qualification to conduct the flight and had current instrument rating. His licence warranted him to conduct the night flight operation. He was not an employee of Merpati Intan Sdn. Bhd., but was an employee of Pelangi Air Sdn. Bhd., an air service operator at the Kuala Lumpur International Airport. The Commander operated the same type of aircraft, a very slight variant from one that Merpati Intan owned. As in this case, the Pelangi Air entered an agreement to lease its Commander to Merpati Intan on ad hoc or on short term basis expiring when the new company was able to hire a permanent commander.

The First Officer had the appropriate licence and qualification to conduct the flight and had current instrument rating. His licence warranted him to conduct the night flight operation as copilot. He was an employee of Merpati Intan Sdn. Bhd.

The operator's flight schedules were mainly daylight operations. Though the flight crew were properly licensed to undertake the flight, they did not have much experience in night operations around Miri airfield. The lack of local knowledge was obvious when the crew opted to maintain a 1500 foot wide circuit when there were obstacles exceeding this height.

From the FDR and CVR, the crew had not performed well during flight especially after contacting Miri Approach. When the crew sighted the airfield, they initiated visual approach to the airfield. However, as stated in the AIP, RACT1-2.2:

### Visual Approach

When the pilot of an IFR flight reports that he has and can maintain the aerodrome in sight, the flight may be cleared for visual approach provided the pilot has indicated such and the conditions of para 8.(1a) & (1b) are met.

- a) the reported ceiling is at or above the approved initial approach level for the aircraft so cleared;
- b) the pilot reports at the initial approach level or at any time during the instrument approach procedure that the meteorological conditions are such that with reasonable assurance a visual approach and landing can be completed.

The crew however, with respect to the above statement, accepted the controller's instruction to hold east of the airfield. In IMC and moonless night, IFR was still applicable. They were also not at initial approach altitude nor were in the process of conducting the instrument approach procedure, although they might have the assurance they could complete a visual approach and landing.

## 2.7 Air Traffic Controller

From the FDR and CVR, the Approach Controller had performed well to control all departing and landing aircraft. However, he did not intend to provide IFR procedures on B1839 throughout the flight. As B1839 approached the airfield from Brunei, at 4000 feet, the approach to the airfield was initially made on IFR. In IFR condition, it

would be inappropriate for the controller to clear BI839 to the east of the airfield, then few minutes later said again to hold east of the field and "report visual with the field." The action by the controller, asking the crew to report visually, had coax them into changing the applicable flight rules. If the Approach Controller had been aware of the meteorological reported cloud ceiling of 1400 feet and 2 NM visibility, he should not clear or prompt the aircraft for a visual approach.

Visual Approach had been much debated by pilots and air traffic controllers. The pilots had depended upon the controllers whilst the controllers had also depended upon the pilots to reduce their workload. Some pilots expected the controllers to monitor their safety altitude limitations and some controllers expected the pilots to monitor the same. Both personnel have their own workload whilst on duty, but both should also be vigilant and checking one another. However, when both of them are overloaded with work that is caused especially by lack of facilities, the vigilance and the checking of one another is not conducted or often neglected. The air crew and the controller, in this case, lacked the knowledge about the visual approach requirements that is stipulated in the AIP. Eventually, an instruction from a controller who is not aware of the requirement, is accepted by the crew who are also not aware of the same.

## **2.8 The Operating Company**

Merpati Intan Sdn.Bhd., as stipulated in the Certificate of Registration of Aircraft issued by DCA Malaysia, was at the time of accident, the Hirer/Charterer of the aircraft whilst the owner was Royal Brunei Airlines. At that time, Merpati Intan Sdn.Bhd. was in the process of obtaining DCA Malaysia's Air Operating Permit (AOP) and Air Operators Certificate (AOC). The AOP is DCA's economic grant to a company or a person requesting to conduct non schedule air transportation of passengers, goods, mail or aerial works in the country and internationally. The process, that existed before the promulgation of Malaysian Civil Aviation Regulations (MCAIR) 1996, includes various aspects of route studies, organizational structure, inspections of aircraft airworthiness and flight operations requirements. Whereas the AOC, introduced in the new MCAIR 1996, is DCA's safety grant to a company or a person that request to conduct either air service or non schedule transportation of passengers, goods, mail or aerial works in the country and internationally. The process of AOC also includes various aspects of studies, documentations, verifications, inspections and certifications in line with ICAO specifications and references to the Ministry of Transport.

