

No. 3

Hawker Siddeley HS-748, HS-THB, accident near Bangkok
International Airport, Thailand, on 27 April 1980.
Report released by the Accident Investigation Committee,
Ministry of Communications, Thailand.

SYNOPSIS

On 27 April 1980, HS-748 Series II, HS-THB of Thai Airways Company was on a scheduled domestic passenger flight. The flight operated on the route Bangkok - Khon Kaen - Udon - Nakhon Phanom - Udon - Khon Kaen - Bangkok. It departed Bangkok International Airport at 0101 hrs. On the last leg it departed Khon Kaen Airport at 0550 hrs, ETA Bangkok International Airport at 0656 hrs. During approach to runway 21R at an altitude of 1 500 ft near Bangkok International Airport, the aircraft entered a severe thunderstorm. It crashed into the ground approximately 8 NM northeast of Bangkok International Airport (Lat 14° 03'N, Long 100° 41'E). The accident occurred at approximately 0655 hrs. (day time).

The Aircraft Accident Investigation Committee concluded that the cause of the accident was that the aircraft encountered a thunderstorm which had a severe downdraft. The pilot could not maintain altitude and crashed into the ground.

All times in this report are GMT.

1. INVESTIGATION1.1 History of the flight

On 27 April 1980, HS-748 Series II, HS-THB was on a scheduled domestic passenger flight. The flight operated the route Bangkok - Khon Kaen - Udon - Nakhon Phanom - Udon - Khon Kaen - Bangkok. The departure flight was flight number TH 221 which departed Bangkok International Airport at 0101 h, arrived Khon Kaen Airport at 0210 h, departed Khon Kaen Airport at 0233 h, arrived Udon Airport at 0251 h, departed Udon Airport at 0309 h, arrived Nakhon Phanom Airport at 0349 h. The return flight, flight number TH 231, departed Nakhon Phanom Airport at 0408 h, arrived Udon Airport at 0448 h, departed Udon Airport at 0507 h, arrived Khon Kaen Airport at 0532 h, departed Khon Kaen Airport at 0550 h, ETA Bangkok International Airport at 0656 h.

At 0559 h, after take-off from Khon Kaen Airport, the pilot reported to Bangkok Area Control Centre that he was climbing to 6 000 ft, ETA Korat at 0626 h, ETA Bangkok International Airport at 0656 h and requested ATC clearance to Bangkok International Airport via W6 - KT - W1 - BKK. Bangkok Area Control Centre cleared HS-THB to Bangkok International Airport via this route, to maintain FL 120 and asked the pilot to report when the aircraft reached FL 120.

- At 0614 h the pilot reported that HS-THB reached FL 120.
- At 0626 h the pilot reported that the aircraft was over KT.
- At 0627 h Bangkok Area Control Centre informed the pilot that HS-THB was in radar contact, 5 miles northwest of KT.

- At 0642 h Bangkok Area Control Centre cleared HS-THB to descend to 8 000 ft and informed the pilot that the altimeter setting was 1 008 mb. This was acknowledged by the pilot.
- At 0644 h, Bangkok Area Control Centre advised the pilot to contact Bangkok Approach Control on 119.1 MHz.
- At 0644 h, the pilot contacted Bangkok Approach Control and reported that he was maintaining 8 000 ft. Bangkok Approach Control advised the pilot to descend to 6 000 ft and informed him that the altimeter setting was 1 008 mb. This was acknowledged by the pilot.
- At 0648 h Bangkok Approach Control advised HS-THB to descend to 6 000 ft.
- At 0651 h Bangkok Approach Control advised HS-THB to descend to 1 500 ft.
- At 0653 h the pilot reported that HS-THB had reached 1 500 ft.
- At 0654 h Bangkok Approach Control informed the pilot that HS-THB was 7 miles from the Outer Marker and cleared the aircraft to make an ILS approach to runway 21R. This was acknowledged by the pilot.
- At 0656 h Bangkok Approach Control advised the pilot to contact Bangkok Tower on 118.1 MHz but no answer from the pilot was received. Bangkok Approach Control tried to contact HS-THB until 0709 h but no answer was received.

HS-THB operated in good weather conditions on both the outbound and return flights until, descending to runway 21R nearly at the airport, it encountered an area of rain. Later, HS-THB lost altitude rapidly. Many things in the passenger cabin fell to the cabin floor. It was raining with hail. Looking through the windows, some passengers saw grey clouds. Then the aircraft could maintain altitude. Thirty seconds later it again lost altitude, more severely than the first time. Finally it crashed into a paddy field and skidded forward about 510 ft. Fire occurred in both wings for a while. The accident site was 8 NM northeast of Bangkok International Airport (Lat 14° 03'N Long 100° 41'E). The accident occurred at 0655 h (day time).

