



**AIRCRAFT ACCIDENT REPORT NO 01/89**

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**REPORT ON THE ACCIDENT OF THE  
BOEING 747-200 (N807FT)  
AT 9.8 NM SOUTH EAST OF SUBANG INTERNATIONAL  
AIRPORT, SELANGOR, MALAYSIA  
ON 18 FEBRUARY 1989**

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DEPARTMENT OF CIVIL AVIATION

AIRCRAFT ACCIDENT

REPORT NO: 01/89

OPERATOR : FLYING TIGER LINE, INC.

AIRCRAFT : TYPE : BOEING 747-200

: NATIONALITY : UNITED STATES OF  
AMERICA

: REGISTRATION : N807FT

DATE AND TIME

OF ACCIDENT : 18TH FEBRUARY 1989

AT 0632 HRS.

PLACE OF ACCIDENT : 9.8 NM SOUTH EAST OF SUBANG  
INTERNATIONAL AIRPORT.

NOTE : All times in this report are  
local ( + 8 hours U.T.C. )

## SYNOPSIS

The accident was notified to the Chief Inspector of Aircraft Accidents by Subang Airport Air Traffic Control at 0650 hrs. on 18th. February 1989. The state of registry, which was also the state of operator and manufacturer (United States of America) was advised of the accident on that date and was invited to participate in the investigation as accredited representatives. The accredited representatives were from National Transportation Safety Board and Federal Aviation Administration and were accompanied by personnel from Boeing and Pratt & Whitney.

At 0632 hrs., flight 066, a Boeing 747-200, registration N807FT, was engaged on a scheduled cargo flight from Singapore Changi International Airport to Subang International Airport in Kuala Lumpur. It crashed 9 nautical miles (NM) South East of Subang International Airport whilst descending for a NDB approach to runway 33 at Subang. One occupant and three crew members were fatally injured and the aircraft was completely destroyed.

1.

FACTUAL INFORMATION

1.1

History of Flight

Flying Tiger, flight 066, was a scheduled cargo flight from Changi International Airport to Taipei, with an intermediate stop at Subang.

At 0603:20 hrs., flight 066, departed Changi on an IPR flight plan to Subang via Airways Alpha 464 with a crew of three and one passenger on board. The flight cruising altitude was flight level 200 and the first officer was the flying pilot.

Shortly after takeoff at 0605:10 hrs., flight 066 was instructed by Singapore tower to call Singapore radar on radio frequency 127.3 Mhz. The flight crew misread the message and acknowledged 'roger 120.3 Mhz'. Repeated attempts were made by the flight crew to call Singapore radar on 120.3 Mhz, but only to find out that they had misread the radio frequency given. At 0606:10 hrs. the flight crew established radio contact with Singapore radar on 127.3 Mhz and the flight was immediately cleared to climb to flight level 200 and was radar vectored to join Alpha 464. Flight 066 was later cleared to

resume normal navigation direct to Mike Charlie (MC) for its enroute flight to Subang.

At 0615:01 hrs., control of the flight was transferred to Lumpur Air Traffic Control and communications were immediately established. The flight was cleared to track direct to Kilo Lima, a final approached fix, equipped with NDB beacon, for NDB letdown and approach to runway 33 Subang. Shortly thereafter, the flight crew tuned on the Lumpur ATIS on frequency 127.6 Mhz, to receive the following information, 'This is the Kuala Lumpur Terminal information Juliet, time is two zero , runway three three, wind calm, visibility six thousand meters, misty, three octas ground level, six octas at one four thousand, temperature two three, dew point two two , QNH one zero one one, two nine decimal eight six, trend no significant change, approach light runway one five unserviceable, TVASI runway one five unserviceable, ILS runway three three unserviceable, threshold runway one five displaced by one eight three meters, landing distance available three two nine two meters'.

At 0621:20 hrs., flight 066 was instructed to descend to flight level 130 and 2 1/2 minutes later further clearance was given to continue descend to 7000 ft. on QNH 1011.

At 0624:36 hrs., passing 12000 ft., the control of the flight was transferred to Lumpur Tower. At this point, the flight was approximately 64 DME from VBA VOR. The controller cleared flight 066 to Kilo Lima at 7000 ft. Subsequently, the flight was advised 'Expect no delay be advised visibility the tower's observation visibility all round is about 3000 meters'. Flight 066 answered 'Okay, is the full runway open as far as the length of the runway goes'. The controller replied 'Affirmative full length available'. Flight 066 then replied 'Okay we read a bunch of Notams about holes and ditches and stuff like that we just wanted to make sure'.

At 0627:00 hrs., Lumpur tower controller requested from the flight crew the distance from VBA. After being told that the flight was 50 DME, the controller cleared the crew to descend to 5500 ft.

AT 0628:48 hrs., the first officer commented that 'we still got nothing but flags on the ILS'. The

commander replied 'yeah you are too far out there'. The first officer then said that 20 miles did not seem too far out. He then asked the commander to query Lumpur tower whether the ILS was working. At this time, flight 066 received and acknowledged two clearances to descend to 3500 ft. and then to 2700 ft.

At 0631:07 hrs., when the commander enquired about the status of the ILS, the tower replied 'ILS for 33 is not available. If you wish ILS 15 is available'. However, the commander immediately declined to carry out an ILS approach for runway 15, but opted to come straight in for runway 33. Shortly afterwards, the commander asked the first officer 'Alright just hit the Kilo Lima then make your turn to three zero zero'. The first officer then commented 'how in the # does he expect us to find the runway'. The commander then again prompted the first officer to "hit" Kilo Lima beacon and passing the beacon to turn to two two nine heading.

At 0631:51 hrs., the tower controller called flight 066 and said 'Tiger six descend - two four zero zero cleared for NDB approach runway three three'.

Immediately, the first officer made a remark 'NDB that # #' over the radio intercom. Approximately 7 seconds later, the commander acknowledged the clearance 'Okay four zero zero'. Although the read back was different from the clearance given, the commander's acknowledgment was not commented by ATC.

At 0632 hrs., the commander told the first officer 'alright go ahead I will set ya up'. He then continued 'you got them all set up right now, two five five and three five five'. Two five five and three five five were NDB/locator frequencies for Kilo Lima and South Marker located at 8.8 nm and 3.5 nm respectively, along the final approach for runway 33 Subang.

Twenty two seconds later, the first officer said to the commander 'I think they are not set up like that'. The commander replied 'yeah you got em set up'. The first officer insisted that the NDB frequency selection was not what the commander briefed. Following this there was a mild argument between the commander and the first officer over the selection of NDB and by the end of which, the commander admitted his error. As a result of this,



the commander then changed one of the NDB frequency from 338 Khz to 355 Khz and the agreed frequencies of 255 Khz and 355 Khz were set up.

At 0632:44 hrs., the first officer suggested to the commander '# this # lets go over and do ILS'. He then continued 'I haven't even got the # plate in front of me'. The commander replied 'You are alright just keep on going down to four hundred feet'. He then said to the first officer 'We go down you feel uncomfortable we don't break out we will make a miss okay'. The first officer then replied 'okay'.

During the descent, the cockpit voice recorder (CVR) indicated that the flight crew had carried out the in-range checks. At 0631:33 hrs., the first officer asked for 'Down to the line on the checklist'. His challenge was responded by the flight engineer 'okay do you want the INS now'. The checks were then disrupted, but, it was continued at 0633:25 hrs. when the flight engineer said 'gear down tilt check. Nav and auto flight panel'. At 0633:36 hrs. the CVR indicated that the flap handle was being moved, which was immediately followed by the first officer saying 'Lets go all the way on the check list'. Subsequently, the

flight crew progressed their checks, checking the speed brake, brakes and flap.

At 0633:54 hrs., the Ground Proximity Warning System (GPWS) whopper sounded and the "Pull Up Pull Up" voice warning began. The GPWS warning continued for 2.5 seconds. During the 2.5 seconds period, there was no remark made by the flight crew regarding the activation of GPWS.