As Merpati Intan Sdn. Bhd, did not have its own aircraft maintenance facilities to ensure compliance with airworthiness requirements, the company made agreements with Boskym Udara Sdn. Bhd, to conduct the airworthiness functions of its aircraft and records. The aircraft underwent Scheduled Maintenance and Boskym Udara Sdn. Bhd. using the Air Tech Malaysia format, issued the Certificate of Release to Service on 12 August,1997. The aircraft, had valid documentation and the maintenance facility maintained it in accordance with the appropriate maintenance schedule and its records were in good order.

Although, at that time Merpati Intan Sdn. Bhd., had an operational organisation and personnel to conduct the flight operational control over the preparations, planning, training, flight procedures, management, or addressing deficiencies, but DCA had not approved the company's application for an AOP. As the aircraft were already available for operation, the company made an agreement to assign its flight operational functions to another non scheduled company, Hornbill Sdn. Bhd., that was based in Kuching, Sarawak. Hornbill Skyways Sdn. Bhd. had been operating with an AOP, a non scheduled operator conducting rotary and fixed wing flights for many years. However, it had not been operating Dornier 228 type of aircraft, but was operating several SC 7 Skyvan on similar type of operation. Hornbill Skyways then became responsible to all operational requirement for Merpati Intan's operation in Miri, as was agreed, for two months.

Though Hornbill Skyways was to provide operational control on all flight operation matters, there was very little evidence to indicate that this had been done effectively. It appeared that this arrangement was merely a commercial exercise. Several key personnel within Hornbill Skyways particularly flight operation were not even aware of this arrangement.

### **3 Conclusions**

Following is a list of findings and causes established in the investigation.

#### **3.1 Findings**

- 3.1.1 The Flight Data Recorder and Cockpit Voice Recorder revealed most of the clues to the causes of this accident.
- 3.1.2 Initially Miri Approach Controller cleared the aircraft direct to Victor Mike India (VMI) and no delay was expected but later cleared it to east of the airfield.
- 3.1.3 The Commander replied they would proceed direct to Victor Mike India (VMI) and then complied with the Controller's instruction to hold at 4000 feet and proceeded to east of the airfield.
- 3.1.4 The Commander saw the very dim airfield lights when they were passing 3478 feet from a position 3 NM east of the airfield. The crew identified the airfield and turned left, received ATC instructions to descend below 3000 feet.
- 3.1.5 The Approach Controller cleared them to final Runway 02 and added that they had to accommodate one Cessna 208 departure.
- 3.1.6 Commander indicated to his First Officer that he wanted to go back to early downwind leg.
- 3.1.7 Approach Controller wanted the aircraft's position but did not specifically ask for Radial, DME and height from the aircraft.
- 3.1.8 The First Officer requested confirmation for clearance to final position, but Approach Controller said "... mmm clear to join aaaa... five miles, final runway".
- 3.1.9 The ICAO Regulatory Material, Para 1 a) 2.2 1 in the Malaysian AIP states that all flights shall be conducted in accordance with IFR during the hours between sunset and sunrise.
- 3.1.10 Holding east of the field is not a published procedure.
- 3.1.11 Holding east of the airfield at night poses many difficulties.
- 3.1.12 Miri weather was 2 NM visibility, weather fine, cloud base 1400 feet, broken 1500 feet.
- 3.1.13 During downwind leg, the Commander had no visible horizon, nor lights from the ground that can become a useful horizon to indicate any shadow of obstacles.

- 3.1.14 Miri Aerodrome Control is divided into Approach Control, Tower and Ground Control. Very often, due to insufficient controller, Approach Controller conducts the Tower Controller duties even during busy conditions.
- 3.1.15 The Merpati Intan Sdn. Bhd. was in the process of obtaining DCA Malaysia Air Operating Permit when the accident occurred.
- 3.1.16 Merpati Intan Sdn. Bhd. as it had not obtained AOP yet, hired Boskym Udara Sdn. Bhd. to service its aircraft, entered into an agreement with Hornbills Skyways. Sdn. Bhd. to conduct flight operational functions and leased a pilot from Pelangi Air.
- 3.1.17 Merpati Intan Sdn. Bhd. besides it had to obtain Air Operating Permit, it had also to obtain AOC as required in the Malaysian Civil Aviation Regulation 1996.
- 3.1.18 The Commander had the appropriate licence and qualification to conduct the flight and had current instrument rating.
- 3.1.19 The Commander underwent his basic and advance flight training in the Royal Malaysian Air Force and DCA issued the civil Commercial Pilot's License on the basis of his experience in the Air Force.
- 3.1.20 The First Officer had the appropriate licence and qualification to conduct the flight and had current instrument rating.
- 3.1.21 The crew's judgment and knowledge on IFR procedures were not satisfactory.
- 3.1.22 The crew accepted the controller's instruction to hold east of the airfield at 4000 feet although the reported ceiling (cloud base) was 1400 feet and 1500 feet, a moon less night where IFR was applicable.
- 3.1.23 The Approach Controller instructed the crew of the aircraft to hold east of the airfield; before the Commander reported passing VMI; the pilot had not reported that he could maintain the aerodrome in sight; the aircraft was not conducting an instrument approach; and there were no radar being used.
- 3.1.24 The Lambir Hill, 1525 feet high, 8.4 Nm from the airfield, where the plane crashed into, did not have obstruction light on it.

