

GOVERNMENT OF INDIA  
MINISTRY OF COMMUNICATIONS



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Report of the Indonesian Commission of En-  
quiry on the accident to Air India International's  
Constellation Aircraft, VT-DEP, "Kashmir  
Princess", on the 11th April 1955 in the South  
China Sea off the Great Natuna Islands.

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# AIRCRAFT ACCIDENT INVESTIGATION REPORT

REPUBLIC OF INDONESIA

MINISTRY OF TRANSPORT AND COMMUNICATIONS

AIRCRAFT ACCIDENT INVESTIGATION REPORT 1/55

Constellation L-749A VT-DEP

GREAT NATUNA ISLANDS

April 11, 1955

## INVESTIGATORS

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NOTE.—*This report has been compiled according to the suggestions laid down in I.C.A.O. Doc. 6920-AN/855.*

### *Concerning the investigation*

The investigation was conducted in accordance with the provisions in I.C.A.O. Annex 13.

### *Accredited Representative of India :*

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### *His advisers :*

Col. A. K. Mitra, Military Attache, Embassy of India, Djakarta.

Y. R. Malhotra, Chief Inspector of Accidents, Civil Aviation, India.

### *Accredited Representative of United Kingdom :*

M. J. Muspratt Williams, Director, Civil Aviation, Hong Kong.

### *His Adviser :*

Newton, Chief Investigating Officer, Accident Investigation Branch, Ministry of Transport and Civil Aviation, Great Britain.

### *Advisers to the Investigation Committee :*

A. J. Chaves, Chief Instructor, Indonesian Aviation Academy, Civil Aviation, Indonesia.

Capt. K. Vishvanath, Divisional Operations Manager, Air-India International Corporation, Bombay.

K. G. Appusamy, Chief Inspector, Air-India International Corporation, Bombay.

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## 1. ACCIDENT DETAILS

- (a) Location . . . . . South China Sea, off Great Natuna islands  
at 107° 59' 38" East, 003° 53' 12" North.
- (b) Date and time (GMT) . . . . . April 11, 1955; 09:30 Z
- (c) Type of flying . . . . . Non-scheduled international charter.
- (d) Object of flight . . . . . To transport Chinese delegation from  
Hong Kong to Djakarta for the Bandung  
Conference.
- (e) Date and time of receipt of notification by investigator. . . . . April 12, 1955 ; 00:00 Z GMT
- (f) Date and time of arrival of investigators at scene. . . . . April 15, 1955 ; 02:30 Z GMT

## 2. SUMMARY OF ACCIDENT

The aircraft took off with eight crew members, which included the Aircraft Maintenance Engineer who was booked as a passenger, and eleven passengers from Hong Kong for Djakarta.

The flight was uneventful until approximately five hours after take off, when a muffled explosion was heard in the aircraft, then cruising at 18000 feet over the sea. Smoke started entering the cabin through the cold air ducts almost immediately, and a localised fire was detected soon after on the starboard wing behind No. 3 engine nacelle.

A rapid descent was commenced for ditching the aircraft, and distress signals broadcast. In spite of fire fighting action, during which No. 3 engine was feathered, the fire spread very rapidly and caused hydraulic failure followed by electrical failure. During the final stages of the descent, executed under extremely difficult circumstances, dense smoke entered the cockpit reducing the visibility to almost nil.

The aircraft impacted the water with the starboard wing tip, and the nose submerged almost instantaneously. Only three crew members survived the accident. The aircraft was destroyed.

Maps of the planned flight route and of the scene of the accident will be found at Appendix 1. (not printed).

## 3. AIRCRAFT INFORMATION

The aircraft VT-DEP "KASHMIR PRINCESS", owned by Air-India International Corporation, Bombay was a Lockheed Constellation 749A type. It had flown a total of 11,163 hours.

Detailed aircraft information will be found at Appendix 11.

## 4. CREW INFORMATION

The crew of the aircraft consisted of :

- Captain
- Co-Pilot.
- Flight Navigator.

Flight Engineer.  
 2 Flight Pursers.  
 Air Hostess.  
 Aircraft Maintenance Engineer.

Detailed crew information will be found at Appendix III.

#### 5. PASSENGERS

This information will be found at Appendix IV.

#### 6. WEATHER CONDITIONS

The weather at the time of the accident was fair with good visibility. It was not a factor relevant to the accident.

#### 7. NAVIGATION AIDS

Navigation not being a factor relevant to the accident, no specification of aids is being given.

#### 8. FIRE FIGHTING EQUIPMENT

##### (a) *Specification of equipment :*

The aircraft was fitted with standard Lockheed fire detection and fire-fighting equipment.

This provides fire detectors in the following areas :

- No. 1, 2 and 3 zones of each powerplant,
- Left hand and right hand cabin heater enclosures.

The smoke detection equipment in the baggage compartments had been removed from this aircraft under CAA approval.

The fire fighting equipment consisted of two sets of three CO<sub>2</sub> bottles each. Each bank can be selected and discharged into any of the following areas :

- No. 2 and No. 3 zone of each powerplant,
- Left hand and right hand cabin heater enclosures,
- Front and rear baggage compartments.

In addition hand fire extinguishers were located in the cockpit, the Navigators compartment and both the passenger cabins.

##### (b) *Equipment used :*

A bank of CO<sub>2</sub> bottles was discharged in the rear baggage compartment as the presence of smoke through the individual cool air ducts indicated the possibility of fire in this compartment.