At 0633:58 hrs., the commander said 'So you got the ILS set -right' and the first officer replied 'yeah'. The commander then told the first officer 'I'm gonna put you on fourteen seven and that'll give you -. ' At this time the GPWS whopper and pull up voice warning were again activated and continued for 7.5 seconds until impact. Towards the end of the warning, the flight engineer made a comment 'I've got a hundred feet on the -. ' However, his comment was a little too late as impact was imminent.

The accident occurred on the South Eastern slope of 'Bukit Hitam Puchong' in darkness, about 9.8 nm from Subang Airport, at an elevation of 481 ft. above sea level.

1.2 Injuries to persons

<u>Injuries</u>	<u>Crew</u>	<u>Passengers</u>	<u>Others</u>
Fatal	3	1	0
Non Fatal	0	0	0
None	0	0	0

1.3 Damage to Aircraft

The aircraft was destroyed by impact and ground fire.

1.4 Other Damage

There was minor damage to the forest reserve.

1.5 Personnel Information

The three crew members of flight 066 were qualified and certificated for the flight and had received training required by current regulations.

1.5.1 Commander

The commander, age 59, was employed by Flying Tiger on 20th. April 1955. He held FAA Airline Transport Pilot certificate No. 1290302 with an aircraft multi-engine land rating. He held type ratings for the Boeing 747, DC-4 , DC-8, L-1049, and CL-44. His last medical check was carried out on 1st.

August 1988 with the limitation that, 'he shall possess correcting lenses for near vision'.

The commander had a total flying hours of more than 25,500 hrs. He had flown about 92.59 hrs. for the last 90 days. In the 30 day and 24 hrs. periods preceding the accident he flew 51.23 and 0 hours, respectively.

Company records revealed that the commander had not flown into Kuala Lumpur in the last 18 months. Line check reports indicated that the commander was never checked on NDB approaches since 19th. April 1980. Nevertheless, several NDB approaches were noted to have been carried out in a simulator during proficiency check and the last one being on 27th. March 1988.

The last line check was successfully completed on 9th. February 1989. The check pilot who conducted the line check stated that he had examined the commander previously and that his proficiency "over the years has been above average. " The chief pilot of Flying Tiger described the commander as a "professional pilot. " He added that "you never heard his name mentioned in a derogatory sense" and that the commander did his job quietly without causing problems or attention from the central

management. Pilots who flew with the commander described him as friendly and said his cockpit style was relaxed. The commander was married, with several grown up children, and maintained homes in both Los Angeles and Las Vegas. According to several persons, the commander was in good spirit in the period before the accident and there were no major problems in his personal life. The commander planned to retire in December, 1989 when he would have become sixty years old.

1.5.2 First Officer

The first officer 54 years old, was hired by Flying Tiger in the year 1965. He held Airline Transport Pilot Certificate No. 1696349 with Commercial privileges and airplane single and multi engine land rating and type rating on DC-8. The first class medical was renewed on 7th. October 1988 with limitation, 'holder shall possess correcting glasses for near vision'.

The first officer initially qualified as a first officer on B747 in 1982 and last completed recurrent training on B747 on 28th. January 1989. He had flown to date a total of about 16,000 hours and in the 30 day and 24 hours periods preceding

the accident he flew 51.23 and 0 hours respectively. There was no record to indicate that he had flown into Kuala Lumpur in the last 18 months. Except for NDB approaches carried out in flight simulator during proficiency check, there was no record to indicate for the last few years that he had carried out a NDB approach on the aircraft.

The first officer was qualified as commander on the DC-8 aircraft and served in this capacity for a brief period in 1981. However, according to several persons, he preferred to work as co-pilot on the B747 at a lower rate of pay because his co-pilot seniority allowed him to work trips that permitted more time at home. The first officer was married to his current wife for eight years (his second marriage), lived in a house that the couple had recently built, and was reported to be in excellent spirits in the period before the accident. His wife stated that he called every night when he was away. The first officer owned a Cessna 182 aircraft, which he flew regularly for recreation. Other pilots described him as meticulous, immaculately groomed, and friendly.

1.5.3 Flight Engineer

The flight engineer, age 70, was employed by Flying Tiger on 12th. November 1956. He held Flight Engineer Certificate No. 1116160 with ratings on reciprocating engine powered aircraft, Turbo propeller powered aircraft and Turbo jet powered aircraft. He also held Airline Transport Certificate No. 1208156 and Commercial Pilot Certificate No. 1208156. His second class medical was renewed on 27th. February 1988 with limitation 'holder shall possess glasses for near vision'.

The flight engineer first obtained his flight engineer's licence on 21st. February 1948. He passed his last second officer check on 7th. February 1988 and his last line check on 12th. February 1988.

The flight engineer had accumulated an approximate total of 30,000 flying hours. In the 30 day and 24 hour periods preceding the accident, he flew 64.29 and 0 hours, respectively. He had not landed in Kuala Lumpur International Airport in the last 18 months.

The flight engineer retired from a position as commander when he reached age sixty years and returned to work as a flight engineer in the company. Several people indicated that his reason for returning was financial need. Captains who had flown with him described him as slow and deliberate but "able to get the job done."

#### 1.5.4 Aerodrome Controller

The aerodrome controller, 32 years old joined the Department of Civil Aviation in 1975. He held aerodrome control rating, which he obtained on 27th August 1977. On 1st October 1980 he was given an approach control rating. ~~Though he was a qualified approach controller, he was yet to obtain a radar rating.~~

#### 1.6 Aircraft Information

Type:	:	Boeing B747-249F
Reg:	:	N807FT
Manufacturer	:	Boeing Commercial Airplanes, Seattle, USA
Year of Manufacture	:	1979 Serial No. 21828



Owner : Flying Tiger Line  
Inc.

Certificate of Airworthiness : Certified by FAA on  
11 December 1979

Last Maint. : Check A on 17  
February 1989

Hours Flown Since last Maint. : 17 hours

Hours Flown Since New : 34,034 Hours

Max. regulated Landing wt. : 630,000 lbs.

Estimated wt. at time of accident : 462,000 lbs.

Estimated fuel remaining : 36,000 lbs.

The certificate of airworthiness of the aircraft was valid at the time of the accident and the aircraft had been maintained in accordance with existing company and FAA criteria.

A review of the aircraft's maintenance records did not disclose any recurrent write ups or discrepancies that could have a bearing on the accident.

Weight and balance computation showed that the weight of the aircraft at the time of the accident was 462,000 lbs.

The weight and balance were calculated to have been within limits at take off and at the time of the accident. The aircraft was fuelled with approximately 50,000 lbs. at take off and had approximately 36,000 lbs of fuel aboard at the time of the accident.

#### 1.7 Meteorological Information

On 19th. February 1989, the significant weather element prevailing over Subang Airport was mist/fog and the critical condition associated with it was poor visibility.

The mist set in around 2300 hrs., but visibility generally remained greater than 10 kilometers. The fog set in around 0345 hrs., deteriorating the visibility rapidly to 300 meters. The fog temporarily cleared at around 0530 hrs., with improvement of visibility to 6 km., though still in misty condition. Misty condition with visibility of about 6 km. prevailed until 0630 hrs. Fog set in again at around 0645 hrs., reducing visibility to 200 meters. The vertical extent of the fog was not measured at that particular period.

Throughout the misty and foggy morning, 2-5 octas of stratus at ground level and 3-6 octas of altocumulus with base at around 14000 feet were observed.

There was no meteorological observation station at or in the vicinity of the crash site. The nearest observation station available was at Subang Airport, which was about 9.8 nm away. Based on the satellite cloud pictures, there was no significant weather observed over the crash site.

Besides the generally calm surface condition, no strong wind up to the altitude of 5000 ft. was observed. The wind above 5000 ft. was generally easterly to south easterly at 10 to 35 knots. The temperature and dew point was 23° C and 22° C respectively while the QNH was 1011 hpa.