## **3.2 Casual Factors**

- 3.2.1 Commander's and the First Officer's decision to execute a visual approach when the reported ceiling was below the approved initial approach level stated in the Terminal Approach Chart;



- 3.2.2 Commander's and the First Officer's inability to navigate visually in IMC after they had declared visual with the airfield;
- 3.3 Whereas the following are contributory factors to the causes of the accident:
  - 3.3.1 The Air Traffic Controller's decision to clear the aircraft to execute a visual approach when the reported ceiling was below the approved initial approach level in the Terminal Approach Chart; and
- 3.4 Whereas the investigator has observed that:
  - 3.4.1 Hornbill Skyway's operational control was insufficient to ensure a pilot that was not his employee and that he had the necessary qualifications to conduct the charter.

## 4 **Safety Recommendations**

Following is investigator's brief statement of recommendations made for the purpose of accident prevention and resultant corrective action.

- 4.1 DCA shall, through which ever means, inform all air crew to strictly adhere the rules of the air especially in relation to visual approach in IFR conditions;
- 4.2 DCA shall ensure that all air traffic controllers in the state to adhere strictly to the rules of the air especially in relation to visual approach in IFR conditions;
- 4.3 DCA shall, in order to lessen the controller's and pilot's growing workload in Miri Aerodrome, consider installing a radar system;
- 4.4 DCA shall ensure that all operators have obtained the safety relevant safety standards before conducting their operations and ensure they continuously conform to the authority's specification from then on; and
- 4.5 DCA shall review the existing Right hand circuit pattern for Runway 02.

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## Appendices

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CVR Transcript from 9M-MIA (from ATC handover to MIRI Approach)

TRANSCRIPT OF THE COCKPIT VOICE RECORDER FITTED TO DORNIER 228-212 9M-MIA WHICH CRASHED ON 6 SEPTEMBER 1997 AT MIRI IN MALAYSIA.

THE CONTENT OF THE TRANSCRIPT COVERS THE PERIOD FROM THE ATC HANDOVER TO MIRI APPROACH.

THE TRANSCRIPT HAS BEEN GENERATED BY THE MALAYSIAN DEPARTMENT OF CIVIL AVIATION IN CONJUNCTION WITH THE AIR ACCIDENTS INVESTIGATION BRANCH, UK.

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ATC		FLIGHT DATA RECORDER				Sources		COCKPIT VOICE RECORDER		Sources		ATC VOICE RECORDER	
Time Local	Time (m.s)	Sec to go	Altt'd Feet	IAS kts	Hdg deg								
	15:02	949	4059	180	244	P2			30 miles.				
						P1			Okay.				
						P2			So we ....				
						P1			Call Approaching Anduki.				
						P2			Okay.				
	15:09	942	4080	182	244	P2 RT			Brunei 839, Approaching Anduki this time 4000 feet.				
						Brunei Approach			839 maintain eh....four. Contact MIRI one two three decimal three.				
						P2 RT			Maintain four thousand feet, eh.. over to MIRI on one two three decimal three. Good night sir, Thank you.				
						P1			Okay lah				
192720	15:42	909	4130	181	234	P2 RT			MIRI Approach, Brunei 839. Good evening.				
192727	15:49	902	4130	181	238	Approach			Brunei 839, good evening. Go ahead.				
	15:54	897	4140	181	243	P2 RT			Brunei 839. Released by Brunei radar. Maintaining four thousand feet. Currently two nine DME Victor Mike India on radial of eh.....				
						P1			zero six zero.				
						P2 RT			...zero....				
						P1			...six zero.				
						P2 RT			... zero five five.				
						P1			Okay.				
						P2 RT			Victor Mike India estimate, eh..... Victor Mike India time four four.				
	16:16	875	4110	181	250	Approach			Brunei 839 is cleared to Victor Mike India four thousand and eh.....no delay expected runway 02. Maintain radial zero five five.				
						P1			Okay.				
192807	16:29	865	4081	183	246	P2 RT			Cleared direct to Victor Mike India four thousand....feet on the radial of zero five five. Brunei 839 no delay expected.				
						Approach			Brunei 839.				
		834	4050	184	235					MH2625		Miri Malaysian 2625	
										Approach		Malaysian 2625 taxi to holding point	
										MH2625		Holding point, Malaysian 2625 request ATC.	
										Approach		Standby Sir.	
										Approach		9DJ, surface wind, light and variable, cleared for touch and go, confirm making missed approach, sir?	
										9MDJ		Negative, touch and go.	
										Approach		9DJ, surface wind is light and variable, cleared for touch and go, left turn.	
										9M-MDJ		9DJ	
	17:08	821	4037	181	212	P1			Oh I wonder lah, we try wide circuit				
						P2			Ah... ha..				

