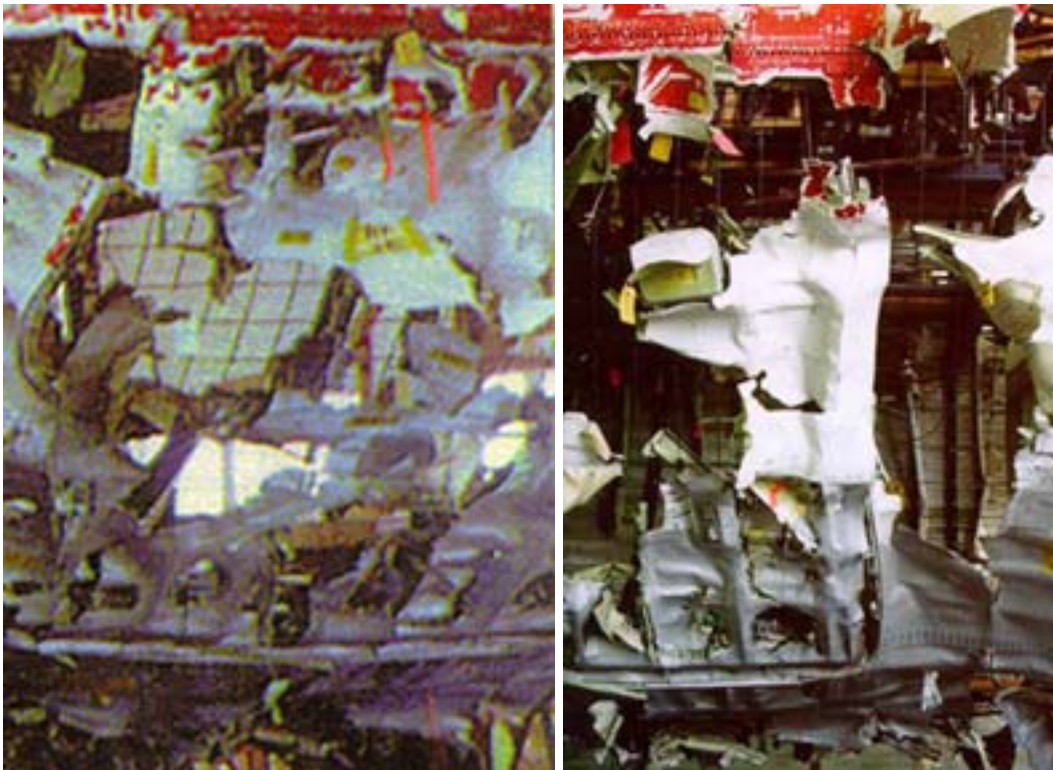


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**AIRCRAFT
ACCIDENT
REPORT
Trans World Airlines Flight 800
Part III
Door Story**



**Report on the accident to
Trans World Airlines Flight 800
Boeing 747-131, N93119
Near East Moriches, New York
July 17, 1996
by John Barry Smith,
Independent Aircraft Accident Investigator**

Part III: Door Story

Forward Cargo Door Areas Compared for United Airlines Flight 811, Pan Am Flight 103, Air India Flight 182, and Trans World Airlines Flight 800.

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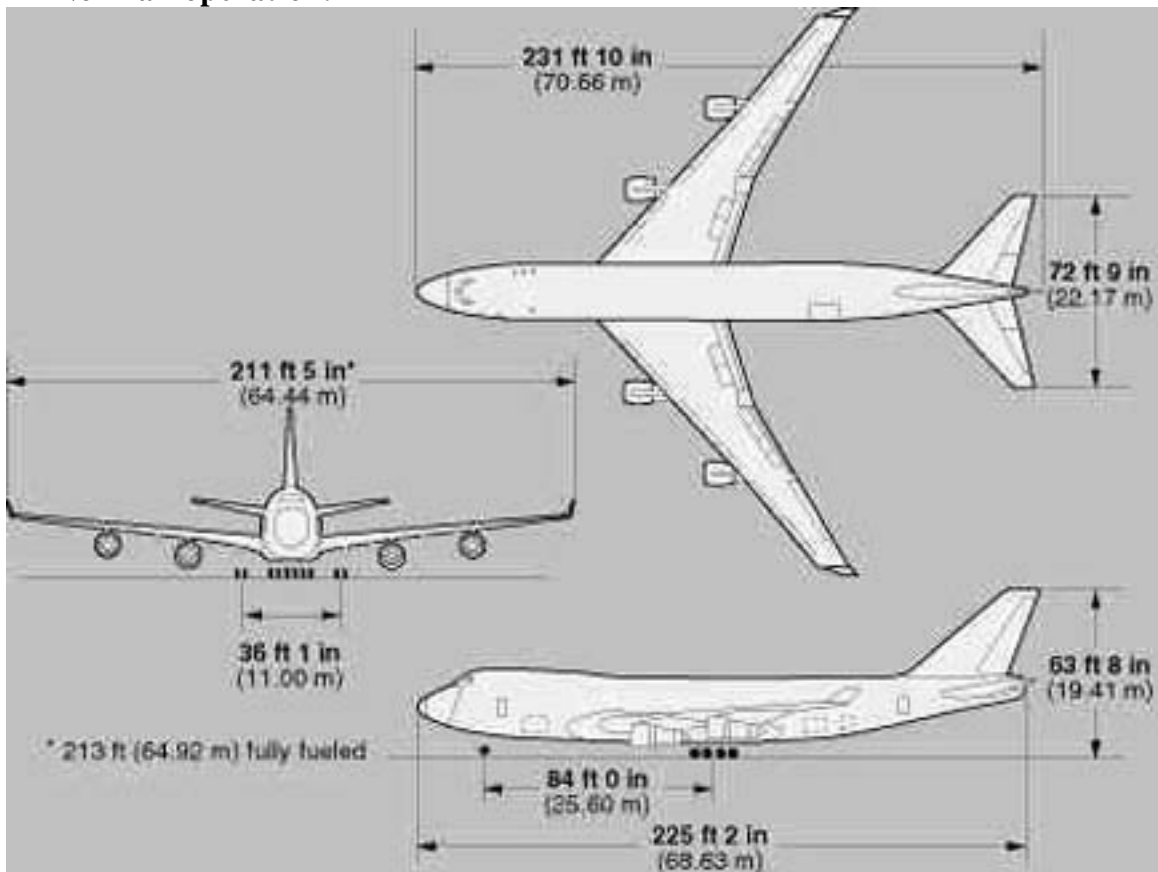
1. Introduction.
2. Normal Operation.
3. United Airlines Flight 811.
4. Air India Flight 182.
5. Pan Am Flight 103.
6. Trans World Airlines Flight 800
7. Forward cargo door areas examined in detail.
8. Pressure relief doors examined in detail.
9. Port and Starboard sides of Trans World Airlines Flight 800 examined in detail.
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1. Introduction.

The forward cargo door areas of four fatal Boeing 747 inflight accidents are examined and analyzed in schematics, photographs, and drawings from official government aircraft accident reports, press reports, and private files. The aircraft are Air India Flight 182, Pan Am Flight 103, United Airlines Flight 811, and Trans World Airlines Flight 800. The similarities of location of damage are revealed in the vertical tear lines above the cargo door, the outwardly peeled fuselage skin and door skin, jammed or missing pressure relief doors, the essential missing parts of the door such as latches and locking handle, petal shaped ruptures, and the general overall appearance of a shattered fuselage forward of the wing on the right side only. The relatively smooth port sides are shown also when available. A conclusion may be made that one cause may have been the initial event for all four accidents and that cause is the shorted wiring/forward cargo door rupture/explosive decompression/inflight breakup explanation.

In addition, the normal operation of the forward cargo door is shown in pictures and described in text.

2. Normal operation.



Layout of Boeing 747 dimensions.