Soon after, however, a fire was located on the starboard wing behind No. 3 engine nacelle, and this was followed by a warning of fire in No. 2/3 zone of No. 3 engine. The other bank of three CO<sub>2</sub> bottles was then, therefore, selected and discharged in this area.

After both banks had been discharged, a warning, indicating a fire in the RH heater enclosure, came on. The fire extinguisher selector was selected to this area, but no fire fighting action could be taken.

¶ Although the discharge of CO<sub>2</sub> in No. 2/3 zone of No. 3 engine resulted in the fire warning light going off, the fire fighting action proved ineffective due to circumstances which are referred to later in this report.

#### 9. WITNESSES

Three eye-witnesses were interrogated.

A list of the witnesses with their statements will be found at Appendix V. (not printed).

#### 10. OTHER STATEMENTS

(a) The three surviving members of the crew were interrogated. Their statements will be found at Appendix VI. (not printed).

(b) A number of persons, concerned with this flight and the subsequent search and rescue actions, were interrogated.

A list of these persons with their statements will be found at Appendix VII: (not printed).

#### 11. EXAMINATION OF WRECKAGE AND TECHNICAL INVESTIGATIONS

(a) *Location of wreckage and general observations:*

The aircraft had crashed into the sea 235 miles NW of Kuching. The wreckage was located by Indonesian fishermen on the 12th April, 1955 at an average depth of 35 feet of clear water, but it could not be seen from the surface. An Indonesian patrol vessel was detailed at the site. Salvage operations commenced on the 25th April and lasted for ten days. They were conducted by HMS "Barford", the Indonesian naval salvage vessel RI "Triton" and other Indonesian vessels. Salvage operations were hampered due to the presence of sharks.

A list of items recovered will be found at Appendix VIII (not printed). It is estimated that about 85% of the wreckage was recovered. The only major structural component not recovered was the tail section.

All components were individually examined as each was recovered from the sea bed. All the wreckage recovered was transported to Djakarta, and again inspected by the Committee, accredited representatives of India and the United Kingdom and advisers from Air-India International and the Lockheed Aircraft Corporation.

Great care was exercised in lifting the wreckage from the sea bed on to the decks of the vessels, and surprisingly little damage was caused during this operation, conducted under difficult conditions.

The area in which the components were recovered is shown in a sketch included in Appendix VIII. (not printed).

(b) *Condition of wreckage:*

The wreckage indicated that the aircraft had suffered considerable damage on impact with the sea, in addition to fire damage. Salt water corrosion was most noticeable on magnesium alloy engine parts; other parts were comparatively free.

The aircraft had broken into 12 major sections as follows :

1. Cockpit
2. Tourist section of fuselage.
3. Rear section of fuselage upto tail.
4. Port wing.
5. Centre section top skin.
6. Centre section bottom skin.
7. Starboard wing.
8. No. 1 power plant.
9. No. 2 Power plant.
10. No. 3 power plant.
11. No. 4 power plant.
12. Tail section (not recovered).

(c) *Examination of wreckage :*

A detailed examination of the major components indicated the following :—

1. *Cockpit section :*

This section consisted of the complete fuselage forward of 260 bulkhead.

The nose cover forward of the nose pressure bulkhead was missing. The crew door was also missing ; crew door frame at bulkhead 260 had opened up.

All the crew seats were adrift, but the commander's body was still in his seat.

The co-pilot's sliding window was open; pilot's rearmost side window was broken.

There was slight damage to the outer skin on the port side, just forward of the radio rack. No other damage or signs of burning were present in this area.

The nose gear was retracted and locked, but the doors were missing.

The floor structure and boards of the navigator's compartment and part of the tourist cabin were still attached to this section, but the fuselage had broken off at bulkhead 260.

The navigator's instrument panel was intact.

All plumbing, wire bundles, cables etc. up to the tourist compartment, were attached to this section.

A record of the cockpit instrument readings and control settings will be found at Appendix IX. (not printed).

*Tourist section of the fuselage :*

This extended from fuselage station 420 to station 620.

This section of the fuselage had been torn off from the centre section and the entire floor structure, including the boards and seats was missing.

The top of the fuselage extended to the front up to station 270, but the width of the skin on the extended portion gradually decreased and was only 10 inches at station 270.

The other portions of the fuselage between stations 260 and 420 had broken up in several places, and was recovered separately.

This section had evidence of a serious fire and burning on the starboard side, commencing from approximately the emergency exit, and extending rearwards.

Ducts, hatracks and upholstery in the cabin area over the centre section had suffered by fire.

All the three emergency exits in this section were open.

Fire damage and smoke trail extended from the starboard side of the fuselage through the cabin. The smoke had passed through the port emergency exit. Other than the smoke trail thus defined on the outside of the fuselage, there was no other indication of fire on the port side.

### 3. *Rear fuselage section :*

This extended from fuselage station 620 to the tail cone location, but nearly 2/5 of the fuselage on the starboard side was burnt away and missing.

There was no evidence of fire in sections of the baggage compartment still with this section.

The auxiliary vent exit door was adrift and the main passenger door was pushed in.

The lounge area was fairly intact.

Only a small section of the floorboard, with a double standard seat forward of the auxiliary water tank in the cabin was still attached to the fuselage.

There was no burning on the port side.

The rear pressure bulkhead had been torn off from the fuselage and was picked up separately.

Both the port and starboard cabin heaters were not located.

### 4. *Port wing :*

This section of the wing had sheared off at station 145.