CVR TRANSCRIPT FROM 9M-MIA

AIR ACCIDENT INVESTIGATION REPORT No: 08/97

192824					P1	Kalau tidak we can request for runway 20	Approach	Malaysia 2625 ATC
					P2	Ah.....		
					P1	Ah .. tak apa lah never mind,	MH2625	Go ahead.
17:16	815	4037	183	245	P2	So we expected a ...	Approach	Malaysia 2625 is cleared to Kuching via Golf 580 to cruise flight level 310, squawk 0500.
					P1	We go downwind,		
					P2	Victor mike ?	MH2625	Roger 2625 is cleared Kuching light lever 310/0500 we have 152 on board endurance two and half hours.
192920	787	4052	183	247			Approach	2625.
							Approach	Malaysian 3728 descend below two thousand.
							MH3728	Roger cleared below two thousand. Confirm cleared for ILS?
							Approach	Malaysia 3728 Affirm.
							MH3738	3728.
192932	775	4080	181	241	P1	So now we have to do the eh..Bakam m ... Bakam.	MH2358	Malaysia 2358 five thousand picking up Bakam Hold now.
					P2	Bakam, I got....	Approach	Malaysia 2358
					P1	Okay itu dia...		
					P2	Bakam is 395		
					P1	Okay.		
					P2	on the radial of a ... zero two.....		
					P1	What's the distance? Ten point five eh?		
					P2	zwro		
					P1	FAP dia ... ten point five eh?		
					P2	Ah... one zero five.		
					P1	Okay		
					P2	Ten point five and ah.....two thousand eight hundred feet.		
					P1	Okay.		
18:22	749	4141	181	252	P1	Holding...holding height two thousand eight?		
					P2	Yeah, two thousand eight.		
					P1	Okay.		
193003							Approach	Malaysia 3728 your range from touch down, and your level passing?
193010							MH3728	Malaysia 3728 passing two thousand, six miles.
							Approach	Malaysian 3728 surface wind light and variable, runway 02, cleared to land.
							MH3728	Cleared runway 02, Malaysia 3728.
193034							Approach	Malaysia 3728.
							Approach	Malaysian 2358, descend to three thousands, report turning in bound.
							MH2358	Leaving 5000 for 3000, call again turning inbound Malaysia 2358.
							Approach	2358.
19:07	704	4059	184	241	P2	So we request lower?		
					P1	Okay, say descend 3000.		
					P2	Ya.		