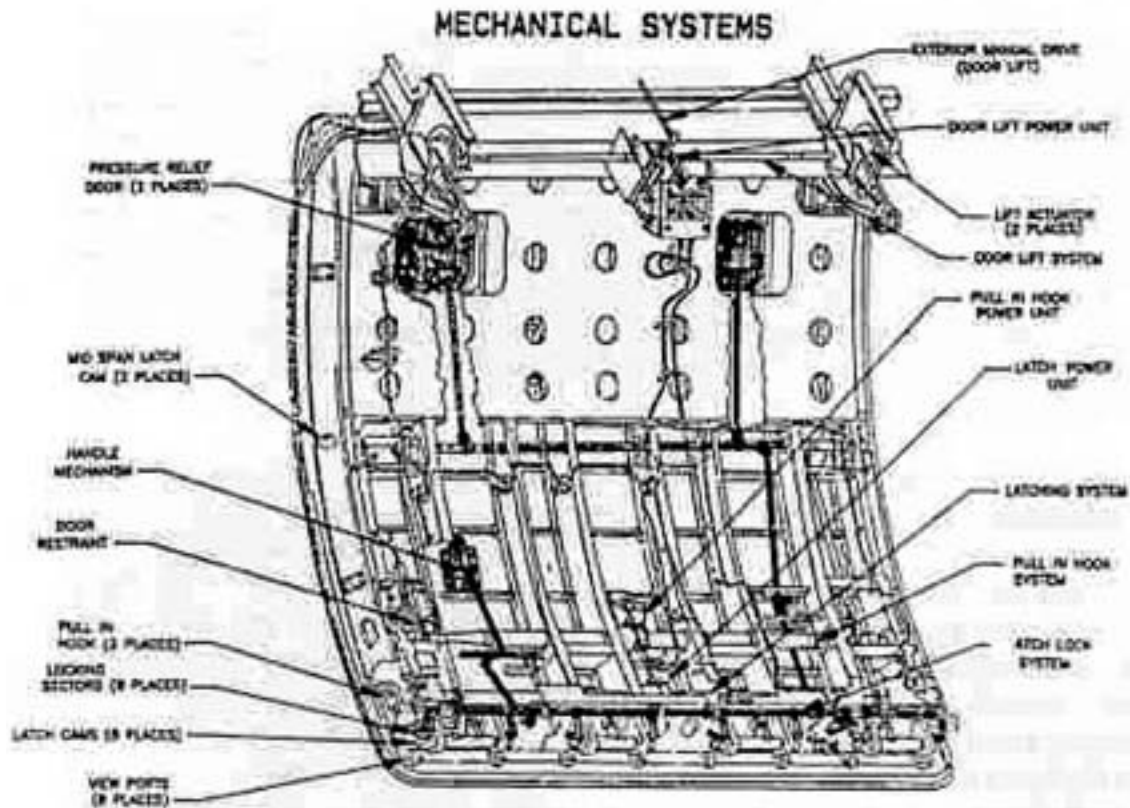
Above: Boeing 747 on ground loading cargo through opening outward nonplug forward cargo door. The tiny dot of the one midspan latch on the leading edge of the door can be seen.



Above: Closeup of Boeing 747 closed forward cargo door showing manual locking handle, upper hinge, over pressure relief doors, passenger windows above door, and R2 door.



Above: Closeup of open forward cargo door showing open manual locking handle, several of the bottom eight latches, forward leading edge midspan latch, and the aft leading edge midspan latch pin.



Drawing of Boeing 747 cargo door from NTSB AAR 92/02.

1.6.2 Cargo Door Description and Operation

Both the forward and aft lower cargo doors are similar in appearance and operation. They are located on the lower right side of the fuselage and are outward-opening. The door opening is approximately 110 inches wide by 99 inches high, as measured along the fuselage.

Electrical power for operation of the cargo door switches and actuators is supplied from the ground handling bus, which is powered by either external power or the APU. See figure 17 for a diagram of the cargo door electrical circuitry. The engine generators cannot provide power to the ground handling bus. APU generator electrical power to the ground handling bus is interrupted when an engine generator is brought on line after engine start. The APU generator "field" switch can be reengaged by the flightcrew, if necessary on the ground, to power the ground handling bus. The air/ground safety relay automatically disconnects the APU generator from the ground handling bus, if it is energized, when the airplane becomes airborne and the air/ground relay senses that the airplane is off the ground.

The cargo door and its associated hardware are designed to carry circumferential (hoop) loads arising from pressurization of the airplane. These loads are transmitted from the piano hinge at the top of the door, through the door itself, and into the eight latches located along the bottom of the door. The eight latches consist of eight latch pins attached to the lower door sill and eight latch cams attached to the bottom of the door. The cargo door also has two midspan latches located along the fore and aft sides of the door. These midspan latches primarily serve to keep the sides of the

door aligned with the fuselage. There are also four door stops which limit inward movement of the door. There are two pull-in hooks located on the fore and aft lower portion of the door, with pull-in hook pins on the sides of the door frame.

The cargo doors on the B-747 have a master latch lock handle installed on the exterior of the door. The handle is opened and closed manually. The master latch lock handle simultaneously controls the operation of the latch lock sectors, which act as locks for the latch cams, and the two pressure relief doors located on the door. Figure 5 depicts a lock sector and latch cam in an unlocked and locked condition.

The door has three electrical actuators for opening/closing and latching of the door. One actuator (main actuator) moves the door from the fully open position to the near closed position, and vice versa. A second actuator (pull-in hook actuator) moves the pull-in hooks closed or open, and the third actuator (latch actuator) rotates the latch cams from the unlatched position to the latched position, and vice versa. The latch actuator has an internal clutch, which slips to limit the torque output of the actuator. Normally, the cargo doors are operated electrically by means of a switch located on the exterior of the fuselage, just forward of the door opening. The switch controls the opening and closing and the latching of the door. If at any time the switch is released, the switch will return to a neutral position, power is removed from all actuators, and movement of the actuators ceases.

In order to close the cargo door, the door switch is held to the "closed" position, energizing the closing actuator, and the door moves toward the closed position. After the door has reached the near closed position, the hook position switch transfers the electrical control power to the pull-in hook actuator, and the cargo door is brought to the closed position by the pull-in hooks. When the pull-in hooks reach their fully closed position, the hook-closed switch transfers electrical power to the latch actuator. The latch actuator rotates the eight latch cams, mounted on the lower portion of the door, around the eight latch pins, attached to the lower door sill. At the same time, the two midspan latch cams, located on the sides of the door rotate around the two midspan latch pins located on the sides of the door frame. When the eight latch cams and the two mid-span cams reach their fully closed position, electrical power is removed from the latch actuator by the latch-closed switch. This completes the electrically powered portion of the door closing operation. The door can also be operated in the same manner electrically by a switch located inside the cargo compartment adjacent to the door.

The final securing operation is the movement of lock sectors across the latch cams. These are manually moved in place across the open mouth of each of the eight lower cams through mechanical linkages to the master latch lock handle. The position of the lock sectors is indicated indirectly by noting visually the closed position of the two pressure relief doors located on the upper section of each cargo door. The pressure relief doors are designed to relieve any residual pressure differential before the cargo doors are opened after landing, and to prevent pressurization of the airplane should the airplane depart with the cargo doors not properly secured. The pressure relief doors are mechanically linked to the movement of the lock sectors. This final procedure also actuates the master latch lock switch, removing electrical control power from the opening and closing control circuits, and also extinguishes the cockpit cargo door warning light through a switch located on one of the pressure relief doors. Opening the cargo door is accomplished by reversing the above procedure.

The B-747 cargo door has eight (8) view ports located beneath the latch cams for direct viewing of the position of the cams by means of alignment stripes.

Procedures for using these view ports for verifying the position of the cams were not in place or required by Boeing, the FAA, or UAL (see 1.17.5 for additional information).

Closing the door manually is accomplished through the same sequence of actions without electrical power. The door actuator mechanisms are manually driven to a closed and latched position by the use of a one-half inch socket driver. The door can also be opened manually with the use of the socket driver. There are separate socket drives for the door raising/lowering mechanism, the pull-in hooks, and the latches.