It extended up to the wingtip, and there was not much burning on the inner wing, although the trailing edge top skin over the flap bays had evidence of burning.

The outer wing had been partially burnt and the rear half of this section was missing. The leading edge of the outer wing had opened up. The landing gear was locked in the retracted position.



5. *Centre section :*

The centre section was recovered in two :

(a) The top skin with corrugations from station 60 on the starboard side up to station 145 on the port side.

It included the attachment fittings to the port wing.

(b) The bottom skin, which also covered the same area.

The front and rear beams were not recovered.

An inspection did not reveal anything significant.

6. *Power Plants :*

All the power plants were recovered, without cowlings.

The cabin superchargers from nacelles No. 1 and 4 were recovered separately.

No. 1 engine was without the propeller, which had broken off with the propeller shaft and could not be located.

The propeller on No. 3 engine was in the feathered position.

There was no evidence of fire of the power plants.

There was no evidence of fire having originated in any of the aforementioned components, although it had undoubtedly spread to the fuselage when the aircraft was still in the air.

The fire pattern indicated that it had spread to the starboard side of the fuselage above the wing, and had been of enough intensity to burn through the fuselage side. It had then gone into the cabin area as was indicated by burnt cushions and cabin furnishings.

The maximum intensity of fire in the cabin had been in the area over the centre section.

The front of the tourist cabin and the rear of the standard cabin were comparatively free of fire damage.

Smoke had passed through the open emergency exit on the port side on top of the wing.

The remaining damage in all the above components was caused by impact and salt water corrosion only.

7. *Starboard wing :*

This component was recovered by the Indonesian Naval vessel RI "Triton" on the 30th of April 1955. The equipment on board this vessel was unable to lift the wing clear of the water and on to the deck. On the 2nd May 1955 this wing was transferred by HMS "Barford" from the RI "Triton" to s.s. "Belantik."

This section extended from station 60 to the tip.

The trailing edge section of the wing from station 80 up to the refrigerator location was completely missing, aft of the rear beam. The complete rear beam web in this area had also been burnt.

The leading edge of the inner wing had also suffered damage by fire and the smoke pattern indicated that it had spread to this area from the rear at station 80.

The landing gear was locked in the retracted position.

A well defined water line was noticeable, and the intensity of the fire on leading edge sections of the outer wing which had remained above the waterline for some time after the "ditching" had been severe.

An inspection of the wheel well indicated evidence of explosion in this area.

The nucleus of the explosion appeared to be at the centre of wing stations 172 and 191 and immediately forward of the rear beam. This was clearly indicated by the outward bulging of all the skin and rib members in the immediate area surrounding the nucleus.

The force had been of sufficient magnitude to cause bulging out of the front beam web in this area.

The 24 ST strut assemblies of ribs at stations 164 and 172 had been bent.

The inboard solid rib of No. 3 fuel tank outer-section, forming the inner wall of this tank, had been punctured into the tank, as was the solid rib forming the wall between No. 3 and No. 4 fuel tanks.

The top skin had bulged up from the rib. A number of corrugations in this area had been torn.

A hole had been blown through the bottom skin in this area, and the surrounding skin had bulged outwards. The hole extended to and included the lower rear beam cap.

Pronounced and deep pitting as if by shrapnel was detected on surrounding skin, the side of the 24 ST strut assemblies and the 8630 steel drag link tubes facing the explosion.

Pitting, as if by glancing shrapnel, had also been defined on those surfaces of the strut assemblies which were parallel to the movement of the shrapnel.

The direction indicated by these pitting confirm the source of explosion to have been in the wheel well area referred to above.

*(d) Special investigation :*

After the evidence of explosion in the starboard wheel well had been established, a thorough and minute search for extraneous articles in this area was commenced.

This yielded parts of a clockwork mechanism, which was trapped between a corrugation and the rib forming the inner wall of No. 3 tank outer-section.

This mechanism had the FAST/SLOW regulator graduations on it. It had evidence of having been subjected to heat, pressure and salt water corrosion, and it was in no way connected with any aircraft equipment.

Further search resulted in the detection of other parts, forming part of a clock-work mechanism.

The 24 ST strut members, the 8630 steel drag link tubes and the 24 ST second stiffener from the rear on the rib forming the outer wall of No. 3 tank

inboard section, were removed from the wreckage for a laboratory examination.

Other loose pieces found in the wheel well area were also collected for identification.

The strut members and steel tubes had, as previously noted, been indented by shrapnel, while the stiffener had been punctured at two locations.

The report received from the laboratory will be found at Appendix XI. (Not printed).

Photographs covering the examination of the wreckage will be found at Appendix X. (Not printed).

## 12. GROUND INSTALLATION

Not applicable.

## 13. COMMUNICATIONS

The aircraft was flying in Singapore FIR when the MAYDAY calls were transmitted. These signals were received by Radio Station Kemajoran, Djakarta, at 1109 25 Z April 1955 and relayed to Singapore.

Detailed communication information will be found at Appendices VI and VII (not printed).

## 14. DISCUSSION OF EVIDENCE

The aircraft was inspected by licensed Aircraft Maintenance Engineers at Bombay on the 8th April 1955. The result of the inspection was satisfactory and a Trip Certificate, valid for 60 hours of flying or 7 days elapsed time was issued on 8-4-55 at 0600Z GMT by A.M.E. No. 438 covering the airframe and by A.M.E. No. 316 covering the powerplants. The aircraft then took off on the evening of the 8th April to operate a scheduled flight to Singapore. It returned to Bombay on the 10th April after an uneventful flight.