1.8

#### Aids to Navigation

Except for the ILS/DME for runway 33, all Navigational Aids at Subang International Airport were fully operational when flight 066 attempted a <sup>landing for</sup> NDB approach to runway 33. The ILS/DME for runway 33 had been unserviceable since 19th. August 1988 due to work in progress at Subang Airport.

The Navigational Aids in use for the NDB approach for runway 33 included the non directional beacon (Kilo Lima) and a Locator beacon (Sierra Mike). These aids were checked immediately after the accident and were found to be in serviceable state. The Kilo Lima beacon and Sierra Mike <sup>Locator</sup> beacon were transmitting on frequencies of 255 Khz and 355 Khz respectively.

The published NDB approach for runway 33 began at an altitude of 2400 ft. The minimum sector altitudes for 25 nm radius were as follows:-

- a) from 330 degrees M to 150 degrees M - 7000 ft.
- b) from 150 degrees M to 330 degrees M - 2000 ft.

The flight profile of this approach consisted of a holding pattern and an inbound track of 329 degrees Magnetic. The obstacle clearance altitude for this approach was 550 ft.

The radar in use at Subang was an Airport <sup>Primary</sup> Surveillance Radar ASR-803. The system did not provide altitude, <sup>speed, heading</sup> readout to the controller. The radar had an effective range of 60 nm radius and was used primarily for approach control. Subang

International Airport <sup>6</sup> was also equipped with a Marconi Type <sup>Versary</sup> S650 Radar, which had a range of 200 nm and is being used for area control.

1.9 Communications

There was no reported or known communication malfunction on the day of the accident.

1.10 Aerodrome Information

Subang International Airport, elevation 89 ft. above mean sea level, is 8 nm West of Kuala Lumpur City. The Airport is equipped with only one runway 33/15 and is 11,400 ft. long.

At the time of the accident, runway 33/15 was undergoing a runway extension construction work. Because of the construction, some facilities were out of service. All data concerning the situations were published in a Notam dated 1st. November 1988. The Notam listed 18 items, which included threshold displacement, declared distances and state of approach and ground aids. The preflight bulletin Notams issued to the crew of flight 066 was a 4 paged Notam. It listed 23 items concerning the situations at Subang International Airport.

(See appendix A)

The ARES broadcast included unserviceability at Subang which the crew <sup>found</sup> <sub>Page 19</sub> on for information.

1.11 Flight Recorder

N807FT was equipped with a Sundstrand Model Part Number 981-6009-011 Flight Data Recorder (FDR) Serial Number 2839. The recorder showed no outward evidence of damage. A readout was made of the whole flight from departure in Singapore to impact at Subang.

N807FT was equipped with a Sundstrand cockpit voice recorder (CVR) Serial Number 7125 A. The recorder was recovered from the aircraft and a transcription of the CVR was prepared covering the period from approximately 13 min. prior to the accident (See Appendix B). Playback of the CVR tape found that there was no recording on track one and two.

A plot of the last 179 seconds of flight 066 flight path profile was derived by integration of pertinent CVR data and with FDR's altitude trace. (See appendix C).

Examination of this plot disclosed that the Ground Proximity Warning System (GPWS) warning came on twice during the descent. The first GPWS warning came at least 16.5 seconds before impact and lasted for 2.5 seconds. An interval of 6.5 seconds was

noted before the second GPWS warning came, which lasted for about 7.5 seconds. Throughout this period, none of the crew made any comment or any attempt to react to the GPWS warning.

The descent rate was approximately 1200 ft. per minute until selection of undercarriage down and flaps to 10 degrees. The descent rate then increased to about 1600 ft. per minute. At 800 ft. and when flaps were selected to 20 degrees, the descent rate decreased to 1100 ft. per minute.

During the descent, the FDR readout showed that the indicated airspeed was maintained between 155 knots to 180 knots. When the recording traces terminated the airspeed was 155 knots. A maximum control column backward position was also recorded just before impact.

1:12

#### Wreckage and Impact Information

The aircraft initial impact was made on the tree canopies located 250 feet away from the foot of a ridge. This area was covered by secondary jungle with an average tree height of 70 feet.

All four engines struck the treetops almost simultaneously, causing substantial damage to the engine nose cowls and engine fan blades. The initial ground contact was firmly made at the slope of the ridge at approximately 481 feet above mean sea level. Investigation on the wing and body landing gears revealed that there were signs of structural failures due to tremendous tensional loads. This was evident on the lower inner cylinder of the respective gear struts which depicted the path of shearing towards the rearward direction. The imprint marks on the tire carcass of the forward wheels had shown consistent failure patterns, suggesting that the landing gears were in the down position.

Subsequent investigation on the flaps transmission jackscrews and imprint burnt marks on the flap selector quadrant revealed that the flaps were deployed to 20 units. The flaps were totally destroyed upon impact.

The effect of the direct impact on the slope of the ridge had caused tremendous compressive loads on the lower belly section of the fuselage. The lower cargo compartments and the centre wing tank were



completely ruptured. The wreckage distribution of several airconditioning components were generally confined to the initial impact point and most of the components were found partially embedded in the ground.

After the initial ground contact, the aircraft continued up the hill slope, and in the process, caused the complete detachment of the left wing from the fuselage. The left wing was totally destroyed by fire. Fuel spillage from the rupture of the center, right and left wing tank compartments had also set fire to the surrounding trees along the path of the crash.

The fuselage had been subjected to compressional and torsional loads during the impact and was broken at five places. The nose and the forward cabin sections were totally destroyed by fire and the majority of the cockpit instrument and switches were found to be severely burnt.

Examination of the major airframe structures and components revealed that the aircraft did not experience any sign of structural distress or system anomaly prior to the crash.

It was established that the flaps were set to 20 units; all the landing gears were in the down position and the horizontal stabiliser was set to 5 1/2 units of trim. These indicated that the aircraft was configured to a normal landing approach at the time of the accident.

1.13

Medical and Pathological Information.

The commander's most recent medical examinations was conducted on 1st. August 1988, whilst the first officer and the flight engineer underwent their medical examination on 7th. October 1988 and 27th. December 1988 respectively. The commander and the first officer were assessed fit to the FAA USA category one while the flight engineer was awarded category two medical standard.

A review of the crew's medical files indicated that the commander had a history of heart rate irregularities and high blood sugar. However, both problems appeared to be under control. In the case of the first officer, the FAA file indicated a waiver for hearing loss in the high frequency range. The first officer did not wear a hearing aid, and some concern had been expressed that such

that all three crew members appeared healthy and said that they were unaware of any coughing. However, another jumpseat rider said that the flight engineer's hands trembled constantly. A commander who had flown previously with the flight engineer said that he had trouble with eyesight and used a magnifying glass in cockpit duties.

There was no indication from those interviewed that the crew had any alcohol or drug related problems. Both commander and the first officer were reported to be occasional drinkers.

Several types of tablets were found in the wreckage of flight 066. These tablets were identified as Tylenol with Codeine Number 3 and Chlor-Trimeton Decongestant.

#### 1.14 FIRE

1.14.1 There was no evidence of in-flight fire. The aircraft experienced post flight fire due to ground impact. Intense ground fire occurred around the cockpit area. The fire was initiated as a result of fuel spillage from the damaged belly and wing tanks and was ignited due to impact or an

tanks and was ignited due to impact or an electrical discharge after impact. It took about 35 hrs. for the fire to be under control as the crash area was not accessible by road and thus, there was great difficulty in bringing fire vehicles to the site.

Airport fire service was notified of the location of the wreckage at 0655 hrs. and about 140 fire and rescue personnel responded with one rapid intervention vehicle and two extra large foam tenders.

1.15 Survival Aspects

1.15.1 This was not a survivable accident.

1.16 Test and Research

1.16.1 Medical Tablets

Tylenol with codeine number 3 was found in a vial with a label indicating it was were prescribed to the flight engineer. The tablets were clearly marked and easily identifiable as a medication and was produced by the Mc Neil Consumer Products Company. Each tablet contains 300 milligrams of acetaminophen and 30 milligrams of codeine phosphate.