3. United Airlines Flight 811



United Airlines Boeing 747 in colors of 1989 with normally closed forward cargo door.

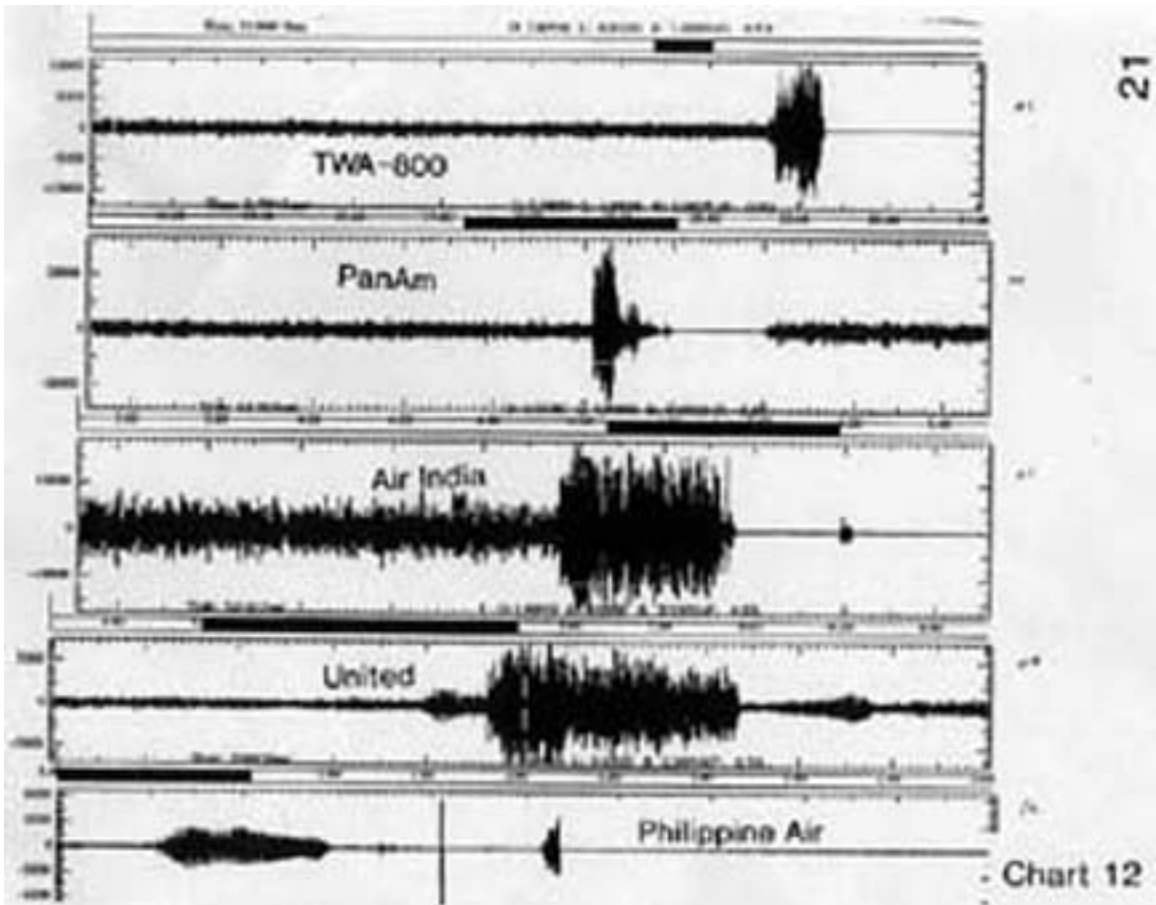


Chart 12 from Public Docket for Trans World Airlines Flight 800 comparing the sudden loud sounds from the inflight CVRs of Trans World Airlines Flight 800, Pan Am Flight 103, Air India Flight 182, United Airlines Flight 811 and a Boeing 737 on the ground.



Melodramatic artist's impression on cover of June 1989 Popular Mechanics showing United Airlines Flight 811 as it descends to land after inadvertent opening of forward cargo door in flight.



Photo of hole in United Airlines Flight 811 made by inadvertent opening of forward cargo door in flight. Note rectangular shape.



Photo of hole in United Airlines Flight 811 made by inadvertent opening of forward cargo door in flight.



Photo from NTSB AAR 92/02 of hole in United Airlines Flight 811 made by inadvertent opening of forward cargo door in flight.

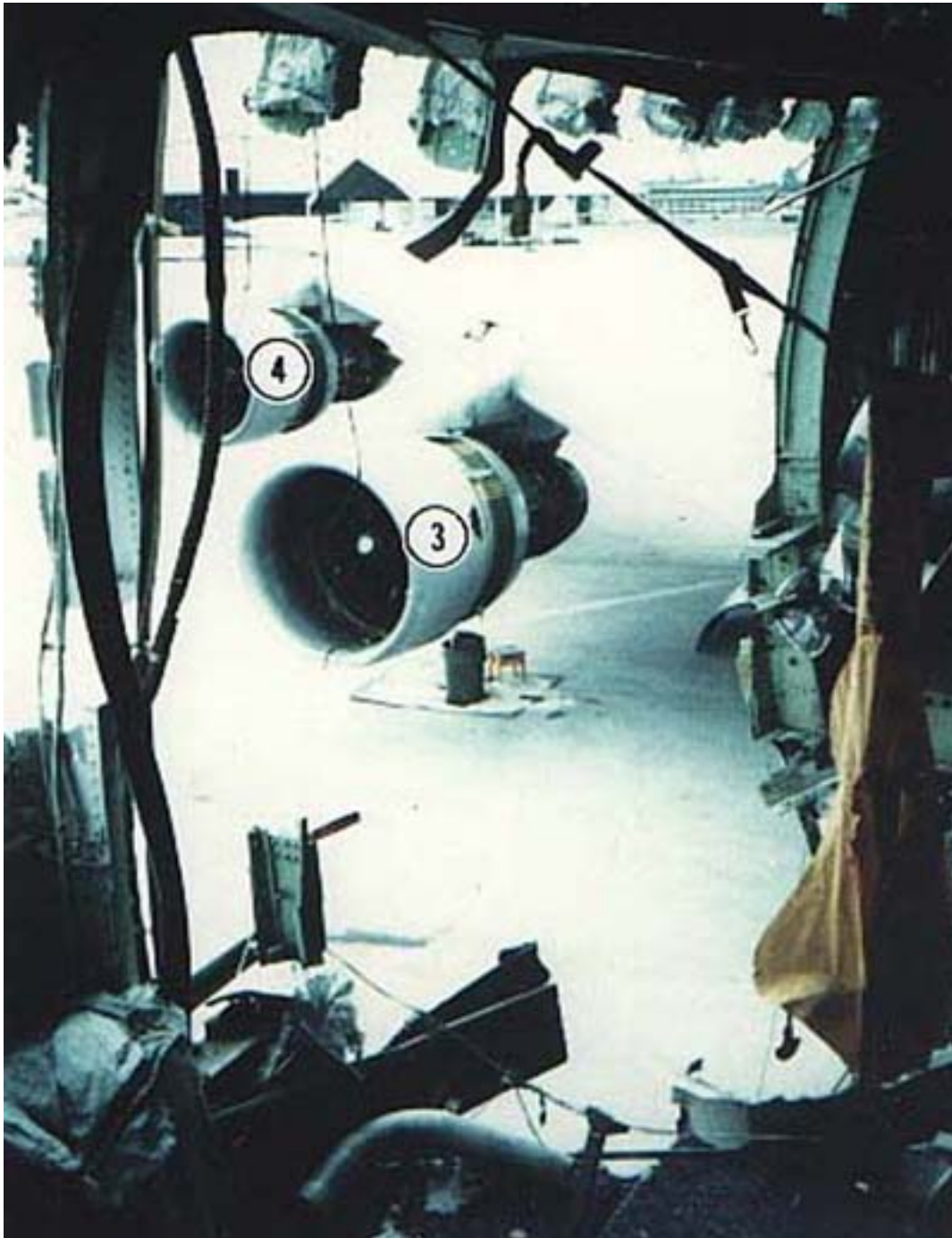


Photo from inside United Airlines Flight 811 showing the hole caused by inadvertent opening of forward cargo door in flight revealing engine numbers three and four which received the ejected foreign objects which caused the fire and internal engine damage.