193051									P2 RT	Brunei 839 18 DME Victor Mike India. Request lower?		
	19:18	693	4029	185	244				Approach	Brunei 839 maintain four thousand and clear to east of the field. You are number three in sequence.		
193104	19:22	689	4007	186	246				P2 RT	Maintain four thousand east of the field and number three in sequence. Brunei 839.		
	19:35	676	3948	187	250				Approach	Brunei 839.		
									P2	East of the field....		
									P1	Okay, East.		
									P2	.... and descend four thousand feet....		
									P1	Four thousand.		
									P2	....number three.		
									P1	Four thousand. Number three.		
									P2	Yeah.		
	19:42	669	3940	187	246				P1	Mana MIRI punya apron light ? nampak ?		
									P2	Tak nampak...		
									P1	Belum lagi...		
									P2	Tak nampak		
									P1	Belum lagi.		
									P2	Okay		
	19:50	661	3918	186	241				P1	There is...town okay... MIRI town ye.		
	19:52	659	3918	185	242				P2	We go Victor Mike India first lah.		
	19:54	657	3926	185	243				P1	Okay, okay, one and two on VOR. ILS apa frequency?		
	20:10	641	3940	183	244				P2	One and two VOR		
									P1	Dia punya ILS apa frequency ?		
193142									P2	I put..... one one zero .....	TSE 504	Approach Transmile 504, holding point, ready.
									P2	...one one zero.		Transmile 504, holding point, you are number 2 for departure.
									P1	One one zero, okay.		Roger number 2, Transmile504
									P1	Okay, set both on VOR now.		
									P2	Okay, both on ILS now.		
									P1	Okay.		
193158	20:40	611	3903	185	239						Approach	Malaysian 2358. You're position in the hold.
											M 2358	We are turning inbound now, passing four thousand.
											Approach	Malaysian 2358. On turning inbound, clear for Bakam Approach and slow down to accommodate one Boeing departure runway 02.
											M 2358	Roger clear Bakam Approach and Malaysia 2358.
											Approach	2358
	20:50	601	3926	183	237				P1	Oh...tak nampak dia punya lighting.		
									P2	Tak nampak jugak.		
									P1	Hazy eh...		
									P2	Ah....		
	20:54	597	3948	182	238				P1	Sudah one or two miles....dekat dah..		
193235	21:00	591	3963	181	238				P2	About five miles.	9M-MDJ	MDJ left hand downwind one thousand feet we like to climb

193245						P1	Yeah.		Approach	west of the airfield for three thousand. 9DJ, initially maintain one thousand, hold west of the field radial 270 or greater
193250									9M-MDJ	Roger, one thousand, holding west of the airfield, 270 or greater, copied.
193303				183	225				Approach	9DJ - confirm established on radial 270 or greater.
									9M-MDJ	We are crossing radial presently of 260.
193317				184	238				Approach	9DJ - R-report established on Radial 270 or greater.
									9M-MDJ	Will call establish radial 270 or greater.
									Approach	Malaysia 2625 - Behind the landing Twin Otter, line up runway 02, behind.
									MH2625	Line up behind Twin Otter, Malaysia 2625.
									Approach	2625
									Unknown	helo ya ya .....tengan busy. Sibua weather.
	22:00	531	4014	178	240					
193410		497	3985	183	242				9M-MDJ	9DJ crossing radial 270
193437	23:00	471	4029	179	239	P2 RT	Brunei 839 is eh.....east of the airfield this time.		Approach	9DJ
	23:10	461	4052	179	239				Approach	Malaysia 2358 your..... report your position.
									MH2358	Just left Bakam two thousand eight hundred Malaysia 3258
									Approach	Malaysia 2358 report passing two thousand.
									MH2358	Malaysia 2358
	23:23					P1	Boleh nampak....			
						P2	Ah.....boleh nampak.			
						P1	Miri bawah okay.			
	23:24	447	4007	183	228	P2	Ah roger, I just told them we're visual with the field.			
193505		442	3992	183	223	P1	Call 4000 east of the airfield.		Approach	To roll pass thank you
										343 welcome
	23:34	437	3970	183	221					3728 roll pass --- Sorry guy, a bit slow.
										Don't worry.
193521	23:40	431	3992	182	221				Approach	Malaysian 2625, expedite lineup, runway 02.
193530	23:41	430	3985	182	221	P2	Are you sure that one is the airfield?		M 2625	Expedite lineup runway 02, Malaysian 2625.
						P1	No, not yet.		Approach	Malaysia 3728 cleared back track to apron.
	23:54	417	4037	180	213	P1	Itu hangar light kan... yang hujung sana tu..		MH3728	cleared back track Malaysia 3728.
						P2	Uh?			
						P1	Hangar light ?			
						P2	Mana.			
						P1	Tu sana dekat airfield.			
	24:01	410	4081	178	214	P1	Re check the airfield?			
193540	24:02	404	4133	176	220	Approach	Brunei 839, confirm visual with the field?			