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	4	40	-
Serious	-	9	-
Minor/None	-	-	

1.3 Damage to aircraft

The aircraft was destroyed.

1.4 Other damage

None.

1.5 Crew information

1.5.1 Flight crew

1.5.1.1 The pilot-in-command, aged 54, held an Airline Transport Pilot Licence valid until 2 August 1980 with an Instrument Rating and Aircraft Type Rating for the HS-748, Group 1. He had flown a total of 18 096:28 h, including 7 796:17 h in the HS-748 type, of which 193:17 h were flown in the last 90 days and 4:18 h in the last 24 h. He held a medical certificate valid until 2 August 1980 with the endorsement that he must wear corrective lenses while exercising the privilege of the certificate.

1.5.1.2 The Co-pilot, aged 55, held an Airline Transport Pilot Licence valid until 3 July 1980 with an Instrument Rating and Aircraft Type Rating for the HS-748 Group 1. He had flown a total of 24 372:46 h, including 11 899:45 h in the HS-748 type, of which 229:00 h were flown in the last 90 days and 4:18 h in the last 24 h. He held a medical certificate valid until 3 July 1980 with the endorsement that he must wear corrective lenses while exercising the privilege of the certificate.

1.5.2 Air traffic controller

1.5.2.1 The Bangkok Radar Approach Controller, aged 27, completed an Air Traffic Control Course from the Civil Aviation Training Centre - Thailand. She had performed air traffic control duties for 7 years. She held an Air Traffic Control Licence valid until 28 August 1980 with a Radar Approach Control Rating.

1.5.2.2 The Tower Controller, aged 35, completed an Air Traffic Control Course at the Airman Technical Training School, RTAF. He had performed air traffic control duties for 16 years. He held an Air Traffic Control Licence valid until 19 October 1980 with an Aerodrome Control Rating.

1.6 Aircraft Information

1.6.1 HS-748 Series II, Serial No. 1568, HS-THB was manufactured by the Hawker Siddeley Aviation Ltd., England in 1964. It had been in service with Thai Airways Company since 27 November 1964. It had accumulated a total time of 12 791:47 h. It was inspected when certificate of airworthiness No. 35/22 was issued by the Department of Aviation on 26 August 1979 valid until 25 August 1980.

1.6.2 The aircraft was equipped with two Rolls Royce Dart MK532-22 turbo propeller engines.

1.6.2.1 The port engine, serial No. 19320 accumulated a total time of 7 707:02 h since manufactured on 14 May 1971. It was removed from the port wing of HS-THF on 20 April 1978 for overhaul. After overhaul was completed, it was installed on the port wing of HS-THB on 8 April 1979. It had accumulated a total time of 1 516:54 h since last overhaul on 8 April 1979. No discrepancies were reported in the engine log book before this accident.

1.6.2.2 The starboard engine, serial No. 570 was removed from the port wing of HS-THG on 27 April 1978 for overhaul. It had a total time of 6 220:35 h since manufactured on 10 November 1976. After overhaul was completed, it was installed on the starboard wing of HS-THB on 12 April 1979. It had accumulated a total time of 1 526:28 h since last overhaul on 12 April 1979. No discrepancies were reported in the engine log book before this accident.

1.7 Meteorological Information

Weather at Bangkok International Airport prepared by Aeronautical Meteorological Division, Meteorological Department on 27 April 1980.

0500 h

VTBD 20004 9999 3CB020 6CI300 35/27 1009 CB N ESE NOSIG.

0530 h

VTBD 18005 9999 3CB020 6CI300 35/27 1009 CB N ESE NOSIG.

0600 h

VTBD 20010 9999 3CB020 6CI300 35/27 1008 CB N TO NE NOSIG.

0630 h (25 min before accident)

VTBD 18012 9999 3CB018 6CI300 34/27 1008 CB DIST RASH N NOSIG.

0640 h (SPECI) (Broadcast by ATIS at 0651 h 4 min preceding the accident.)

VTBD 18016 9999 17TS 3CB018 3SC040 6CI300 17TS N GRADU 20015 5000 10BR 50
DZ/95TS 2CB020 5CUSC030 5ACAS100 TREND.

According to the ATIS there was an additional weather report that a thunderstorm was moving from north to northeast. The official of the Aeronautical Meteorological Division certified that this additional report was true.