Sea surrenders Flight 811 culprit



Navy photo by Omar Hasan

The bottom half of the cargo door from United Flight 811 is examined on board a Navy contract support ship after it was retrieved from a depth of nearly three miles. The crew of the mini-sub Sea Cliff hopes to recover the top half this weekend. See story on Page A3.

Photo of newspaper article and photograph showing the lower half of retrieved forward cargo door, loose wiring, the longitudinal split at midspan latches, and the peeled away skin from the aft midspan latch.



Photo from NTSB AAR 92/02 for United Airlines Flight 811 showing both halves of the retrieved door, the longitudinal split at midspan latches, and the peeled away skin from the aft midspan latch.



Closeup photo from NTSB AAR 92/02 for United Airlines Flight 811 showing bottom half of the retrieved door, the longitudinal split at midspan latches, and the peeled away skin from the aft midspan latch.

United Airlines Flight 811:

"The CVR revealed normal communication before the decompression. At 0209:09:2 HST, a loud bang could be heard on the CVR. The loud bang was about 1.5 seconds after a "thump" was heard on the CVR for which one of the flightcrew made a comment. The electrical power to the CVR was lost for approximately 21.4 seconds following the loud bang. The CVR returned to normal operation at 0209:29 HST, and cockpit conversation continued to be recorded in a normal manner.

NTSB Accident Report 92-02 Page 25

United Airlines Flight 811:

"However, the decompression event caused a data loss of approximately 2 1/2 seconds. When the data resumed being recorded, all values appeared valid with the exception of the pitch and roll parameters. Lateral acceleration showed a sharp increase immediately following the decompression. Vertical acceleration showed a sharp, rapid change just after the decompression and a slight increase as the airplane began its descent." NTSB AAR 92/02. page 25

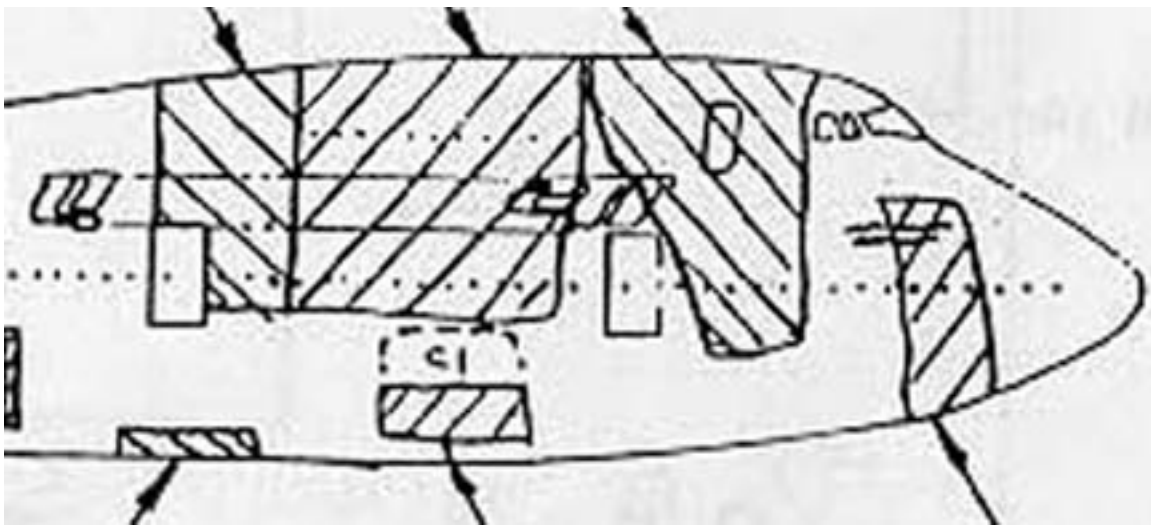
Regarding United Airlines Flight 811 from NTSB AAR 92/02 to explain the above evidence:

'The National Transportation Safety Board determines that the probable cause of this accident was the sudden opening of the forward lower lobe cargo door in flight and the subsequent explosive decompression. The door opening was attributed to a faulty switch or wiring in the door control system which permitted electrical actuation of the door latches toward the unlatched position after initial door closure and before takeoff. Contributing to the cause of the accident was a deficiency in the design of the cargo door locking mechanisms, which made them susceptible to deformation, allowing the door to become unlatched after being properly latched and locked.'

4. Air India Flight 182



Photograph of Air India Boeing 747.



Reconstruction drawing from the Kirpal Report and the CASB report on Air India Flight 182 showing the longitudinal split of the forward cargo door and the vertical tearing of the skin above the door.

From the Kirpal report:

"2.11.4.6 All cargo doors were found intact and attached to the fuselage structure except for the forward cargo door which had some fuselage and cargo floor attached. This door, located on the forward right side of the aircraft, was broken horizontally about one-quarter of the distance above the lower frame. The damage to the door and the fuselage skin near the door appeared to have been caused by an outward force. The fractured surface of the cargo door appeared to have been badly frayed."

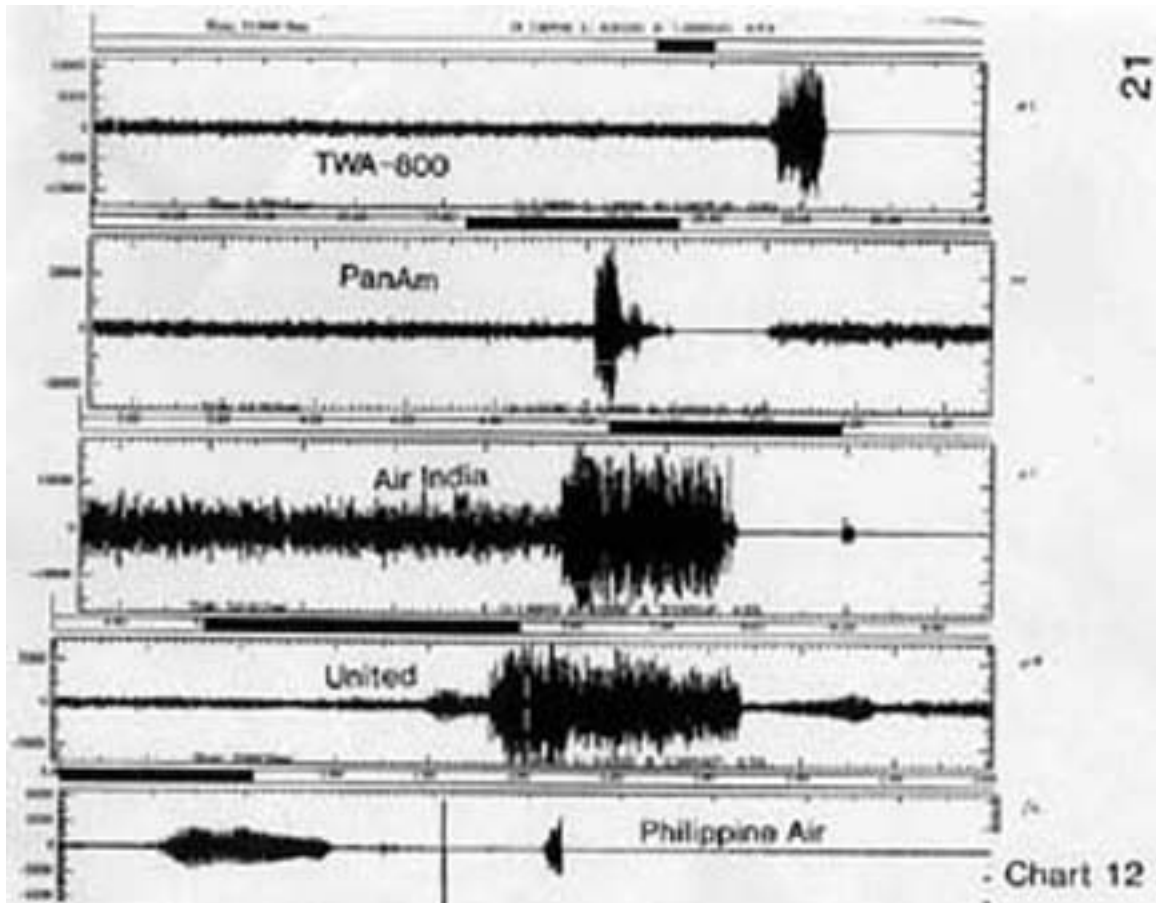
From private correspondence: "After lunch with them I [Mr. Campbell] asked " in light of what we now know on 811 do you still think that Air India was a bomb ?" The reply was that we [NTSB] never thought that Air India was a bomb in fact the video shows a cargo door exactly the same as 811. I [Mr. Campbell] wrote to both Air India and the Canadian Safety Board with my findings on 811 but did not even have the courtesy of a reply ."