Chlor-Trimeton Decongestant tablets were also found in the wreckage. These tablets represented a medication produced by the Schering Corporation. Each tablet contains chlorpheniramine maleate, which is an antihistamine and pseudoephedrine sulfate, which is a sympathomimetic agent.

1.16.2 Evidence of Coughing Sounds on the CVR

A review was made to examine evidence of coughing sounds on the CVR tape. The objective was to establish the degree, origin and possible significance of any coughing behaviour by the crew member.

The review identified thirteen places at which clear human coughing sounds were identified. Most of these were double or multiple cough episodes. There were two additional instances of sound that resembled cough that could not be definitely identified. There was also one instance of a sound similar to clearing the throat.

It was certain that most of the coughs were made by either the Commander or the first officer. This was because, most of the coughs were very loud on the tape, so that whoever was coughing had to be

sitting close to the CVR microphone located at the front of the cockpit. Coughs by the flight engineer or the passenger would not have been recorded with such fidelity. In the case of two of the coughs, there was an impression based on the timing of the cough compared to background conversation that the commander might be the individual coughing.

1.16.3 Flight Profile - Terrain Avoidance

A reconstruction of the actual flight profile to determine whether terrain avoidance was possible had any of the crew members initiated evasive manoeuvres at the onset of the GPWS warning was conducted using a Boeing 747-200/300 simulator.

An approximate gross weight of 462,000 lbs., the calculated weight prior to impacts was used in the analysis. The other parameters needed to simulate the evasive manoeuvres were calculated by averaging the final 20 seconds of data recorded by the FDR. The evasive manoeuvre procedures were based on the Operations Manual terrain avoidance procedure. Flaps 20 degrees and landing gear extended configuration was maintained during the simulation. The profile of the ridge was estimated using the

height at impact, including the height of the trees and slope of the hill side.

Based on the results of the simulation the ridge could have been avoided if the operations manual's terrain avoidance manoeuvre had been executed at the first alert from the GPWS. The analysis also indicated that the ridge could still be cleared even if action had been delayed until approximately 6 seconds prior to impact.

1.17 OTHER INFORMATIONS

Nil.

2.

## ANALYSIS AND CONCLUSION

2.1

### ANALYSIS

The aircraft was certificated, equipped and maintained in accordance with regulations and approved procedures. There was no evidence to suggest that any malfunction of the aircraft, aircraft systems, power plant, or the flight control system contributed to the cause of the accident.

The flight crew were qualified to perform their assigned duties, however, there was no record indicating that they had flown into Subang International Airport in the last 18 months. The aerodrome controller in the Subang Tower was properly qualified and had accepted the responsibility to perform the duty of an approach controller. It was also noted that the aerodrome controller, <sup>was</sup> ~~although~~ a rated approach controller, did not possess a radar rating.

When flight 066 was in Kuala Lumpur Flight Information Region, it was routed along a non standard route (abeam BP NDB direct to KL NDB). The area controller did not confirm the identity of



the aircraft on radar since it was the only traffic in his sector. Flight 066 was transferred direct from area control to aerodrome control and it was also established that, the area controller did not coordinate the transfer of control with either the approach controller or aerodrome controller.

According to ATC local procedures the aircraft should be transferred by the area controller to approach controller who will in turn transfer the aircraft to the aerodrome controller.

The commander, after being cleared by ATC to carry out a NDB approach runway 33, misread the descent clearance and descended to 400 ft. instead of 2400 feet. The descent to 400 ft. was initiated when the flight was still approximately 7 NM prior to reaching the Kilo Lima beacon. Though the flight crew knowingly descended the aircraft, the descent profile was not in conformity with required NDB procedures.

#### 2.1.1 Operational Factors

Voice identification of the CVR, indicated that the first officer was the flying pilot whilst the commander was acting in the capacity of a co-pilot.

Though the first officer was at the controls throughout the flight, most decisions pertaining to the flight were made by the commander. In accordance with the operations manual, the commander could take any action judged necessary to preserve and maintain the safety of the flight.

Prior to the departure from Changi the flight crew was provided with the necessary dispatch data including NOTAMS and weather information for Subang. The dispatch data was delivered to the flight crew at the baggage check-in counter at around 0500 hrs. and the flight crew were brought to the aircraft almost immediately. There was no evidence to suggest that the flight crew had analysed these data prior to boarding the aircraft.

The departure procedure at Changi was straight forward and control of the flight during climb out was transferred only once. During the departure, at about 0605:10 hrs., Singapore Tower instructed flight 066 to call Singapore radar on 127.3 Mhz.

The commander misread the instruction and acknowledged 120.3 Mhz instead. There was some confusion by the commander as he attempted calling

Singapore radar on 120.3 Mhz, 4 times. Though it was resolved, the commander appeared to be quite unprepared for the Changi departure procedures.

At 60 DME VBA, the commander asked Lumpur tower if the full length of the runway was available. The commander also wanted to confirm the contents of the NOTAMS regarding airfield construction works in Subang. The commander's concern over the above matters served to confirm that the flight crew had little knowledge of the contents of the dispatch data given to them in Singapore. Additionally, the flight crew did not disseminate the contents of the ATIS, although they tuned in to the broadcast during the cruise.

The flight crew had prepared themselves for an ILS Runway 33 arrival at Subang. At time 0628:48 hrs., when flight 066 was 20 NM from Subang or 12 NM from the Kilo Lima NDB beacon, the commander and the first officer appeared confused when there was no indication of the ILS runway 33, (the unavailability of the ILS was made known to them through NOTAMS and ATIS). The commander opined that they were still too far out whereas the first officer thought otherwise. On receipt of the

advice from the tower that ILS 33 was not available the commander immediately informed the tower that they would be coming for straight in approach and instructed the first officer to "hit" Kilo Lima beacon. Shortly afterward, the altitude alert tone sounded indicating that the aircraft was passing 3600 ft. for 2700 ft.

At this juncture, it was apparent that the first officer was very uneasy and agitated with the type of approach the commander had elected. The first officer's agitation was evident when he made a remark "how in the # does he expect us to find the runway". The commander again asked the first officer to "hit" Kilo Lima beacon and then turn to heading two two nine. At approximately 0631:51 hrs., Lumpur tower instructed Tiger 066 to descend to 2400 ft and cleared for NDB approach runway 33.

Their unpreparedness to conduct a NDB approach was confirmed when the CVR disclosed that the flight crew did not readily possess the Kilo Lima NDB approach chart with them. Evidence seemed to indicate that the required chart was probably kept together with other charts in the upper deck behind the cockpit. An approximate distance of 7 NM from

7  
Assumpt

the Kilo Lima NDB left them with very little time to retrieve the required NDB chart. However, no mention was made by any of the flight crew to suggest this action.

The CVR also indicated a number of irregularities in the crew's conduct during the climb, cruise and descent. Specifically, the irregularities were over radio calls, NDB frequency selection and altitude callout. The evidence concerning the radio calls revealed that the commander was inattentive and had on several occasions made wrong read backs and acknowledgments. As regards to the selection of the NDB frequencies, it was evident that the commander had selected 338 Khz instead of 355 Khz, in their preparation to execute the NDB approach. The commander and the first officer entered into a mild argument over this matter and the first officer had to convince the commander repeatedly of his wrong selection. A comparison of the CVR transcript with the Flying Tiger flight operating procedures disclosed that the flight crew omitted altitude callouts during the approach into Subang. Altitude callouts were not made for approaching 18,000 ft. and 10,000 ft., and 1,000

ft. above assigned altitude including initial approach altitude.

In summary, the above evidences disclosed some confusion on the part of the crew as to what instrument approaches were available for their use at Subang. After they were cleared for NDB approach, there was further confusion concerning the procedures involved in the NDB approach. Since the flight crew did not readily have the required NDB approach chart with them, their unpreparedness to conduct a proper NDB approach can only be attributed to inadequate pre-flight preparation.