On arrival at Bombay, a terminal check was carried out, together with rectification work for the defects reported during the previous flight. These defects were of a routine nature, and included a fuel metering defect (running rich) of No. 2 engine. Both the fuel injection pumps on this engine were replaced and, after a ground run, the aircraft was cleared for flight.

The aircraft then taxied out to the runway, to operate a scheduled flight to Hong Kong.

During the pre-take-off engine run up, the Flight Engineer reported a mag drop on No. 2 engine. The aircraft returned to the apron for further checking. The engine was given another run up by the A.M.E. on duty at the apron, and the performance was found to be entirely satisfactory. The Captain and Flight Engineer of the aircraft then carried out another run up, and they satisfied themselves of the performance. The passengers were again enplaned and the aircraft made a normal take-off on the afternoon of the 10th April, 1955 for Hong Kong, *via* Calcutta and Bangkok.

At Bangkok a fresh crew took over the aircraft. The composition of the crew was then the same as that of the subsequent Hong Kong-Djakarta flight.

The complete outward flight from Bombay to Hong Kong was of a routine nature, with the aircraft fully airworthy and properly certificated.

A transit check at Hong Kong was carried out by Hong Kong Aircraft Engineering Corporation under the supervision of Aircraft Maintenance Engineer Karnik, who accompanied the aircraft. He also checked up the No. 2 engine R. H. distributor, as there were some traces of oil on the outside of the cover. He found it satisfactory.

Refuelling was also carried out, and a total of 2,520 Imp. gallons of fuel were uplifted.

The aircraft was at Hong Kong for 80 minutes, during which the crew received their briefing and the aircraft was loaded.

The aircraft took off from Hong Kong at 0425Z GMT on 11-4-55. The flight was routed to overfly Natuna Islands, for navigational check purposes. It had on board 11 passengers. It also carried 3,780 Imp. gallons of fuel and 140 Imp. gallons of oil. The gross-take-off weight was then 98,376 lbs. and the load was properly distributed with the centre of gravity at 25% MAC.

The crew members were the same as had brought the aircraft in from Bangkok. The aircraft was under the command of Captain Jatar, who was one of the most senior and experienced pilots of Air-India International Corporation. He had a total of over 12,300 hours of flying, which included over 4,900 hours in command of Constellation type aircraft.

Co-pilot Dikshit had a total of nearly 7,200 hours flying experience. His licence included DC3 and Viking aircraft command flying. He had flown a total of nearly 870 hours as co-pilot on Constellation type aircraft.

The other members of the crew were also adequately experienced and all were properly licensed for the duties which they were performing.

After the take-off, routine messages were exchanged by the aircraft with ground stations.

At about 0923Z hrs, when the aircraft was cruising at 18,000 feet in clear weather, an explosion occurred on board. All the three surviving members of the crew heard this explosion and there is little doubt that it was loud enough to be heard by all on board. A.M.E. Karnik, who was sleeping in the tourist cabin, was woken up by the shock of the explosion.

He then noticed smoke emanating from the cold air ducts, and suspected a fire in the rear baggage compartment. He reported this to the Commander.

A rapid descent and depressurisation was commenced. A bank of CO<sub>2</sub> bottles was discharged into the rear baggage compartment in accordance with the drill.

By this time Pathak, the Navigator, had noticed a fire on the star board wing behind No. 3 engine nacelle. This fire was spreading very rapidly, and this information was conveyed by Karnik to the Commander, who went back to see the fire from the tourist cabin and then returned to his seat.

The generators were switched off as a precaution against electrical fire but again switched on later.

Ditching was decided upon and each crew member took appropriate action.

The fire spread rapidly and was approaching the fuselage. A.M.E. Karnik, therefore, estimated that the wing would not hold on for long, as metal was melting.

The fire warning in No. 2/3 Zone of No. 3 engine then came on. No. 3 engine which was functioning normally, was feathered, and the remaining bank of CO<sub>2</sub> bottles was discharged in No. 2/3 zone.

The starboard heater fire warning then came on, but the extinguishers had been exhausted.

During the descent Co-pilot Dikshit sent out MAY-DAY calls and reported fire in the baggage compartment, after consulting Captain Jatar.

A left hand turn was executed, in an attempt to ditch near land. The Hostess issued life vests to all passengers first and then the crew. There was no panic. The passengers were in their seats.

Navigator Pathak had in the meantime located the position of the aircraft and passed it to Co-pilot Dikshit, who had to help the Captain with the controls, as the aircraft was getting uncontrollable due to starboard wing dropping.

At this stage the Flight Engineer reported hydraulic failure. Co-pilot Dikshit switched on the auxiliary boosters, which functioned satisfactorily.

He then again managed to pick up the microphone to report his position, but found it dead.

Door to crew compartment was open during emergency, and smoke entered crew compartment. A.M.E. Karnik opened two port emergency exits in cabin over the wing and one in crew compartment, when he felt dizzy.

At this stage very thick black smoke entered crew compartment, which obscured forward visibility just prior to ditching. Co-pilot Dikshit opened the sliding window on his side. He had to peer at the instrument panel to check airspeed indicator reading, which was 140 knots when he last observed it.

In spite of all efforts to level off the air-craft for ditching, it continued in a shallow right hand turn and hit the water with the star-board wing. Flaps could not be used because of hydraulic failure.