Quote above from correspondence of Mr. and Mrs Campbell discussing comments from NTSB

officials matching United Airlines Flight 811 forward cargo door to Air India Flight 182 forward cargo door.

B737, and a gun shot on the flight deck of a B737. Considering the different acoustic characteristics between a DC-10 and a B747, the AIB analysis indicates that there were distinct similarities between the sound of the explosive decompression on the DC-10 and the sound recorded on the AI 182 CVR.

Excerpt above from the Kirpal report and CASB report on Air India Flight 182 giving an explanation for the sudden loud sound which matches an explosive decompression open cargo door event on a DC-10, a widebody passenger airliner.



Air India Flight 182:

"From the CVR and DFDR, AI 182 was proceeding normally en route from Montreal to London at an altitude of 31,000 feet and an indicated airspeed of 296 knots when the cockpit area microphone detected a sudden loud sound. The sound continued for about 0.6 seconds, and then almost immediately, the line from the cockpit area microphone to the cockpit voice recorder at the rear of the pressure cabin was most probably broken. This was followed by a loss of electrical power to

the recorder." Canadian Aviation Safety Board Air India 23 June 1985, page 21
Canadian Aviation Safety Board Air India 23 June 1985, page 21 "When
synchronized with other recordings it was determined, within the accuracy that the
procedure permitted, that the DFDR stopped recording simultaneously with the
CVR." "Canadian Aviation Safety Board Air India 23 June 1985, page 22

4.0 CONCLUSIONS

The Canadian Aviation Safety Board respectfully submits as follows:

4.1 Cause-Related Findings

1. At 0714 GMT, 23 June 1985, and without warning, Air India Flight 182 was subjected to a sudden event at an altitude of 31,000 feet resulting in its crash into the sea and the death of all on board.
2. The forward and aft cargo compartments ruptured before water impact.
3. The section aft of the wings of the aircraft separated from the forward portion before water impact.
4. There is no evidence to indicate that structural failure of the aircraft was the lead event in this occurrence.
5. There is considerable circumstantial and other evidence to indicate that the initial event was an explosion occurring in the forward cargo compartment. This evidence is not conclusive. However, the evidence does not support any other conclusion.

5. **Pan Am Flight 103**



Pan Am 747 showing colors of 1988 and open forward cargo door.



Staged bombing of a Boeing 747 at Bruntingthorpe UK showing the massive damage which occurs when a real bomb goes on in a Boeing 747.

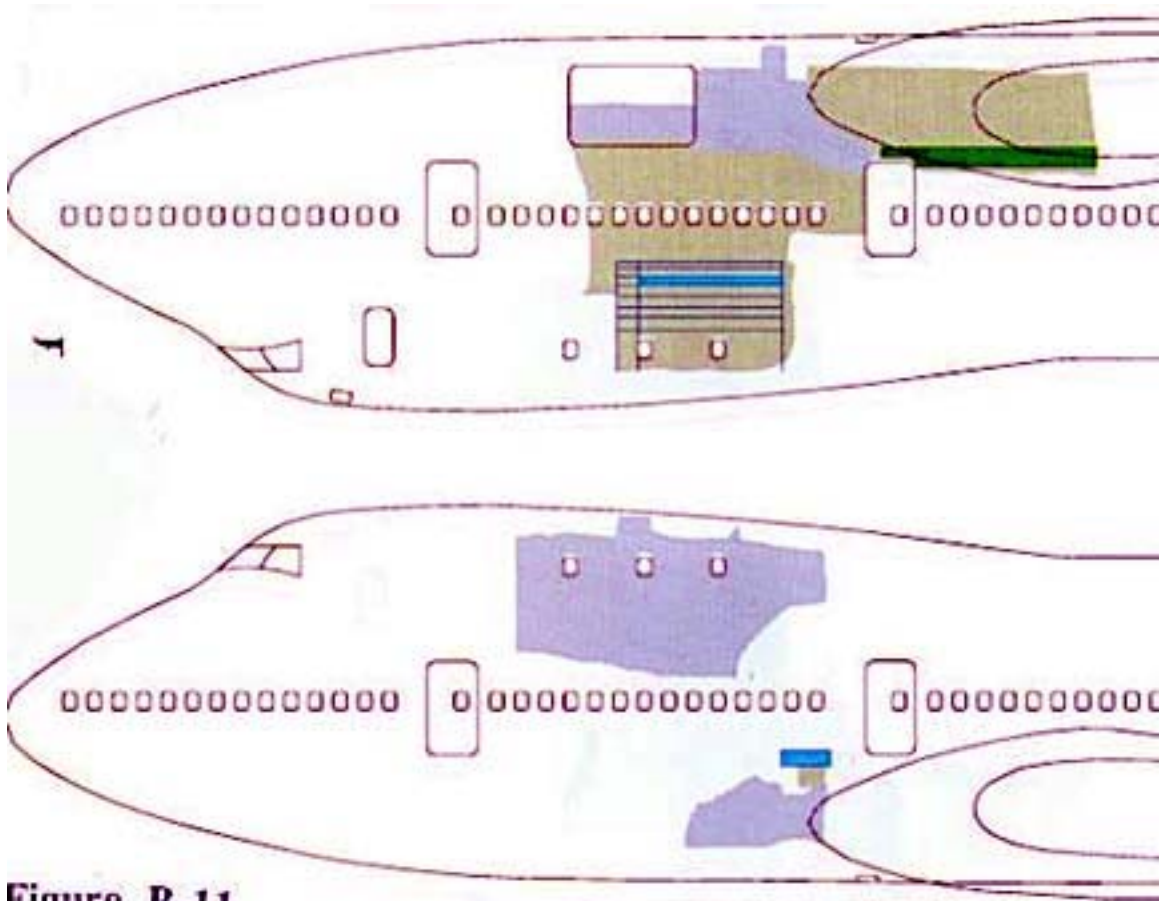
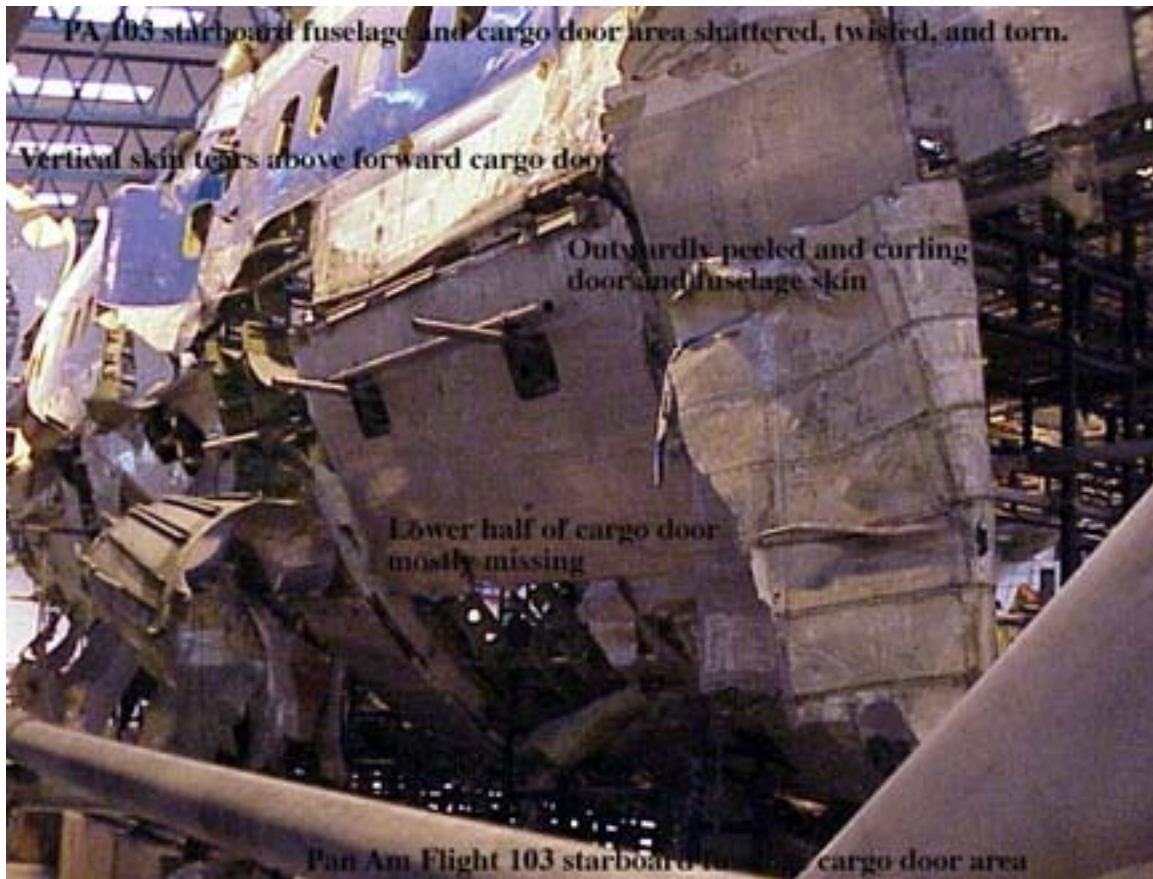