#### 2.1.2 COMMUNICATION

It was established earlier that Flight 066 had descended to four zero zero feet instead of two four zero zero feet. An analysis of the descent clearance revealed that the most critical interpretation/misinterpretation centred around the word 'to/two'. When clearance was given by the controller for flight 066 to descend 'two four zero zero', the controller meant 2400 feet, but it was misinterpreted by the commander as 'to four zero zero'. Depending on how 'two/to four zero zero'

was being said, it could mean two four zero zero or, if used with a pause in between to/two and four, it also could be interpreted as 'to four zero zero'. In this case, evidence indicated that there was no pause in between the word two and four. Further more, the controller was consistent with his phraseology on transmission of numbers in that he had never used the word "TO ....." when transmitting numbers. When the commander acknowledged 'OK four zero zero', no comment was made by either the flight crew or the controller.

In accordance with ICAO Annex 10, all numbers except whole hundreds, whole thousands and combinations of thousands and whole hundreds shall be transmitted by pronouncing each digit separately. Whole hundreds and whole thousands shall be transmitted by pronouncing each digit in the number of hundreds or thousands followed by the word HUNDRED or THOUSAND as appropriate. Combination of thousands and whole hundred shall be transmitted by pronouncing each digit in the number of thousands followed by the word THOUSAND followed by the number of hundreds followed by the word HUNDRED.

2.1.3 MEDICAL FACTOR

Despite the fact that all the flight crew members were given a clean bill of health during their last medical checkup, a considerable degree of attention was focused on the crew's physical and physiological condition to determine whether medical factors had affected their performance capability or physiological state.

Medical tablets

It was established that tylenol with codeine number 3 found in a vial, was prescribed to the flight engineer. A note retrieved from the wreckage disclosed that the flight engineer was on medication due to the diarrhoea he contracted on 13th February 1989.

Tylenol with codeine number 3 is the treatment of a condition causing acute pain. Codeine could impair the mental and /or physical abilities required for the performance of potentially hazardous task, and the patient using this drug should be cautioned accordingly.



Several chlor-trimeton decongestant tablets were also recovered from the wreckage. These preparations contained chlorpheniramine malcate, which was antihistamine and pseudoephedrine sulphate, which was sympathomimetic agent. Antihistamine could have sedative effect to some people and pseudoephedrine might have a mild stimulant effect.

#### COUGHS

The cockpit voice recorder indicated 13 places of human coughs in the last 30 minutes before the crash. The check pilot who flew during the first leg of the accident flight said that the commander had a little cough as the result of a flu for which he was taking lozenges. In the case of two of the coughs recorded in the cockpit voice recorder, there was an impression based on the timing of the cough compared to background conversation that the commander might be the individual coughing.

The coughs were "very shallow, dry coughs" that were similar to those caused by upper respiratory infection, allergy, or from irritation caused by the low humidity in the airplane. According to

medical experts, the coughs suggested a distraction to the crew member rather than an incapacitation.

#### MEDICAL HISTORY AND FITNESS

The flight crew spent about 36 hrs. in Singapore before going on duty at about 0400 hrs. for the departure to Subang. When in Singapore, the first officer's and flight engineer's hotel bills showed that they had their meals and telephone calls in the hotel itself suggesting that a considerable time was spent there. The commander's hotel bill was itemless and his activities on the day prior the accident could not be determined.

The FAA medical file indicated that the first officer was given a waiver for hearing loss in the high frequency range. The first officer did not wear a hearing aid, and some concern had been expressed that such a hearing loss could affect his ability to communicate effectively in the high noise environment. During the flight, the Commander on several occasions had misread air traffic instructions. Evidences indicated that none of these errors were corrected by the first officer.

2.1.4

WORK IN PROGRESS AND FACILITIES IN SUBANG

Subang International Airport was undergoing a major improvement work, which started from 15th. July 1988 and estimated to be completed on 15th. July 1989. The work consisted of extensions of runway and taxiway, provision of additional high speed turn-offs and Category II approach lights, replacment of runway edge lights and installation of PAPI system and resurfacing of entire length of runway.

The runway would be extended by 1000 ft. towards the North to provide a total runway length of 12,400 ft. During work in progress for the extension of the runway, threshold 15 was displaced by 600 ft. The extension also neccesitated the localizer to be relocated approximately 1000 ft. Northwards of its present position, thus requiring the ILS 33 to be withdrawn during the period of work in progress.

The work in progress in Subang had made the airport to be a rather difficult airport to operate into. The ever changing work in progress requires pilots to be vigilant and to update themselves with the

latest information continuously. It was also noted that the radar in Subang could not provide altitude read out.

## 2.2 CONCLUSIONS

### 2.2.1 Findings

1. The flight crew were properly certificated and qualified.
2. There was no aircraft system malfunction or aircraft structural failure prior to the accident.
3. The aerodrome controller was properly rated and had accepted to perform the duty of an approach controller.
4. In the last 18 months prior to the accident, none of the flight crew had landed at the Subang International Airport.
5. Subang International Airport was undergoing a major improvement work. Because of the work in progress, some part of the runway and several associated Nav aids and facilities were not available.

6. The flight crew appeared confused as to what instrument approaches were available for their use at Subang. After they were cleared for the NDB approach, there was further confusion concerning the procedures involved in the NDB approach.
7. The standard radio communication phraselogy as established by ICAO was not adhered to.
8. The commander misinterpreted the descent clearance given by the aerodrome controller during the NDB approach as 'to four zero zero' instead of 'two four zero zero'.
9. The aerodrome controller did not correct the wrong read back made by the Commander on the descent clearance to 2400 ft.
10. The flight crew did not possess the required NDB approach chart when attempting the NDB approach to runway 33 Subang.
11. The flight crew's decision to descend to 400 ft. was initiated even before the aircraft had reached the Final Approach Fix at the Kilo Lima NDB beacon.
12. The flight crew, particularly the commander, showed signs of inattentiveness throughout the

flight, even when they were in a low workload environment.

13. Tylenol with codeine number 3 and chlor-trimeton decongestant were recovered from the wreckage. Tylenol with Codeine number 3 was prescribed to the Flight Engineer, whereas the owner of the chlor-trimeton decongestant could not be determined.

14. The first officer was given a waiver for hearing loss in the high frequency range. Such a hearing loss could have some effect on his ability to communicate effectively in a high noise environment.

15. The GPWS sounded twice at 16.5 and 7.5 seconds before impact. The flight crew apparently did not respond to this warning.

#### 2.2.2

#### CAUSE

The most probable cause of the accident was that, the crew, while attempting a nonprecision instrument approach, misinterpreted the descent clearance and the aircraft struck a hill at 481 ft above mean sea level.

3.

RECOMMENDATIONS

3.1 It is recommended that:-

1. The correct radio phraseology as recommended by ICAO must be used in all communications.
2. Flight crews should be reminded that they must strictly observe the operating standard and procedures particularly in preflight preparation, cockpit resource management, instrument approaches and usage of medical drugs.
3. ATC personnel should be reminded that they must strictly adhere to the coordination requirements when transferring aircraft from one sector to another as required by the Manual of Air Traffic Services.
4. Subang International Airport must be provided with SSR.
5. Flight crews are to be reminded on the procedures regarding in-flight activation of the GPWS.