Flight Navigator Pathak and A.M.E. Karnik found themselves in the water, but Co-pilot Dikshit had to kick himself free through the sliding window on his side.

Karnik and Dikshit tied themselves together and eventually drifted eight hours later to an island. Pathak landed separately on an uninhabited island and was picked up later by islanders with Dikshit and Karnik.

It is clear that the explosion was followed by a combination of circumstances which embraced practically all emergencies that could have faced the crew. A serious fire that threatened to burn off the wing any minute; hydraulic failure, electrical failure, partial loss of control and dense smoke in the cockpit which restricted the visibility to almost nil during the most critical stages of the descent.

It is estimated, that about 85% of the wreckage was recovered by salvage operations which commenced on the 25th of April 1955 and lasted 10 days.

A detailed examination of the wreckage has been recorded earlier. It is however pertinent to refer to it again.

Two of the three survivors had both witnessed the fire in the very early stage, and had located it behind the No. 3 engine nacelle, soon after the explosion.

Fortunately the right wing which included the starboard wheel well was recovered.

Positive confirmation is available of an explosion having taken place in this area.

In addition to the physical evidence of bulging skin and bent members, there was also deep pitting by shrapnel in the skin surrounding the explosion area, and on the 24 ST struts and steel tubes which were facing the explosion charge. Glancing dents have also been deeply defined in those strut faces which were parallel to the flight of shrapnel. The fuel tank wall was punctured inwards.

Finally parts of a twisted, burnt and corroded clockwork mechanism, which has no relation to any equipment of the aircraft, was found trapped in the very same area where an explosion took place.

The explosion caused by this device resulted in puncturing of the fuel tank, and fire, which developed intensely as it was fed by large quantities of high octane fuel. Heat from this fire travelled forward to No. 3 zone of No. 3 power plant, causing a fire warning from this zone. The discharge of CO<sub>2</sub> in this area caused the warning to go off. This fire also burnt through the rear beam web, which had also opened up due to the explosion. Once the flames had spread to the trailing edge area behind the beam, they started consuming the cabin air ducting, cables and the fuel and hydraulic lines.

This explains the entry of streaks of smoke noticed by A.M.E. Karnik soon after the explosion, and the hydraulic failure experienced at a later stage. This hydraulic failure compelled the crew to switch on the auxiliary boosters for the rudder and elevator. The heavy drain of electrical energy required for the operation of these boosters, combined with the fact that the generators had also to be switched off at one stage as a precautionary measure against electrical fire, would undoubtedly exhaust the batteries. It seems most probable however, that the complete electrical system went 'dead' as a result of the fire, and this explains why Co-pilot Dikshit was unable to send out the position report during the final stages of the descent.

The crew also state that just before the aircraft hit the water, dense black smoke filled the entire cabin and cockpit. It is estimated that it took at least 5 to 6 minutes for the aircraft to descend from 18,000 ft. During this period the flames had spread to the right side of the fuselage. The wreckage shows positive evidence of this area having burnt off in the air. The dense smoke which entered the aircraft, was undoubtedly caused by the fire having entered the cabin after burning through the side of the fuselage.

The aforementioned facts combined together, provide irrefutable evidence of an infernal machine having been placed by some party unknown in the starboard wheel well area, presumably to destroy the aircraft.

The task of this person was rendered easier by the fact that access to this area is extremely easy through the openings in the bottom skin of the wheel well, when the aircraft is on the ground.

#### FINDINGS :

1. The aircraft was airworthy and properly certificated.
2. The crew were experienced and held valid licences.
3. The aircraft was properly loaded and had sufficient fuel for the flight.
4. The take-off from Hong Kong was normal and the flight uneventful for the first 5 hours.
5. An explosion occurred on board the aircraft; when cruising at 18,000 feet over the sea. A fire broke out in the starboard wing and spread rapidly causing failure of the hydraulic and electrical services.
6. A rapid descent for ditching was immediately commenced and the emergency procedures were carried out efficiently and calmly by the crew members under extremely difficult conditions.
7. The aircraft while under partial loss of control hit the water with the starboard wing tip, and broke up on impact.
8. An inspection of the wreckage revealed positive evidence of an explosion in the starboard wheel well of a timed infernal machine, parts of which were still trapped in the wreckage. This explosion caused puncturing of No. 3 fuel tank and a fire, which spread rapidly.

#### 15. RECONSTRUCTION OF FLIGHT UP TO ACCIDENT

This section has been covered under 'Discussion of Evidence'.

#### 16. CAUSE

The Committee determines that the cause of this accident was an explosion of a timed infernal machine, placed in the starboard wheel well of the aircraft.

This explosion resulted in puncturing of No. 3 fuel tank, and an uncontrollable fire.

#### 17. RECOMMENDATIONS

In view of the nature of this accident the Committee refrains from making any special recommendations.

#### 18. SIGNATURES OF INVESTIGATORS

The investigators declare that this report has been compiled to the best of their knowledge and in concurrence and collaboration with the accredited representatives and advisers.

(Sd.) R. J. IMAWAN,

(Sd.) Ir SOETOMO,

(Sd.) Ir J. HEYLIGERS,

(Sd.) Dr. M. S. KAMMINGA.

DJAKARTA :

Dated 25th May, 1955.

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## **APPENDICES**

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*(k) Airframe history*

Flying time since manufacture . 11,163 hrs.

Flying time since last overhaul† . 265 hrs.

(See note below).

Flying time since last major check  
("Terminal Check") . . . 19 hrs.