193545							P1 P2 RT P1	Standby. Brunei 839. Mana.	
	24:14	397	4200	173	222		Approach	Brunei 839 to hold east of the field and report visual with the field.	
193559							P2 RT	Copied that. Hold east of the field. Brunei 839.	
	24:25	386	4223	175	236		Approach P1	Brunei 839. Your distance from Victor Mike India DME? One only...one point five DME.	
193606							P2 RT Approach P1	Currently 1.5 VMI. Brunei 839 .....	
	24:35	376	4185	178	230		P1	Okay its clear.	
							P2	Ah ...	
							Approach	.....to keep clear of the airfield. One Boeing will be taking off runway 02.	
	24:45	366	4133	181	192		P2	Oh yah....visual with the field.	
							P1	Okay	
							P2	Yah... Okay.	
	24:49	362	4081	184	180		P1	Okay, keep clear west....east of the field.	
193627							P2 RT	Copied that Brunei 839 is visual of the field at this time.	
							P1	Bawah kan..	
							Approach	839	
	24:58	353	3985	189	160		P1	I told you already we are to the left. We are close already.	
193658	25:10	341	3918	190	127		P1	Ok, I just reduce the speed a bit, standby.	Malaysia 2625 Runway 02 Left turn after passing two thousand, clear for take off. Roger, cleared for take off, left turn passing two thousand MH2625. 2625
							Approach		
							P2	Ok reduce the speed.	
							P1	No problem. About 65 knots	
							Sound	Warning horn. (3 times)	
193652	25:15	336	3948	184	117		Approach	Brunei 839, your radial crossing and distance from VMI DME?	
							P1	Radial one six zero....	
							P2	Okay	
							P1 RT	..four miles	
193701		326	4074	165	95		P2	One four zero.	Malaysia 2358 passing one thousand three hundred and five DME.
							P1	Yeah	
	25:29	322	4100	159	85		Approach	Malaysia 2358 to orbit on final if unable to continue. Malaysia 2358.	
193715							P2 RT	Brunei 834(9) is crossing radial of a... 125 this time maintaining 4000 feet.	
							Approach	Brunei 839, your distance from VMI DME?	
							P1	Four miles	
							P2 RT	3.6 Victor Mike India	

193725	25:52	299	4163	144	34	Approach P1	Brunei 839 descend to three thousand east of the field. Okay.	
						P2 RT P1	Descend three thousand east of the field, Brunei 839. Okay	
						Sound Approach P2 RT P1	Warning horn. (2 times) 839. Leaving 4000 feet this time, Brunei 839. for three thousand? Yeah. For three thousand.	
193740						P2 P1 P1 P2	Okay	
	26:10	281	4000	148	26	P1	We have Boeing taking off.	
	26:11	280	3992	148	26	P2	You got the runway in sight?	
						P1 P2	Yeah. Okay	
193800		267	3903	147	44	P1 P2	Okay, I make a right turn. eh	MH 2358 Approach
						P1 P1	Okay. Oh... tak descend lagi.	
	26:33	258	3904	143	54	P1 P2	You check again the runway there. Okay	
	26:36	255	3589	144	69	P1 P2	Di sini any ground...high ground...tak ada kan. tak ada	
193815		252	3815	147	85			Approach Malaysia 2358, surface wind, light and variable, runway 02 cleared to land.
	26:41	250	3778	148	95	P2 P1 P2	not within 4 miles.. With in ? Not within in four miles, yeah.	
	26:48	243	3660	151	128	P1 P2 P1 P2	Four miles. Yah. Da da 8 miles. Yah.. about 8 miles.	MH2358 Malaysia 2358.
						P1 P2 P1 P1	Okay, lah. Turning right now you check again the airfield eh. 73 taking off. Okay. Bank angle on	Approach Malaysia 2358
						P1 P2 P1	Okay 15 degrees cukup la	
193845	27:07	224	3493	146	219	Approach	Brunei 839 cleared to track long final, runway 02 from right base.	
	27:16	215	3536	137	260	P2 RT Approach P1 P2	Copied, cleared to track long final, runway 02. Brunei 839. 839 Ok, mana runway. Okay, aircraft.... Ok. Aircraft....	
	27:25	206	3624	126	265	P1	Aircraft taking off. Ok. Airfield in sight.	

							P2	Airfield is there. Two big lights.	
							P1	Zero two?	
							P2	Zero two, right base, zero two.	
							P1	Okay.	
							P2	I got the aircraft visual.	
27:55	196	3668	120	294			P1	We go for downwind, yeah?	
							P2	Okay. Right base.	
							P1	Close slowly descend to ....how many?	
							P2	Ah. Descend to three thousand feet.	
							P1	Okay	
							P2	She asks us to join a long final for runway zero two.	
							P1	Okay	
							P2	One aircraft is on final.....	
							P1	Okay	
							P2	.....you see the aircraft?	
							P1	Satu sudah airborne tadi.	
							P2	ah ha....	
193936	27:52	179	3478	134	278		P1	Oh.....airfield lighting very dim la ya.	
							P2	That's why. Can only.....	Approach
							P1	Calling us? No	9M-MDJ
									Approach
							P2	Okay.	
28:06	165	3347	140	255			P2	So I give tune this to zero two.... zero four	
							P1	Zero two ....Okay.	
							P2	Is set. Zero.....Sorry.....okay, zero two four.	
							P1	Okay.	
							P2	set Zero two four?	
193959	28:25	146	3151	144	194		P1 RT	839 downwind at three thousand feet.	
	28:28	143	3115	145	189		Approach	Brunei 839 descend below three thousand, clear final runway zero two. Slow down to accommodate one Cessna 208 departure.	
	28:36	135	3015	147	181		P1 RT	Copied, descend below two thousand.....three thousand.	
	28:40	131	2950	148	179		P2	I still got the airfield visual.	
							Approach	839	
									Approach
							P1	Zero two zero.	Malaysia 2358, cleared back track to apron.
							P2	Ya.. about six miles we start turning.	MH 2358
							P1	Okay	Approach
							P1	Okay, I go back downwind eh?	Approach
							P2	Ah, downwind 20.	
							P1	Runway 20 lah.	
							P2	Ah....	
29:00	111	2742	145	188			P2	Airfield is at the back.	