( BRIG. GENERAL OMAR BIN SAMAN )  
CHIEF INSPECTOR OF AIR ACCIDENTS  
DEPARTMENT OF CIVIL AVIATION MALAYSIA

01 JULY 1990

((start of recording))

((start of transcript))

1:34  
AM-2 in range

1:36  
AM-3 roger

1:52  
AM-3 landing data and bugs

1:54  
AM-1 on the left

1:55  
AM-2 set right

1:57  
AM-3 altimeters and instruments

1:59  
AM-1 ah set left

2:01  
AM-2 set right

2:03  
AM-3 crew briefing

2:05  
AM-? reviewed

3:27  
AM-1 one to go

3:29  
AM-2 yup

3:38  
AM . ((sound of altitude alert tone))

3:45  
EC tiger six six continue descend to seven thousand QNH one  
ero one one

3:49  
DO-1 ah one zero one one then cleared to seven we're out of  
hirteen point five

4:09  
AM-1 \*\*\*\*

4:10  
AM-2 ah thank you

4:21  
AM-1 son of ah gun



24:36  
SEC tiger six six contact tower one one eight decimal two go  
morning

24:40  
RDO-1 one eighteen two good morning

24:50  
RDO-1 kuala lumpur tower tiger six six eighteen two we're ah  
descending to seven thousand we're out of twelve

24:57  
TWR tiger six six report your distance and radial victor brov  
alpha

25:02  
RDO-1 okay we're sixty four DME now from ah from the VOR and ah  
our INS shows ah fifty

25:10  
TWR tiger six six roger cleared to kilo lima seven thousand  
runway three three QNH of one zero one one expect no delay. be  
advised visibility the towers obversation visibility all around  
is about three thousand meters.

25:27  
RDO-1 okay ah is the full runway open ah as far as the length o.  
the runway goes

25:33  
TWR affirmative full length available

25:35  
RDO-1 okay we read a bunch of NOTAMS about holes and ditches and  
stuff like that we just wanted to make sure

25:39  
TWR okay

25:43  
CAM-1 we won't need ah any auto-brake just go to the end

25:50  
CAM-1 unless you want - if you want it to go ahead

25:54  
CAM-2 no that's \*\*

26:23  
CAM-2 we're cleared direct kilo lima

26:25  
CAM-1 yes two five five

26:27  
CAM-2 \*

26:28  
CAM-1 I set it up for ya

16:31  
RDO-3 tiger operations Kuala Lumpur tiger six six

16:34  
OPS yes sir this tiger ops go ahead

16:36  
RDO-3 tiger six six blocks at four five

16:40  
OPS okay see you on the ground at spot two one

16:44  
RDO-3 say again

16:46  
OPS parking bay will be spot two one

16:48  
RDO-3 roger two one

16:53  
CAM-3 bay two one

16:54  
CAM-1 two one

16:55  
CAM-3 yeah

17:00  
TWR tiger six six report your distance now from VBA

17:02  
CAM-1 what did he say

CAM-2 I don't know

17:03  
RDO-1 ah tiger six six you were you ah was you callin' six six

17:08  
TWR affirmative what is your distance now from victor bravo alpha

17:11  
RDO-1 okay ah fifty miles fifty DME

17:14  
CAM ((sound of altitude alert))

17:15  
TWR tiger six six descend five five zero zero

17:17  
RDO-1 five five zero zero tiger ah six six we're out of ah seventy eight hundred

17:23  
CAM-2 five five zero

7:25  
AM-1 fifty five hundred

7:51  
((tape reversed))

8:25  
AM-? \*

8:36  
AM ((sound of altitude alert tone))

8:48  
AM-2 we still got nothin but flags on the # ILS

8:51  
AM-1 yeah you're to far out here

8:54  
WR tiger six six descend three five zero zero

8:57  
DO-1 roger cleared thirty five hundred we're out of six thousar

0:12  
AM-2 doesn't seem like twenty miles would be too far out

0:16  
AM-1 yeah \*

0:40  
WR tiger six six descend ah two seven zero zero

0:44  
DO-1 roger cleared to ah two thousand seven hundred we're out o  
orty five

0:48  
AM-2 ask him if the ILS is workin'

1:04  
AM ((sound of landing gear warning horn))

1:07  
DO-1 and tiger six six is your ILS in operation this morning

1:10  
WR ILS for three three is not available if you wish ILS one  
ive is available

1:15  
DO-1 no that's okay we'll come on straight in on three three

1:18  
WR ((sound of one mike key))

1:19  
AM-1 alright just hit the ah KL then make your turn to three  
ree zero and ah I will give you the -

31:26  
CAM ((sound of altitude alert tone))

31:27  
CAM ((sound of auto-pilot disconnect warning))

31:33  
CAM-2 down to the line on the checklist

31:34  
CAM-3 okay do you want the INS's now

31:35  
CAM-1 what ever

31:40  
CAM-2 how in the # does he expect us to find the runway- \*\*

31:44  
CAM-1 \*\* hit KL beacon and turn to two two nine and I'll give you  
the ah -

31:51  
TWR tiger six six descend - (two/to) four zero zero cleared for  
NDB approach runway three three

31:56  
CAM-2 NDB that # #

31:58  
RDO-1 okay four zero zero

32:00  
CAM-1 alright go ahead I'll set ya up

32:04  
CAM-1 you got them all set up right now two five five and three  
five five and ah -twenty nine after - three twenty nine inbound

32:17  
CAM-1 okay

32:20  
CAM-2 I think they're not set up like that

32:22  
CAM-1 yeah you got 'em set up -

32:23  
CAM-2 no there not

CAM-1 two five five three five five

CAM-2 no

32:25  
CAM-1 you got two five five

CAM-2 three thirty eight

CAM-1 alright

32:26

CAM-2 I got two five five and we need three five five

32:28

CAM-1 two five five and okay I'll give you three five five over here

32:34

CAM-1 alright you got it

32:37

CAM-1 yo you by there three twenty nine

32:40

CAM-3 hopefully you won't \*\*

32:44

CAM-2 # this # lets go over and do an ILS

32:48

CAM-1 we can do -

32:49

CAM-2 I haven't even got the # plate in front of me

32:51

CAM-1 you're alright just keep on goin' down to four hundred feet

32:55

CAM-1 two five five - still goin' to KL beacon it's on it's on yours

33:13

CAM-1 we go down you feel uncomfortable we don't break out we'll make a mised okay

33:16

CAM-2 okay

33:21

CAM-1 lookin' good

33:23

CAM

((sound of altitude alert tone))

33:25

CAM-3 gear's down tilt checks nav and auto flight panel

33:36

CAM

((sound similar to flap handle being moved))

33:38

CAM-2 let's go all the way on the checklist

33:39

CAM-3 speed brake

13:41  
CAM-1 set

13:44  
CAM-3 you want any kind of brakes

13:46  
CAM-1 ah-

13:47  
CAM-2-yeah let's put the brakes on -

13:49  
CAM-1 ah put them on minimum

CAM-3 okay

CAM-3 \*

13:51  
CAM-3 there givin' eight thousand meters of visibility at this  
time

13:53  
CAM-? flaps

13:54  
GPWS whoop whoop pull up

CAM-1 so you got

13:55  
GPWS whoop whoop pull up

13:58  
CAM-1 so you got the ILS set - right

13:59  
CAM-2 yeah

14:00  
CAM-1 I'm gunna put you on fourteen seven and that'll give you -

14:03  
GPWS whoop whoop pull up

14:04  
GPWS whoop whoop pull up

14:06  
GPWS whoop whoop pull up

14:07  
GPWS whoop whoop pull up

14:09  
GPWS whoop whoop pull up

14:10

CAM-2 oh

CAM-3 I've got a hundred feet on the-

CAM-2 #

SPWS whoop whoop pull u-

14:11

CAM ((sound of impact))

((end of tape))

**FLYING TIGERS N807FT ACCIDENT**  
 747-200F / JT9D-7Q  
 PUCHONG MALAYSIA 19 FEBRUARY 1989

13 MINUTES Begins descent from 20,000 FT

179 SECONDS Selects FLAPS 5

81 SECONDS  
 1st Off - "I haven't even got the / plate in front of me"

CAPT - "You're alright just keep on goin' down to four hundred feet"

CAPT - "Two five five - still goin' to KL beacon..."