*Modifications completed :*

1. L. A. C. S. B. Nos. 158A ; 171 ; 172 ; 175 ; 180 ; 181 ; 183B, 184 ; 191 ; 209 ; 220 ; 227 ; 235 ; 238 ; 242 ; 243 ; 251 ; 254 ; 255 ; 257 ; 260 ; 262 ; 263 ; 264 ; 269 ; 271 ; 274 ; 275 ; 283 ; 285 ; 287 ; 288 ; 300 ; 304 ; 313 ; 333 ; 335 ; 339 ; 343 ; 345 ; 346 ; 348 ; 350 ; 352 ; 353 ; 354 ; 355 ; 358 ; 359 ; 362 ; 363 ; 366 ; 367 ; 368A ; 368B ; 372 ; 376 ; 377 ; 378 ; 379 ; 380 ; 383 ; 384 ; 389 ; 391A ; 394 ; 395 ; 398 ; 399 ; 400 ; 401 ; 402 ; 403 ; 405 ; 406 ; 408 ; 409 ; 410B ; 412 ; 415 ; 416 ; 417 ; 418 ; 419 ; 420 ; 421 ; 422 ; 423 ; 430 ; 433 ; 436 ; 437 ; 439 ; 440 ; 441 ; 442 ; 448 ; 449 ; 450 ; 453 ; 454 ; 455 ; 457 ; 458 ; 459 ; 460 ; 461 ; 462 ; 466 ; 467 ; 468 ; 469 ; 470 ; 471 ; 472 ; 473 ; 474 ; 476 ; 477 ; 478 ; 479 ; 480A ; 481 ; 482 ; 483B ; 484 ; 485 ; 487 ; 488 ; 489 ; 490 ; 491 ; 492 ; 493 ; 495 ; 496 ; 498 ; 499 ; 500 ; 500A ; 501 ; 502 ; 504 ; 505 ; 509 ; 510 ; 511 ; 512 ; 513 ; 514 ; 515 ; 516 ; 517 ; 518 ; 519 ; 520 ; 521 ; 523 ; 524 ; 525 ; 526 ; 527 ; 528 ; 529 ; 530 ; 531A ; 532 ; 533 ; 534 ; 535 ; 536 ; 538 ; 540 ; 541 ; 542 ; 543 ; 545 ; 546 ; 547 ; 549 ; 550 ; 554 ; 555 ; 558 ; 559 ; 561 ; 562 ; 566 ; 567 ; 568 ; 569 ; 571 ; 572 ; 573 ; 574 ; 575 ; 576 ; 577 ; 578 ; 579 ; 581 ; 582 ; 583 ; 584 ; 585 ; 586 ; 587 ; 588 ; 589 ; 591 ; 592 ; 594 ; 595 ; 596 ; 597 ; 599 ; 601 ; 602 ; 603 ; 604 ; 605 ; 606 ; 609 ; 610 ; 611 ; 612 ; 616 ; 618 ; 623 ; 627 ; 628 ; 630 ; 631 ; 633 ; 636 ; 637 ; 638 ; 639 ; 642 ; 648 ; 649 ; 651 ; 652 ; 657 ; 658 ; 668 ; 669 ; 670 ; 670 (with revision of 5-10-53) ; 673 ; 678 ; 679 ; 686 ; 688 ; 691 ; 697 ; 698 ; 707 ; 713 (in part) ; 715 ; 727 ; 730 ; 739 ; 744 ; 768 ; 771 ; 772 ; 776 and 803.

2. L.A.C. S. I. L. Nos. 99 ; 100 ; 103 ; 106 ; 107 ; 110 ; 111 ; 113 ; 115 ; 123 ; 124 ; 126 ; 128 ; 131 ; 133 ; 138 ; 140 ; 142 ; 147 ; 150 ; 152 ; 153 ; 159 ; 160 ; 161 ; 163 ; 164 ; 165 ; 168 ; 172 ; 175 ; 181 ; 182 ; 183 ; 190 ; 200 ; 202 ; 207 ; 211 ; 212 ; 213 ; 214 ; 216 ; 217 ; 220 ; 223 ; 224 ; 225 ; 226 ; 227 ; 231 ; 236 ; 237 ; 239 ; 240B ; 243 ; 244 ; 246 ; 247 ; 248 ; 250 ; 252 ; 256 ; 257 ; 258 ; 260 ; 261 ; 261A & B ; 265 ; 266 ; 267 ; 272 ; 274 ; 276 ; 280 ; 282 ; 283 ; 284 ; 286 ; 289 ; 292 ; 295 ; 295A & B ; 296 ; 297 ; 299 ; 300 ; 301 ; 302 ; 302A ; 303 ; 304 ; 305 ; 307 ; 308 ; 309 ; 312 ; 313 ; 314 ; 315 ; 316 ; 317 ; 318 ; 320 ; 324 ; 325 ; 326 ; 327 ; 328 ; 330 ; 331 ; 332 ; 336 ; 339 ; 340 ; 345 ; 346 ; 349 ; 353 ; 356 ; 357 ; 360 ; 361 ; 366 ; 367 ; 372 ; 380 ; 381 ; 385 ; 386 ; 387 ; 388 ; 391 ; 392 ; 393 ; 397 ; 405 ; 408 ; 409 ; 410 ; 412 ; 413 ; 414 ; 415 ; 420 ; 426 ; 427 ; 433 ; 442 ; 451 & 455.

3. *Other modifications.*—Modification to Cabin Heater Combustion Air System as per Air France Drawings Nos. 16158, 16159 and 16160, carried out.