0700 h (5 min after accident)

VTBD 16014 9999 17TS 3CB018 3SC040 6CI300 34/27 1008 CB MOV E
RAPID VRB 15/20 4000 95TS 2ST010 3CB017 5SC025 8ASAC090 TREND.

0730 h

VTBD 14008 9999 17TS 3CB018 3SC035 7CI300 35/26 1008 TS N MOV E GRADU
16012 9000 2CB020 4CUSC030 4AGAS100 TREND.

The vicinity of the crash site was flooded with mud and water. Some large trees were felled and some house roofs were damaged. There were marks of falling hail on some banana trees. Villagers near the accident site reported that when they heard the engine noise of HS-THB it was raining and hailing. They heard heavy thunder all the time.

1.8 Aids to Navigation

Primary surveillance radar, secondary surveillance radar, VOR and ILS were operating normally.

1.9 Communications

Two-way R/T communications between Air Traffic Control Units and the aircraft were operating normally.

1.10 Aerodrome and Ground Facilities

Not pertinent to the accident.

1.11 Flight Recorders

No flight recorders were installed in the aircraft.

1.12 Wreckage

1.12.1 Wreckage and impact

The fuselage was broken into three parts. The first part was the nose section. It was broken at the leading edge of the wing and folded to the starboard side. The lower portion of this part was damaged up to the cabin floor.

The second part was from the leading edge to the trailing edge of the wing. It aligned to the aircraft skidding direction. Most of passenger seats in this part were torn from the floor.

The third part was from the trailing edge of the wing to the end of the tail section. It aligned to the same direction with the second part. The vertical and the horizontal stabilizers were in their normal positions. They were slightly damaged. All passenger seats of this part were damaged. The cabin floor was in good condition.

1.12.2 Wings and power plants

The starboard wing was torn from the fuselage and fell to the ground approximately 265 ft from the impact position. The wing was broken into two parts. The inner part which still contained the hot section of engine was damaged by fire. The outer part broke off and fell near the inner part. It lay in an upside down position. The fuel tank in the outer part was damaged. The starboard main landing gear assembly attached to the inner part was broken off. The engine minus the hot section was broken into many parts and fell 77 feet behind the trailing edge of the wing.

The port wing which remained attached to the second part of the fuselage was broken. The flap was slightly damaged. The aileron was separated from the wing. There was a mark of fire along the wing span but there were more extensive fire marks in the engine area. The engine mount was broken. The engine was thrown about 200 ft from the aircraft. The port main landing gear was still attached to its position but folded rearward.

1.13 Medical and Pathological Information

A review of the pilots' medical records disclosed no evidence of physical problems which could have affected their judgement or performance.

1.14 Fire

1.14.1 No evidence of in-flight fire was found.

1.14.2 The starboard wing was torn from the fuselage and fell near the impact point about 265 ft away. It was broken into two pieces. There was a mark of fire around the hot section of the engine.

1.14.3 The port wing remained attached to the fuselage. It became damaged while skidding along the ground. A fire occurred at the leading edge of the wing and spread over the port side of the fuselage and vertical stabilizer, as a result of fuel flow from the ruptured fuel tank in the port wing. The fire was extinguished by heavy rain.

1.14.4 The fire truck could not enter the accident site since the vicinity of accident site was filled with water and mud.

1.15 Survival Aspects

At 0705 h Bangkok Tower alerted all units concerned in the vicinity of Bangkok International Airport.

At 0726 h a helicopter from the SAR unit of the Royal Thai Air Force took off. Bangkok Approach Control vectored the SAR helicopter to the position where HS-THB disappeared from the radar scope.

At 0752 h the helicopter sighted the wreckage of the aircraft. The rescue trucks and ambulances could not enter the crash site, survivors had to be evacuated by one helicopter of the Royal Thai Air Force and another helicopter of the Aviation Division, Ministry of Agricultural and Co-operative. They were evacuated from the crash site to the SAR unit and then transported to the hospital by ambulances. The dead persons were lifted by a Royal Thai Air Force helicopter to a nearby road and then transported by microbus of the charity foundation to the hospital for autopsy.

1.16 Tests and Research

None.

1.17 Additional Information

None

1.18 New Investigation Techniques

None

2. ANALYSIS

2.1 Power Plants

2.1.1 Port engine

2.1.1.1 Two propeller blades which remained attached to the propeller hub were bent forward, under power. The other two blades were thrown from the hub. It could be determined that the propeller blades hit the ground while the engine was operating. The propeller blades were in the unfeathered position.

2.1.1.2 The engine was separated into three parts. There were marks of scratches by turbine gears. It was rotational damage which could prove that the propeller blades hit the ground while the engine was operating.