78 SECONDS - Selects FLAPS 10

• 1617.4 FT  
 • 180.44 KIAS  
 • ROD = 1184 FT/MIN

• 1394.0 FT  
 • 173.85 KIAS  
 • ROD = 1666.5 FT/MIN

112 SECONDS  
 CAPT - "Okay four zero zero"

• 1109.6 FT  
 • 172.75 KIAS  
 • ROD = 1611 FT/MIN

139 SECONDS  
 ATC - "Tiger Six Six descend to [two?] four zero zero cleared for NOB approach runway three three"

• 697.0 FT  
 • 164.70 KIAS  
 • ROD = 1100 FT/MIN

Selects FLAPS 20

GPWS - "W100P W100P PULL UP"

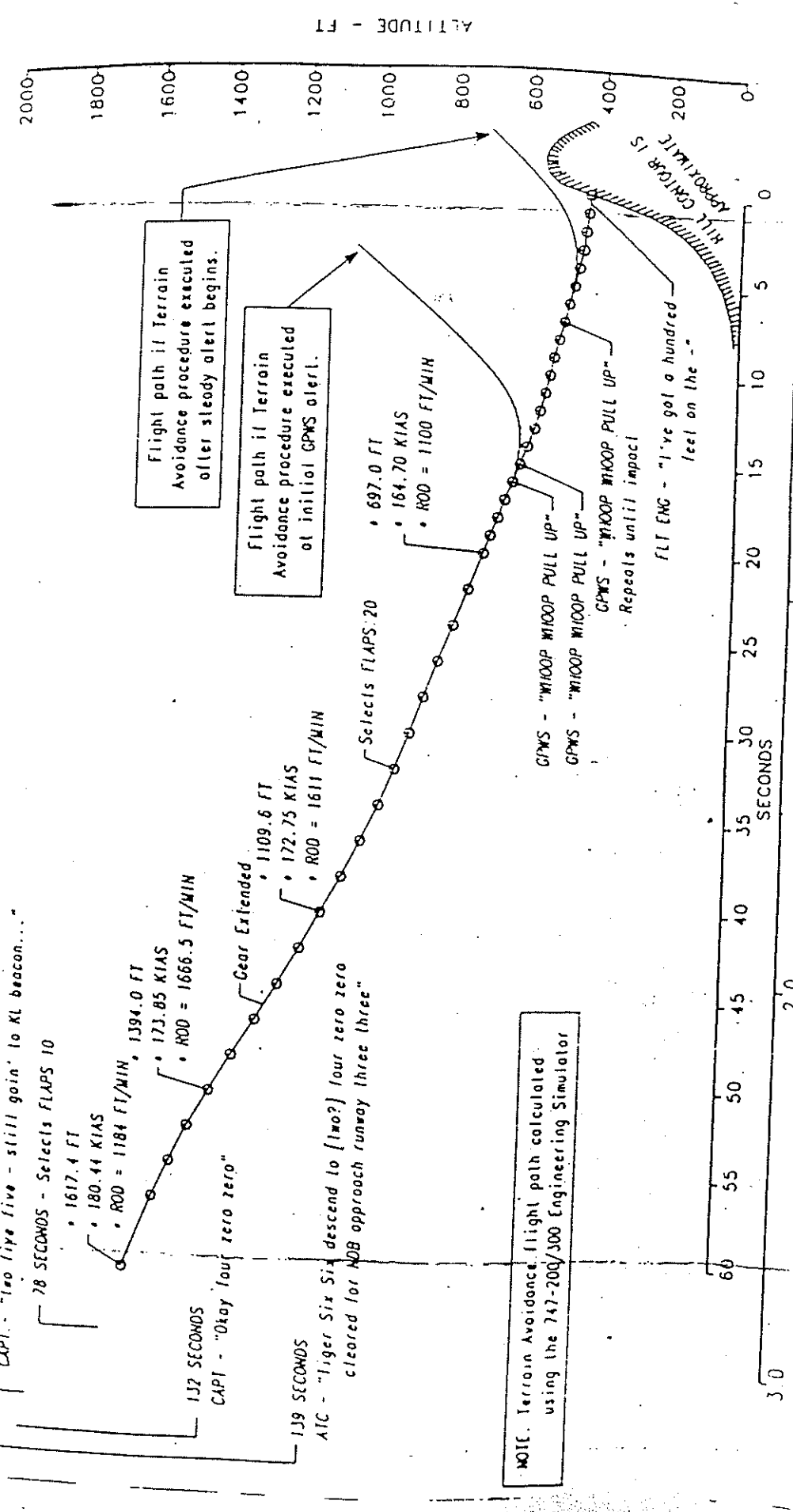
GPWS - "W100P W100P PULL UP"

GPWS - "W100P W100P PULL UP"

Repeats until impact

FLT ENG - "I've got a hundred feet on the..."

APPROACH IS



NOTE: Terrain Avoidance flight path calculated using the 747-200/300 Engineering Simulator



- 1 -

SINGAPORE CHANGI AIRPORT  
 PRE-FLIGHT INFORMATION BULLETIN  
 NOTAM UPDATED AS AT 01:01 1989/02/2

++++ WMKK +++++

ALA LUMPUR (WMKK) C1780 11/8/88 VASIS

=====

E/UFN RWY 15 VASIS NOT AVBL DUE TO DISP THR.

ALA LUMPUR (WMKK) C1820 18/8/88 TWY CENTRELINE

=====

F 08192245/UFN TWY ALPHA CENTRELINE INFRONT OF BAY 1 TO BAY 14 REAL  
 D NOT LGTD.

ALA LUMPUR (WMKK) C1834 19/8/88 ILS I

=====

E/UFN RWY 33 ILS I U/S. CNL NOTAM C1731 6/8. +

ALA LUMPUR (WMKK) C2140 30/09/88 RVR

=====

E/UFN RVR RWY 15/33 NOT AVBL. +

ALA LUMPUR (WMKK) C2169 5/10/88 WIP

=====

E/UFN REF CLASS TWO NOTAM 4/88

ATTACHMENT A, WIP OPPOSITE PRKG APN W OF TWY A FM TWY F TO HLDG PT  
 AND EXTENSIVE VEHICULAR MOV AT HLGT PT RWY 33;

ATTACHMENT B, WIP EXTENSION OF TWY A, TWY AND SWY AT RWY 15 END.

LOTS TO FLW STRICTLY ALONG TWY CENTRELINE AND MNM FWR WHILE TAX.

- NOTAM C1747 9/8.

ALA LUMPUR (WMKK) C2209 10/10/88 THR

=====

E/UFN TEMPO THR DISP 183M FM THR RWY 15. ICAO MARKINGS AND 5 G BAR  
 EACH SIDE. DECLARED DIST:

	TORA	TODA	ASDA	LDA
15	3475	3475	3475	3292
33	3475	3475	3475	3475

NOTAM C1779 11/8.

LUMPUR (WMKK) C2424 8/11/88 LGT  
 =====  
 FM TWY CENTRELINE AND EDGE LGT FM TWY A LEADING TO NORTHERN APN U/

LUMPUR (WMKK) C2487 16/11/88 WIP  
 =====  
 FM BTN 2300/1130 DLY REF CLASS TWO NOTAM 4/88 - ATTACHMENT A, WIP TO  
 A NEW NORTHERN FAST TURN-OFF TWY BTN TWY E AND NORTHERN TWY A.  
 LES CROSSING WORKSITE AND MAIN TWY A. WORK AREAS MARKED AND LIT. PI  
 ER CTN AND FLW STRICTLY TWY CENTRELINE. CNL NOTAM C2459 14/11.

LUMPUR (WMKK) C2678 14/12/88 BIRDS  
 =====  
 FM PRESENCE OF BIRDS AROUND THE AIRFIELD. PILOTS TO EXER CTN DRG  
 KOF.