Added attachment of wing to fuselage intermediate fillet carried out as per L.A.C. Drawing No. 2454.

Modification to fuselage intermediate and trailing edge fillets attachment carried out as per L.A.C. FS/86418.

†*Note.*—Overhaul indicating last (No. 5) inspection of 1500 hrs. period progressive maintenance schedule.

(D) Engine history	No. 1	No. 2	No. 3	No. 4
Flying time since manufacture	8085	7631	8303	5824 hrs.
Flying time since last overhaul	866	1032	1111	279 hrs.
Flying time since last major check (" Terminal Check ")	19	19	19	19 hrs.

**Modifications completed :**

1. L.A.C. S. B. Nos. (Powerplant modifications) : 238 ; 391A, 419 ; 441 ; 453 ; 455 ; 458 ; 473 ; 489 ; 499 ; 504 ; 517 ; 586 ; 600 and revision ; 608 ; 682 ; 684 ; 733 ; 745 and 771.
2. L.A.C. S.I.L. Nos. (Powerplant modifications) : 144 ; 188 ; 199 ; 203 ; 229 ; 243 ; 247 ; 254 ; 272 ; 301 ; 302A ; 310 ; 330 ; 340 ; 353 ; 371 ; 405 and 415.
3. W.A.C. S. B. Nos. (Engine modifications) :

Engine No. 75974: C18-10; -30; -40; -41; -48 ; -50A ; -53 ; -59 ; -61A ; -62 ; -65 ; -69 ; -73 ; -75A, -76 ; -79 ; -80 ; -81A ; -83 ; -88 ; -89A, -90 ; -92 ; -95 ; -97 ; -98A ; -102 ; -104 ; -106A ; -112 ; -113B ; -114B ; -117A ; -123A ; -125 ; -126A ; -127A ; -128A ; -133 ; -134B ; -136B ; -137A ; -140 ; -143A ; -146A ; -147 ; -149 ; -150 ; -156A ; -157 ; -158A ; -160A ; -164 ; -165 ; -166 ; -169 ; -172 ; -173 ; -175 ; -176 ; -178A ; -180 ; -181 ; -182 ; -183 ; -184 ; -189 ; -194 ; -196 ; -197 ; -202 ; -206 ; -207A ; -213 ; -214 ; -223 ; -225 ; -233 ; -234A ; -236 ; -238 ; -240A ; -243 ; -244 ; -246B ; -258 ; -265 ; -282 (in part) ; -287 ; -288 ; -294 ; -295 ; -299 and -310.

L.A.C. : 49/SB238 ; 49/SB600 ; 49/SB771.

-Engine No. 75978 : C18-10 ; -30 ; -40 ; -41 ; -48 ; -50A ; -53 ; -55 ; -59 ; -61A ; -62 ; -65 ; -69 ; -73 ; -75A ; -76 ; -79 ; -80 ; -81A ; -88 ; -90 ; -92 ; -95 ; -97 ; -98A ; -102 ; -104 ; -106A ; -108 ; -112 ; -113B ; -114B ; -123A ; -125 ; -126A ; -127A ; -128A ; -133 ; -134B ; -136B ; -137A ; -140 ; -146 ; -149 ; -150 ; -156A ; -157B ; -158A ; -160A ; -165 ; -166 ; -169 ; -172 ; -173 ; -176 ; -178A ; -180 ; -181 ; -182 ; -184 ; -194 ; -202 ; -206 ; -207A ; -213 ; -214 ; -223 ; -225 ; -233 ; -234A ; -236 ; -238 ; -243 ; -244 ; -246B ; -258 ; -265 ; -282 ; -284 ; -287 ; -288 ; -295 ; -297 ; and -299.

L.A.C. : 49/SB238 ; 49/SB600 ; 49/SB771.

-Engine No. 75959 : C18-10 ; -30 ; -40 ; -41 ; -48 ; -50A ; -53 ; -55 ; -59 ; -61A ; -62 ; -65 ; -69 ; -73 ; -75A ; -76 ; -79 ; -81A ; -88 ; -90 ; -95 ; -97 ; -98A ; -102 ; -104 ; -106A ; -108 ; -112 ; -113B ; -114B ; -123A ; -125 ; -126A ; -127A ; -128A ; -133 ; -134B ; -136B ; -137A ; -140 ; -146A ; -147 ; -150 ; -156 ; -157B ; -158A ; -160A ; -165 ; -166 ; -169 ; -172 ; -173 ; -176 ; -178A ; -180 ; -181 ; -182 ; -184 ; -194 ; -202 ; -206 ; -207A ; -203 ; -214 ; -223 ; -225 ; -233 ; -234A ; -236 ; -238 ; -240A ; -243 ; -244 ; -246B ; -258 ; -265 ; -282 ; -284 ; -287 ; -288 ; -295 ; -297 ; -299 ; -80 and -92.

L.A.C. : 49/SB238 ; 49/SB600 ; 49/SB771.