194037						P1	Okay, you just keep in contact.				TSE 504	Roger cleared to enter runway to follow the Fokker for runway 02. 504
						P2	Ah ha.				Approach	504 Miri.
	29:10	101	2657	142	201	P1	Okay, give landing lights on.				Approach	Malaysia 2358 Miri.
						P2	Okay.				MH 2358	Malaysia 2358 go.
						P1	Put .....ing..... lights off .....				Approach	Contact ground.
						P1	.....				Mh-2358	Over to ground, good night mam.
						P2	Flap to go.					
	29:15	96	2600	141	199	P1	Okay.....speed flap one tadi berapa?					
	29:20	91	2550	141	196	P2	Eh.....ninety seven.					
	29:22	89	2536	140	195	P1	Ok, Ada lagi nampak....				Approach	Good night.
						P2	Ah....					
						P1	Nampak lagi runway					
						P2	nampak...nampak...nampak					
						P1	Nampak ya.					
						P2	Ya. *					
	29:28	83	2487	138	192	P1	Six miles we turn...ya...					
194106		81	2465	139	192	P2	Ha.				9M-MDJ	MDJ any chances climb west of airfield three thousand or four thousand.
						P2	Ah you can turn now la no problem.				Approach	9DJ standby. after the Transmile 504 departure.
						P1	Tak apa lah....we still high, so continue descend ok.				9M-MDJ	Roger copied.
						P1	Itu one aircraft belum depart lagi.					Sibu weather if available.
	29:47	64	2219	137	192	P2	Okay. Speed lever to go.					235 night stopping here sir,
	29:50	61	2163	137	191	P1	Okay. Gear to go also, lah				Tower	Welcome
	29:55	56	2100	137	190	P2	I just give them a short brief.				Tower	Thank you.
						P1	Okay, six miles.					
						P1	****					
194140	30:02	49	2002	136	188	Approach	Brunei 839, report position?				Unknown	The other Fokker
	30:05	46	1960	135	189	P1	Long, extended runway.				Unknown	Good night Mahaan.
194145	30:08	43	1925	135	189	P2 RT	839 extending downwind.				Unknown	Bye
						Approach	Brunei 839.				Unknown	Bless mee
194150	30:13	38	1855	135	190	P2 RT	Confirm clear for final?				Unknown	eh
						Approach	Brunei 839 is mmm clear to join aaa..., five miles, final runway zero two.					
						P1	Okay					
194205		28				P2 RT	Copied 5 miles final runway 02, 839				Unknown	Brunei 839 ..... for saviah ...
						Approach	839					
						P1	Ok.					
194227	30:29	22	1682	131	187	P2	I'll give you ILS. Okay. Gears down eh?				TSE 504	504 is ready for 02
						P1	Okay				Unknown	.....(garble transmission, probably Brunei 839)
194235						P1	This one put on standby.				Approach	Transmile 504, left turn after passing two thousand, cleared for take off.
						P2	Ok. On ILS frequency now.					

194240	30:38	13	1613	130	197	P1	Okay. Good.	TSE 504	Left turn after passing two thousand feet, cleared for take off. 504.
194246	30:45	6	1551	129	213	P1	Speed below 140, flap one.	Approach	504
						P2	Ok, flaps one eh.		
						P1	Okay		
194251	30:46	5	1531	129	216	P2	Okay. Coming up.... slowly.		
194257	30:51	0	1462	129	232	P2	Oooh!		
							<i>sound of impact.</i>		
							<b>end of recording.</b>		
194253								MH 2625	Malaysia 2625 passing level 110 for 310.
								Approach	Malaysia 2625, contact Kota Kinabalu 126.1. Good night.
								MH 2625	Goodnight 2625
194325						Approach	Brunei 839, Report long final runway 02.		
194335						Approach	Brunei 839, Report long final runway 02.		
194351						Approach	Brunei 839, surface wind light and variable, runway 02 cleared to land.		
						Approach	Brunei 839, Miri.	9M-MDJ	Brunei 839, from Delta Juliet, Miri calling you.
								Approach	Delta Juliet Miri.
								Approach	Delta Juliet Miri.