2.1.2 Starboard engine

2.1.2.1 One propeller blade remained attached to the propeller hub. The other three blades were thrown from the hub. One detached blade and one blade still attached to the hub were bent forward, under power. The propeller blades were thrown far due to very high rotational energy proving that the starboard engine was operating during the accident.

2.1.2.2 The impeller vanes were damaged by friction at the edge and twisted to the same direction. It was rotational damage which proves that the propeller hit the ground while the engine was operating.

2.1.2.3 There was a mark of an intense fire at the starboard inner wing near the exhaust gas pipes. It showed that the temperature of the engine was very high which became a heat source for the fire. It is thus proved that the aircraft crashed while the engine was operating normally.

2.2 Landing gear

2.2.1 Port landing gear

2.2.1.1 The landing gear remained in its position but was folded back by impact force. It is determined that the landing gear was in the down position during impact because if it were in the up position, the landing gear up-lock would prevent the landing gear from extending downward and the impact force would push the landing gear into the landing gear bay.

2.2.1.2 The landing gear actuator was fully retracted. It is thus determined that the landing gear was fully down.

2.2.2 Starboard landing gear

2.2.2.1 The landing gear was broken off. It fell in the mid point between the wreckage and the impact position.

2.2.2.2 The landing gear up-lock was unlocked.

2.2.2.3 The landing gear actuator was fully retracted. It is thus determined that this landing gear was fully down.

2.2.3 Nose gear

2.2.3.1 The nose gear was broken off. It lay in front of the aircraft wreckage.

2.2.3.2 One of the twin nose wheels was thrown from the nose gear.

2.3 Meteorological Conditions

According to the Routine Aviation Weather Report (METAR) at Bangkok International Airport from 0600 h to 0730 h, there was a thunderstorm in the north moving northeast. Visibility was more than 10 km. The weather was developing more severely at the time of the accident. According to special weather report (SPECI) issued at 0640 h, there was a thunderstorm in the north. There was 3/8 cumulonimbus, base at 1 800 ft. The weather would gradually change to drizzle with a severe thunderstorm. The amount of cloud would be 2/8 cumulonimbus base 2 000 ft. The visibility would reduce to 5 km.

According to the above-mentioned routine aviation weather report, there was a thunderstorm to the north of Bangkok International Airport. The amount of cloud was 2/8 - 3/8 cumulonimbus based at 1 800 - 2 000 ft. The thunderstorm was moving from north to northeast. Thunderstorms in tropical climates are developed by convection. Visibility around thunderstorms will be good but there are downdrafts and heavy rain in thunderstorms.

There will be hail if the thunderstorm is heavy. In this case, the evidence showed that there was heavy rain associated with hail in the vicinity of the accident site. It is determined that the downdraft in the thunderstorm was severe.

During the time that the thunderstorm moved from the north to the northeast, HS-THB was approaching and descending to runway 21R. At the last contact, the aircraft was 7 NM from the outer marker during which time ILS approach clearance from Bangkok Approach Control was issued to the pilot. The aircraft was heading 209 degrees at an altitude of 1 500 ft. It is determined that the aircraft was approaching underneath the thunderstorm. From the statement of survivors the aircraft lost altitude rapidly the first time. It was probable that the aircraft was entering the area of cold dome of the thunderstorm and it was at first pressed by a downdraft. A moment later the aircraft could maintain altitude. It then penetrated through the middle part of the cold dome which produced a more severe downdraft than the edge of the cold dome. Then it was pressed by downdraft again. The aircraft lost altitude rapidly. The pilot could not maintain the altitude of the aircraft. Finally it crashed into the ground.

2.4 Automatic Terminal Information Service (ATIS)

2.4.1 HS-THB made initial contact with Bangkok Approach Control at 0647 h. Bangkok Approach Control put SPECI on the air via the ATIS at 0651 h (four minutes before the accident).

2.4.2 Analysis of 2.4.1

2.4.2.1 It cannot be proved whether the pilot received aviation routine weather report (0630 h) because he did not acknowledge the receipt of such weather report to Bangkok Approach Control.

2.4.2.2 As the SPECI was broadcast on the ATIS at 0651 h, it is assumed that the pilot might not have received it for the following reasons:

2.4.2.2.1 According to SPECI there was a thunderstorm in the north of Bangkok International Airport which was moving north-east. To make an ILS approach to runway 21R, the aircraft would enter the thunderstorm. If the pilot knew that, he would not direct the aircraft into the thunderstorm.