Figure B-11

Figure B11 from AAIB 2/90 for Pan Am Flight 103 showing initial event time fuselage destruction with small 'bomb' hole rectangle on port side and huge rectangular destruction around forward cargo door on starboard side.



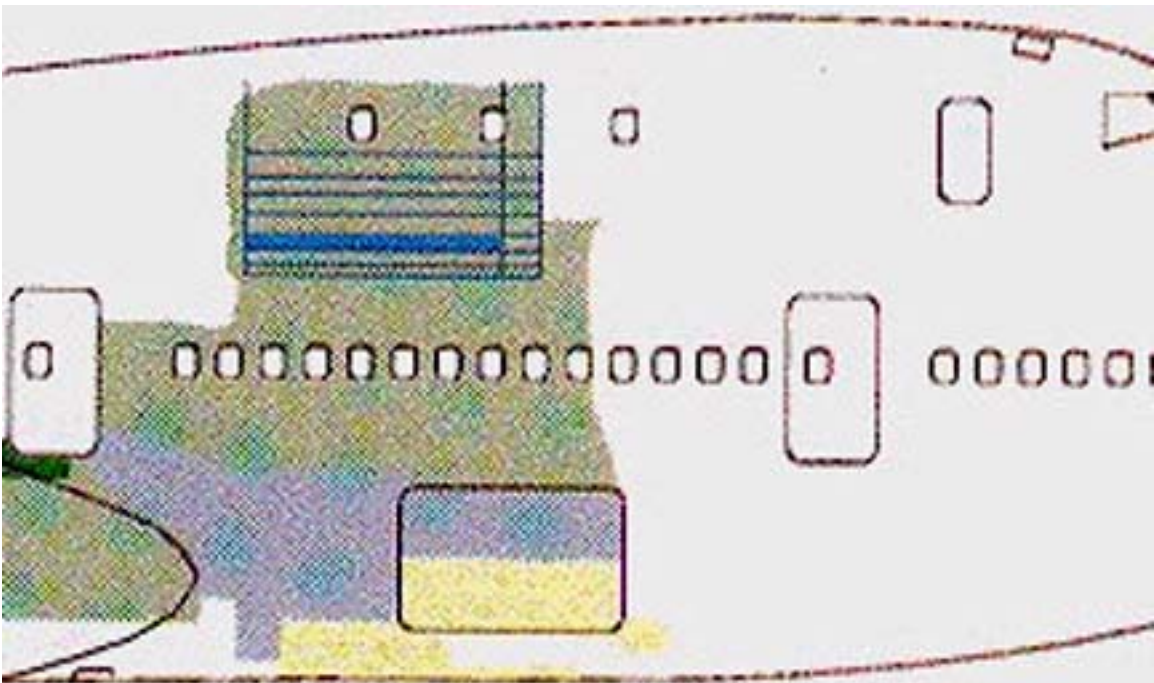
Port side of Pan Am Flight 103 forward of the wing showing the small 'bomb' hole and relatively smooth and intact fuselage skin around it.



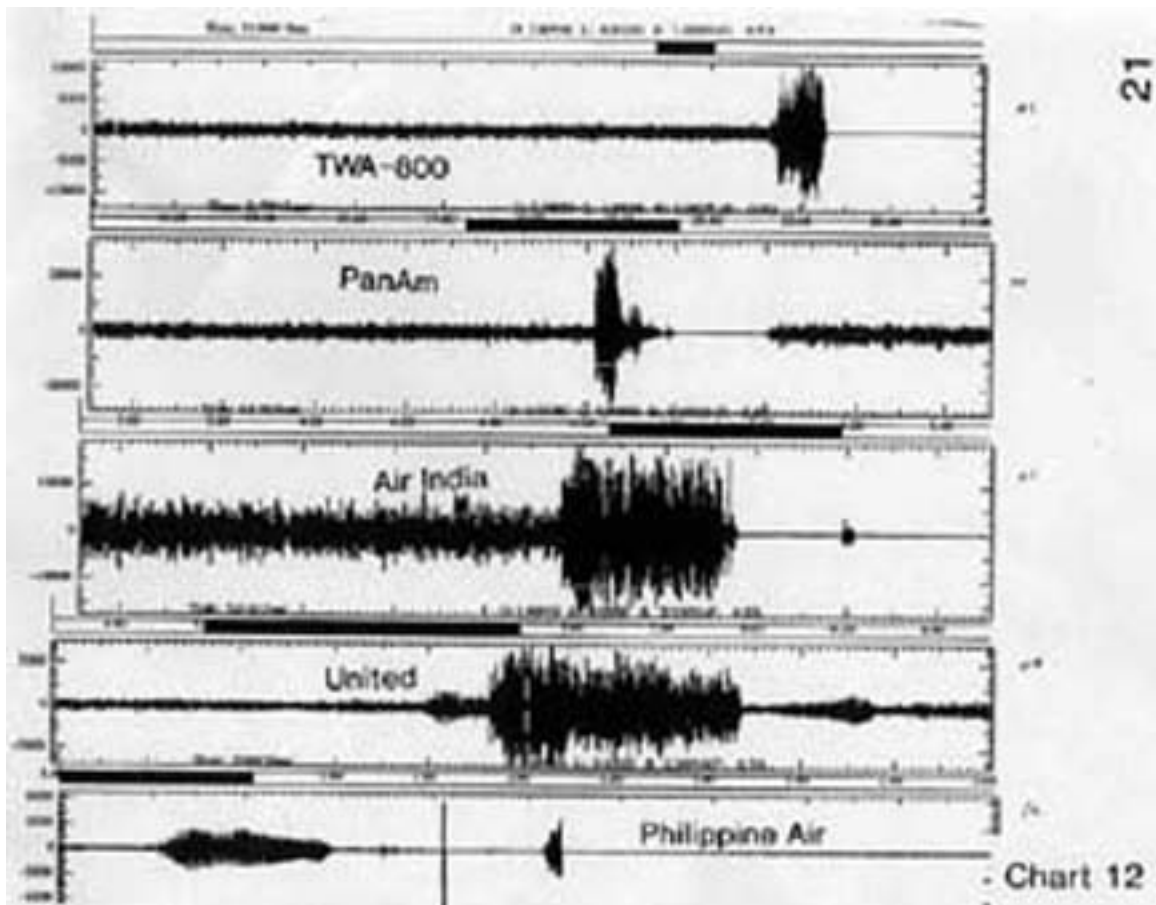
Photograph from AAIB showing Pan Am Flight 103 forward cargo door area revealing the vertical torn skin above door, peeled back and down skin from the aft midspan latch, generally shattered area, and mostly missing lower half of door which includes the manual locking handle and the eight bottom latches.