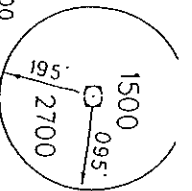
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# INSTRUMENT APPROACH CHART - ICAO

113.50

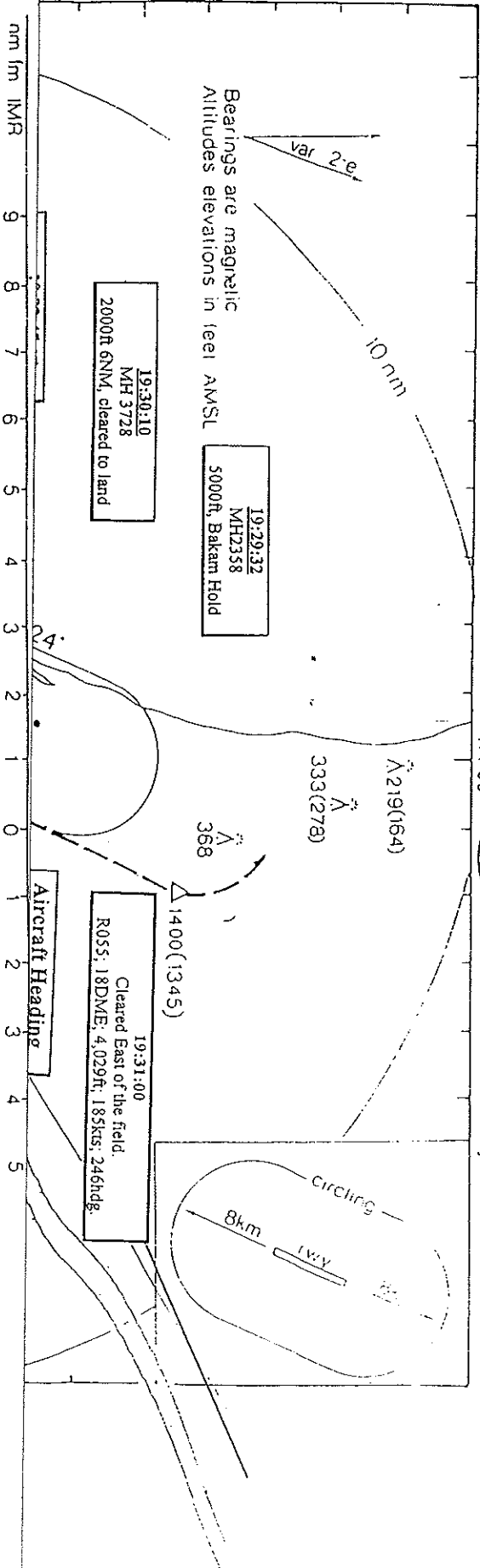
Ad elev 5511  
HEIGHTS RELATED TO  
TWR RWY 02 - ELEV 5511

114.00



TWR 123.3

MIRI SARAWAK  
Rwy 02 VOR/ILS/DME



19:30:10  
MH 3728  
2000ft GNM, cleared to land

19:29:32  
MH2358  
5000ft, Bakam Hold

19:31:00  
Cleared East of the field.  
ROSS: 18DME: 4.029ft, 185kts; 246hdg.

OCA(OCH)

Category of Aircraft	A	B	C	D
Straight - In - Approach	Cat ILS 335(280)	350(295)	360(305)	366(311)
Circling	GP Inop	450(395)	1800(1745)	
Visibility	800(745)		3.7km	4.6km
Distance	6 DME 1900(1845)	5 DME 1600(1545)	4 DME 1280(1225)	3 DME 970(915)
Altitude (heights)			2 DME 670(615)	1 DME 360(305)
Speed			70 knots	120 knots
FAR-MAP 6.1nm			90 knots	140 knots
Rate of descent/GS			5:15 min:sec	3:00 min:sec
			4:00 min:sec	2:40 min:sec
			3:55 min:sec	2:15 min:sec
			4:55 min:sec	1:45 min:sec

CHART 3