2.4.2.2.2 The SPECI was broadcast on the ATIS four minutes before HS-THB crashed. During that time the pilot was making an ILS approach to runway 21R. At that period the pilot had to complete many check lists and also monitor Bangkok Approach Control frequency. He might therefore not monitor the ATIS at that moment.

2.5 Events leading to the accident

The pilot made first contact with Bangkok Approach Control at 0644 h. He was instructed by Bangkok Approach Control to descend from 8 000 ft and was vectored by radar for an ILS approach. At 0651 h Bangkok Approach Control instructed HS-THB to descend to 1 500 ft. At 0654 h Bangkok Approach Control cleared HS-THB for an ILS approach to runway 21R. This clearance was acknowledged by the pilot.

Two-way radio communication between the pilot and Bangkok Approach Control from the initial contact until 0644 h was normal. There was no trace of any difficulty

in the operation of HS-THB during that period. At 0656 h Bangkok Approach Control instructed the pilot many times to contact Bangkok Tower on 118.1 MHz but no answer was received from the pilot. It is assumed that during that time the aircraft was pressed by a downdraft and lost altitude rapidly and it had already crashed into the ground.

2.6 Wreckage and Impact

In examining the aircraft wreckage and impact marks, the aircraft was banked slightly to the right at impact. It ran forward after impact in the flight path direction about 510 ft. It is determined that the speed of the aircraft was high at impact. The aircraft did not stall.

3. CONCLUSIONS

3.1 Findings

- 3.1.1 The aircraft was certificated and maintained according to approved procedures.
- 3.1.2 All crew members were certificated and qualified for the flight.
- 3.1.3 The weight and balance of the aircraft was within limits.
- 3.1.4 There was no evidence of pre-impact structural or flight control failure, fire, or powerplant failure.
- 3.1.5 There was no trace of a lightning strike or sabotage.
- 3.1.6 The VOR, ILS, primary surveillance radar and secondary surveillance radar were operating normally. DME was in operative and had been notified by NOTAM.
- 3.1.7 There was a thunderstorm to the north of Bangkok International Airport, moving northeast.
- 3.1.8 The number of passengers was more than the number of seats.
- 3.1.9 According to the load and balance sheet at Khon Kaen Airport, the aircraft had 2 600 L of fuel providing an endurance of about 0250 h (Elapsed time between Khon Kaen and Bangkok International Airport is 0110 h).

3.2 Probable Cause

The cause of the accident was that the pilot directed the aircraft into a thunderstorm in an early dissipating stage. The aircraft was severely affected by a downdraft and lost altitude rapidly. At that time the altitude of the aircraft was only 1 500 ft and the pilot could not maintain altitude of the aircraft. The aircraft crashed into the ground and ran forward.

Factors which caused the pilot to direct the aircraft into the thunderstorm were:

1. During flight prior to the accident, the pilot did not tune his radio to the ATIS frequency, so he did not receive the special weather report (SPECI) broadcast four minutes before the accident advising that there was a thunderstorm in the area he would soon encounter.

2. The pilot did not make use of airborne weather radar.

3. While the pilot was approaching at high altitude, he could see the thunderstorm, but it was not in his flight path to Bangkok International Airport. When the pilot was descending in compliance with Bangkok Approach Control instruction, he was not aware that the rain area which he was entering was a thunderstorm which was moving and developing severely. The thunderstorm which had developed to the severe stage was moving and intercepted the aircraft.

4. The pilot assumed that flying by radar vector would be safe as he thought that the Approach Control Radar could detect the thunderstorm and Bangkok Approach Control would not vector the aircraft into the thunderstorm.

4. RECOMMENDATIONS

4.1 When there is a weather warning or weather report which is unsafe for the flight, the controller should notify the pilot verbally immediately, not waiting for the notification by ATIS.

4.2 During the initial contact with Approach Control or Aerodrome Control if there is an ATIS, the pilot must listen to the ATIS and confirm that he has received information from the ATIS. If the pilot has not confirmed, Approach Control or Aerodrome Control should ask him and give him the necessary information.

4.3 One meteorological observer should be stationed in the tower to observe weather conditions continuously and report any change in weather conditions immediately.

4.4 Approach Control Radar should have the capability to detect thunderstorms in order that Approach Control can vector aircraft to avoid them.

4.5 During flight, every person on board the aircraft should have a seat with a safety belt.

4.6 Airborne weather radar on the aircraft should be operating and should be used for the safety of flight.

4.7 An aircraft should carry flight recorders.

ICAO Note: Minor editorial changes have been made and names of personnel have been deleted.

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