Closeup of the peeled back skin from the aft midspan latch of the forward cargo door of Pan Am Flight 103.



Reconstruction drawing from the AAIB 2/90 report on Pan Am Flight 103 showing the large area of torn off skin around the forward cargo door, the longitudinal split of the door, and the vertical tearing of the skin above the door.



Pan Am Flight 103:

"The CVR tape was listened to for its full duration and there was no indication of anything abnormal with the aircraft, or unusual crew behaviour. The tape record ended, at 19:02:50 hrs +/- second, with a sudden loud sound on the CAM channel followed almost immediately by the cessation of recording whilst the crew were copying their transatlantic clearance from Shanwick ATC." UK AAIB Report 2/90 Page 15

Pan Am Flight 103:

"The analysis of the recording from the DFDR fitted to N739PA, which is detailed in Appendix C, showed that the recorded data simply stopped. Following careful examination and correlation of the various sources of recorded information, it was concluded that this occurred because the electrical power supply to the recorder had been interrupted at 19:02:50 +/- second." UK AAIB Report 2/90 Page 37

'The report concludes that the detonation of an improvised explosive device led directly to the destruction of the aircraft with the loss of all 259 persons on board and 11 of the residents of the town of Lockerbie'

6. Trans World Airlines Flight 800



Photograph of Trans World Airlines Boeing 747 in 1996 colors.



Photograph of the port side of Trans World Airlines Flight 800 showing the relatively undamaged skin forward of the wing, nose to left.

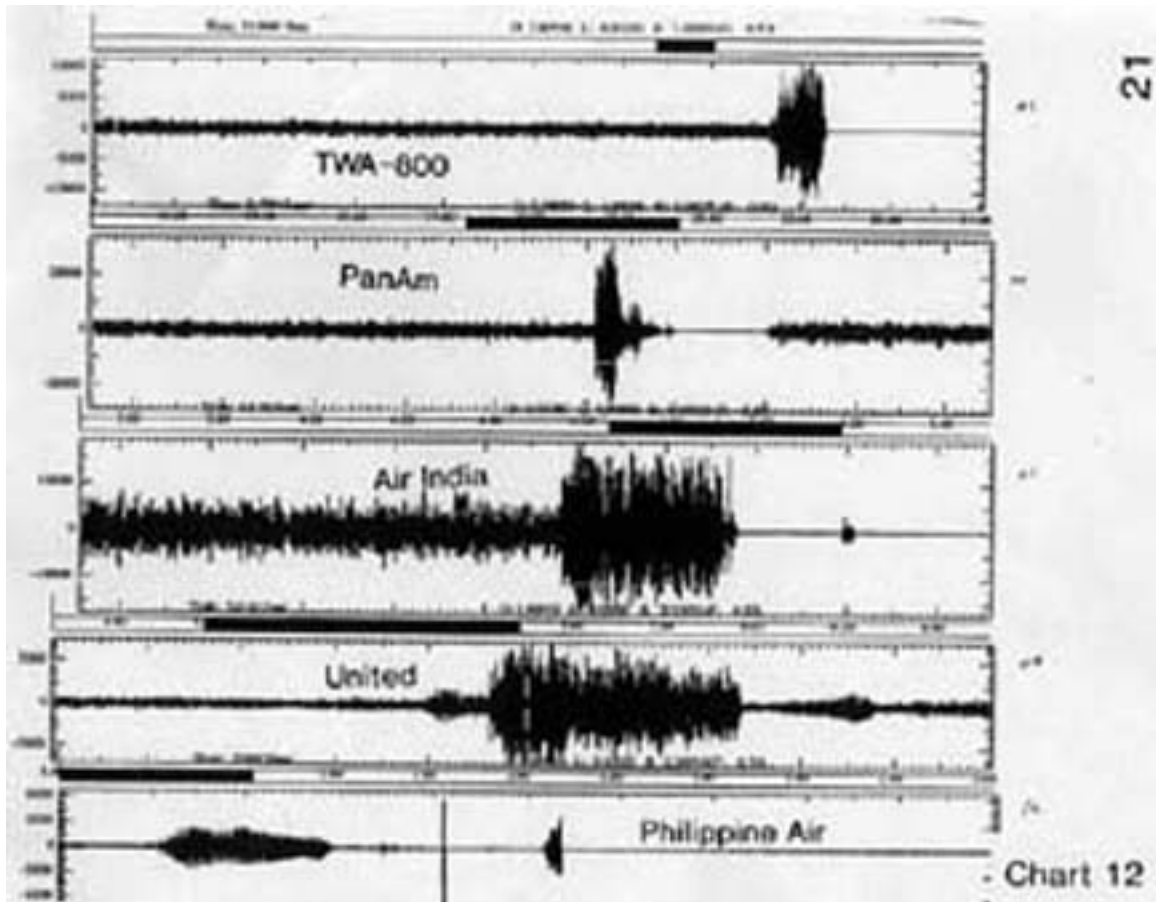


Shattered starboard side around forward cargo door of Trans World Airlines Flight 800 revealing outwardly and petaled shaped skin around aft midspan latch.



Photograph above showing outwardly and petaled shaped skin around forward midspan latch.

3. Docket Number SA-516, Exhibit No. 15C, Report Number 97-82, Section 41/42 Joint, Forward Cargo Door, "Examination of the lower lobe forward cargo door showed that all eight of the door latching cams remain attached (along with pieces of the door itself) to the pins along the lower door sill."



From NTSB: The CVR then recorded a very loud sound for a fraction of a second (0.117 second) on all channels immediately before the recording ended. The accident airplane's last recorded radar transponder return occurred at 2031:12, and a review of the FDR data indicated that the FDR lost power at 2031:12.

From NTSB AAR 00/03 for Trans World Airlines Flight 800. 'The National Transportation Safety Board determines that the probable cause of the TWA flight 800 accident was an explosion of the center wing fuel tank (CWT), resulting from ignition of the flammable fuel/air mixture in the tank. The source of ignition energy for the explosion could not be determined with certainty, but, of the sources evaluated by the investigation, the most likely was a short circuit outside of the CWT that allowed excessive voltage to enter it through electrical wiring associated with the fuel quantity indication system.'

7. Forward cargo doors compared in detail for the four aircraft, Air India Flight 182, Pan Am Flight 103, United Airlines Flight 811, and Trans World Airlines Flight 800.