-Engine No. 186722 : C18-10 ; -30 ; -40 ; -41 ; -48 ; -50A ;  
 -53 ; -55 ; -59 ; -61A ; -62 ; -65 ; -69 ; -73 ; -75A ;  
 -76 ; -79 ; -80 ; -81A ; -83 ; -88 ; -89A ; -90 ;  
 -92 ; -95 ; -97 ; -98A ; -102 ; -104 ; -106A ; -108 ;  
 -112 ; -113B ; -114B ; -117A ; -118 ; -123A ; -125 ;  
 -126A ; -127A ; -128A ; -133 ; 134B ; -136B ; -137A ;  
 -140 ; -143A ; -146A ; -149 ; -150 ; -153 ; -156A ;  
 -158A ; -160A ; -164 ; -165 ; -166 ; -169 ; -172 ; -173 ;  
 -176 ; -178A ; -180 ; -181 ; -182 ; -183 ; -184 ; -190A ;  
 -194 ; -196 ; -202 ; -206 ; -207A ; -213 ; -214 ; -223 ;  
 -225 ; -233 ; -236 ; -240A ; -243 ; -244 ; -246B ; -258 ;  
 -265 ; -282 ; -284 ; -295 ; -297 ; -299 and -300.

L.A.C. : 49/SB 238 ; 49/SB600 ; 49/SB771.

(m) Defects :

1. DEFECTS REPORTED AFTER ISSUE CERTIFICATE OF SAFETY :

A. During Terminal Check, Bombay 10-4-55 :

<i>Defects reported</i>	<i>Rectification work carried out</i>
-No. 1 engine BMEP fluctuates 10 psi. Engine performance normal.	-BMEP transmitter replaced.
-Auto Pilot Altitude Control U/S	-Auto Pilot amplifier replaced.
-No. 2 engine running rich in climb and cruise. Can be manually leaned out without loss of power but CHT shows 25°C less.	LH and RH fuel injection pumps replaced.
-Slight fuel seepage past 2A tank integral dip stick.	-Rectified.
-No. 2 engine mag. drop "L" switch : 100 RPM drop.	-All rear plugs changed and HT leads checked ; 3HT leads replaced.

B. During pre-take-off run-up for flight Bombay-Calcutta 10-4-55 :

<i>Defect reported</i>	<i>Action taken</i>
-On ground run (pre-to) No. 2 engine mag. check excessive BMEP drop ; RPM within limits. Roughness felt during check (Power loss on RPM 2200) OAT +27°C. Above observations on both switches Returned to base.	-Engine ground run-up on arrival of a/c to base and again after passengers were offloaded. The following figures got : RPM 2250 ; MAP 30 ; BMEP 116 ; Mag. drop "R" : 10 BMEP, 60 RPM ; "L" : 10 BMEP, 60 RPM No roughness Engine considered serviceable.

## C. During Transit Check Hong Kong 11-4-55 ;

<i>Defect reported/Action required.</i>	<i>Action taken.</i>
No. 2 engine RH distributor cover to be removed ; check oil around points, clean off if necessary, replace cover.	Distributor cover removed, cleaned the points and inspected, found normal.

DEFECTS DISCOVERED DURING INVESTIGATION : None.

### APPENDIX III

#### CREW INFORMATION

Particulars on date April 10, 1955.

Name of crew member	Duty	Age	Licenses and Ratings			Experience		
			Type	No.	Expiry date	Total	On Constellation type	
							Total	Within 90 days on L-749A
1. Damodar Kashinath JATAR.	Captain	41	'B' Licence end for : Expeditor, DC-3, Viking, Constellation & Super-Constellation.	186	22-5-55	12,310.25 hrs.	4,902.15 hrs. (Command-hours).	188 hrs.
			Pilot Instructors Licence and Class Navigators Licence.	151/186 148	19-5-55			
			R/T Licence	71	20-11-56			
2. Mahesh Chandra DIKSHIT.	Co-Pilot	37	'B' Licence end. for DC-3, Viking, Constellation & Super-Constellation.	458	2-6-55	7,184.15 hrs.	869.15 hrs.	54 hrs.
			2nd Class Navigators Licence.	182	27-5-55			
			R/T Licence	104	1-6-56			
3. J. C. PATHAK .	Flight Navigator	27	Indian 1st Class Nav. Licence.	118	26-8-55	5,234.40 hrs.	No data available.	122 hrs.
			British flight Nav. Licence.	3536	26-8-55			
			R/T Licence	244	13-8-55			
4. K. F. D'CUNHA	Flight Engineer	26	F. E. Approval Letter, 9-12-54, for Constellation A/C.	A1(2)3-1888	3-12-55	1,981.40 hrs.	Idem.	142 hrs.

5. C. D.'SOUZA	Flight Purser	22		1,031.25 hrs. Idem	104 hrs.
6. J. J. PIMENTA	Asst. Flight Purser	28		1,147.30 hrs. Idem	155 hrs.
7. Miss G. BERRY	Air Hostess	22		3,242.10 hrs. Idem ]	194 hrs.
8. Anant Shridar KARNIK.	Aircraft Maintenance Engineer.	30	A.M.E. Licence, Cat : 'A' (DC-3, L-749 & L-1049) ; 'B' (P & W R-985/ R-1830, Wr. Cycl. 18BD-1 & TC18 BDA-1) ; 'X' (com- passes).	447 .. issued 30-8-47	7 yrs. 6 mths .. ..

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## APPENDIX IV

### PASSENGERS

1. Dr. FRIEDRICH JENSEN
2. Mr. STAREC JEREMI
3. Mr. VUONG MINH PHUONG
4. Mr. LI PING
5. Mr. HAO FENG KE
6. Mr. CHUNG PU YUN
7. Mr. HUANG TSO MEI
8. Mr. TU HUNG
9. Mr. LI CHAO CHI
10. Mr. SHEN CHIEN TU
11. Mr. SHIH CHIH ANG.