LUMPUR (WMKK) C2676A 14/12/88 RWY  
 =====  
 2141550/UFN REF MALAYSIA NOTAM CLASS TWO NR4/88 DATED 20 APR 1988 PA  
 RWY RESURFACING OVERLAY WIP WILL TAKE PLACE BEGINNING FM RWY 33. 1  
 AND 300M LONG WEARING COURSE OVERLAY OPS WILL TAKE PLACE BEGINNING F  
 SIDES OF OVERLAY STRIP WILL BE FEATHERED 1.40 PERCENT. SUBSEQUENTL  
 WIDE AND 300M LONG OVERLAY WILL BE APPLIED ON NEXT AVBL NGT ON EACH  
 OF CENTER 15M STRIP. OVERLAY OPS WILL CONTINUE UNTIL FULL WID AND  
 RWY IS RESURFACED. THIS OVERLAY PROC WILL BE REPEATED FOR  
 QUENT 300M LEN OF RWY. PILOTS TO EXER CTN ON TKOF AND LDG ROLLS  
 IALLY IN WET WX AND STRONG CROSSWIND COND. CNL NOTAM C2676 13/12.

LUMPUR (WMKK) C07 2/1/89 TWY CENTRELINE LGT  
 =====  
 FM TWY A CENTRELINE LGT AT HLDG POINT RWY 33 U/S.

LUMPUR (WMKK) C030 7/1/89 RWY WIP  
 =====  
 1080000/05152200 RWY RESURFACING WIP. THE COMBINED BINDER AND WEARI  
 E OVERLAYS RESULTS IN A SUDDEN DROP OF FM FOUR INS TO AS HIGH AS EIG  
 IN THE RWY AND THE RWY SHOULDERS. THIS SFC COND WILL EXIST UNTIL T  
 HOULDERS HAVE BEEN COMPLETELY RAISED TO THE NEW RWY LEVEL. SIMILAR  
 EXIST BTN RWY AND SWY RWY 33 END AND RWY AND NEW RWY EXTENSION RWY 1  
 PILOTS ARE TO EXER CTN ON LDG/TKOF AND STRICTLY FLW RCL.

LUMPUR (WMKK) C031 7/1/89 ATC OPS RESTRICTION  
 =====  
 00071130 DLY FM 7 JAN/UFN TEMPO ATC OPS RESTRICTION WILL APPLY TO  
 STATE CONST OF NEW S BYPASS TWY TO RWY EDGE. SUBJ OPS RQMNTS EXP AL  
 TO BE SCOUTED FOR RWY 15. MEN AND MACHINERY WILL BE WITHDRAWN TO A MN  
 IFT FM RCL AS FLW:  
 DR 01011, 0010 AND 5747 DEP RWY 15 ;  
 DR 0000 DEP ALL ACFT TYP RWY 33;

TO EXER CTN AND STRICTLY FLW RCL.

LUMPUR (WMKK) C032 7/1/89 AIRFIELD RESTRICTION

=====  
10/1100 DLY FM 7 JAN TO 27 FEB, AIRFIELD RESTRICTION OPS TO FACILITATE  
IF TWY FILLET AT N END MAIN TWY A JOINING RWY 15 HLDG PT. MEN AND  
MACHINERY WILL BE WITHDRAWN TO MNM 100FT FM TWY CENTRELINE FOR ACFT MOV.  
TO EXER CTN AND TO FLW STRICTLY TWY CENTRELINE.

LUMPUR (WMKK) C157 21/1/89 APCH LGT

=====  
RWY 15 APCH LGT U/S. CNL NOTAM C1986 7/9/88.

LUMPUR (WMKK) C173 24/1/89 TWY EDGE LGT

=====  
RWY A EDGE LGT FM ABM BAY 10 TO HLDG PT RWY 33 U/S. CNL NOTAM C1987  
180 16/11/88.

LUMPUR (WMKK) C218 30/1/89 TWY

=====  
10/1100 DLY WIE TIL 26 FEB TWY ALPHA WIP. DIGGING OF TRENCHES 6FT  
AND 3FT DEEP FOR LAYING OF CABLES ALONG EASTERN EDGE OF TWY ALPHA FROM  
NORTHERN HLDG PAN TO ABM BAY 14. TRENCHES WILL BE BACKFILLED AND  
CLEANED AS WORK PROGRESSES. MEN AND MACHINERY WILL BE CLEARED FOR ACFT  
PILOTS TO EXER CTN AND FOLLOW STRICTLY TO TWY CENTRELINE.

LUMPUR (WMKK) C252 4/2/89 RWY CLOSURE

=====  
CANCELS TWO NOTAM 4/88 DATED 20 APR PARA 11.1, AD CLSD AS FLW:

- 1. NOTAM 1600/2200
- 2. NOTAM CLOSURE
- 3. NOTAM 1550/2200
- 4. NOTAM 1600/2200
- 5. NOTAM 1645/2230
- 6. NOTAM 1655/2230
- 7. NOTAM 1700/2230
- 8. NOTAM TIL 15 MAY
- 9. NOTAM 1600/2200
- 10. NOTAM CLOSURE
- 11. NOTAM 1620/2250
- 12. NOTAM 1600/2200
- 13. NOTAM 1700/2245
- 14. NOTAM 1655/2230
- 15. NOTAM 1700/2230.

AND C251 3/2.

LUMPUR (WMKK) C258 6/2/89 TWY CENTRELINE LGT  
 =====  
 TWY CENTRELINE LGT FM ABM TWY D TO ENTRANCE TO THE SOUTHERN APN U/S  
 TAM C:98 277I.

LUMPUR (WMKK) C312 17/2/89 WIP  
 =====  
 171645/02252230, REF NOTAM CLASS TWO 4/88 PARA 2, JOINING OF SFC OF  
 AL RWY 15 THR WITH BEGINNING OF NEW RWY EXTENSION INPR BTN 10,300FT T  
 FT FM THR RWY 33 (FST 1,100FT OF ORIGINAL THR RWY 15).  
 TERN 100FT OF EXISTING RWY SFC WILL BE RAISED PROGRESSIVELY TO JOIN  
 4 NEW RWY EXTENSION LEVEL BTN 17 TO 20 FEB.  
 AINING WESTERN SOFT OF EXISTING RWY SFC WILL BE LOWERED 50MM EACH NGT  
 20 TO 24 FEB AND WEARING COURSE APPLIED ON 25 FEB TO BRING BOTH  
 STING AND NEW RWY EXTENSION SFC TO SAME LEVEL. MEN AND MACHINERY WIL  
 AREA DRG ACFT MOV.  
 TERN RWY EDGE LGT IN THE WORK AREA WILL NOT BE AVBL BTN 02191700/  
 42230.

LUMPUR (WMKK) C313 17/2/89 WIP  
 =====  
 JTAM CLASS TWO 4/88 PARA 4.1,  
 VST OF NORTHERN RAPID EXIT TWY INPR. EXCAVATION ON RWY EDGE BTN  
 500FT TO 1,950FT FM DISP THR RWY 15 (8,850FT TO 9,300FT FM THR RWY 33  
 R BTN 02171645/02202230.  
 ST OF NEW SOUTHERN RAPID EXIT TWY INPR BTN 02180200/02262230.  
 EXCAVATION ON RWY EDGE BTN 3,400FT TO 4,100FT FM THR RWY 33 (6,700FT  
 TO 7,400FT FM DISP THR RWY 15) AND ON RWY SHOULDER EASTERN SIDE OF  
 RWY BTN 400FT TO 500FT FM THR RWY 33 (10,300FT TO 10,400FT FM DISP TH  
 RWY 15). WORK AREAS WILL BE MARKED BY MARKER BOARDS HJ AND FLG R  
 HAZARD LGT HN.  
 TEMPO ATC OPS RESTRICTION WILL APPLY FOR WIP. SUBJ OPS RQMNTS, ALL  
 ACFT WILL DEP RWY 15.  
 MEN AND MACHINERY WILL BE WITHDRAWN TO MNM 200FT FM RCL WHEN:  
 I) DEP RWY 15 FOR ALL SKED JET ACFT TYP EA30 AND ABV.  
 II) ARR/DEP RWY 33 FOR ALL ACFT TYP.

LUMPUR (WMKK) C342 19/2/89 RWY EDGE LGT  
 =====  
 N RWY 15/33 EDGE LGT OPR BUT CTN DUE AVBL 400FT APART.

LUMPUR (WMKK) C335 19/2/89 NOB  
 =====  
 N FL 250HZ U/S.

++ END ++