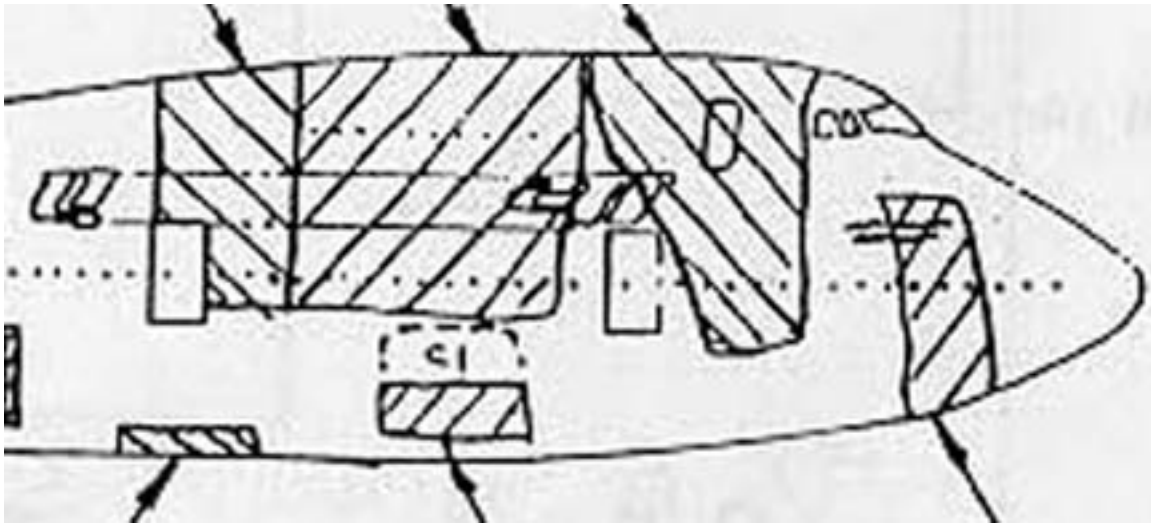
A. United Airlines Flight 811





Photos from NTSB AAR 92/02 for United Airlines Flight 811 showing bottom half of the retrieved door, the longitudinal split at midspan latches, and the peeled away and down skin from the aft midspan latch.

B. Air India Flight 182. From Kirpal and CASB AAR: 2.11.4.6 Section 42
All cargo doors were found intact and attached to the fuselage structure except for the forward cargo door which had some fuselage and cargo floor attached. This door, located on the forward right side of the aircraft, was broken horizontally about one-quarter of the distance above the lower frame. The damage to the door and the fuselage skin near the door appeared to have been caused by an outward force. The fractured surface of the cargo door appeared to have been badly frayed. Because the damage appeared to be different than that seen on other wreckage pieces, an attempt to recover the door was made by CCGS John Cabot. Shortly after the wreckage broke clear of the water, the area of the door to which the lift cable was attached broke free from the cargo door, and the wreckage settled back onto the sea bed. An attempt to relocate the door was unsuccessful.



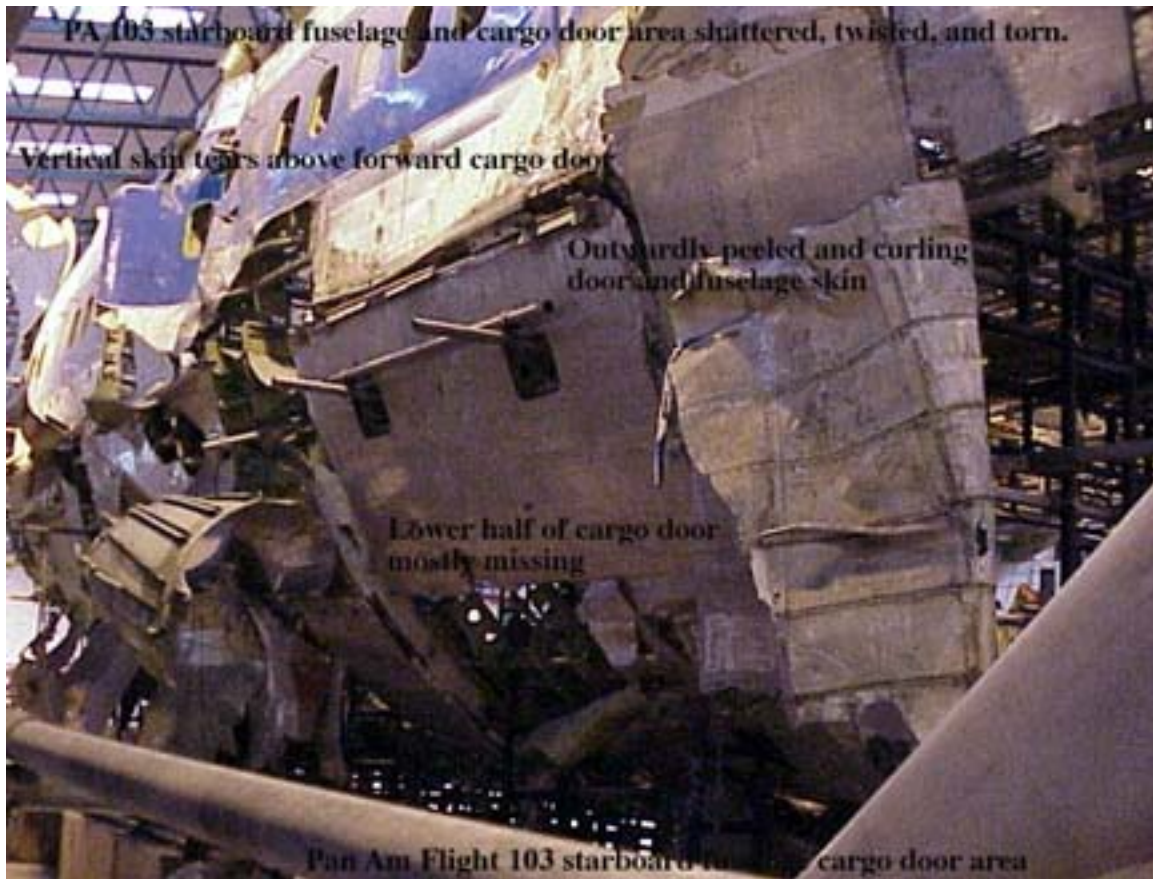
Reconstruction drawing above from the Kirpal Report and the CASB report on Air India Flight 182 showing the longitudinal split of the forward cargo door and the vertical tearing of the skin above the door.

C.

Pan Am Flight 103.



Closeup of the peeled back and down skin from the aft midspan latch of PA 103 forward cargo door.



Photograph from AAIB showing Pan Am Flight 103 forward cargo door area revealing the vertical torn skin above door, peeled back and down skin from the aft midspan latch, generally shattered area, and mostly missing lower half of door which includes the manual locking handle and the eight bottom latches.

D. Trans World Airlines Flight 800



Shattered starboard side around forward cargo door of Trans World Airlines Flight 800 revealing outwardly and petaled shaped skin around aft midspan latch.

8. Pressure relief doors in forward cargo door examined in detail.



Normal Boeing 747 forward cargo door showing aft and forward pressure relief doors near top hinge.

From NTSB AAR 92/02 for United Airlines Flight 811: ‘The cargo doors on the B-747 have a master latch lock handle installed on the exterior of the door. The handle is opened and closed manually. The master latch lock handle simultaneously controls the operation of the latch lock sectors, which act as locks for the latch cams, and the two pressure relief doors located on the door. The final securing operation is the movement of lock sectors across the latch cams. These are manually moved in place across the open mouth of each of the eight lower cams through mechanical linkages to the master latch lock handle. The position of the lock sectors is indicated indirectly by noting visually the closed position of the two pressure relief doors located on the upper section of each cargo door. The pressure relief doors are designed to relieve any residual pressure differential before the cargo doors are opened after landing, and to prevent pressurization of the airplane should the airplane depart with the cargo doors not properly secured. The pressure relief doors are mechanically linked to the movement of the lock sectors. This final procedure also actuates the master latch lock switch, removing electrical control power from the opening and closing control circuits, and also extinguishes the cockpit cargo door warning light through a switch located on one of the pressure relief doors.’



United Airlines Flight 811 forward cargo door showing missing aft pressure relief door and jammed open status of forward pressure relief door according to NTSB AAR 92/02.

Below excerpts for NTSB AAR 92/02 for United Airlines Flight 811:

'The ramp service personnel said that they had verified that the forward cargo door was flush with the fuselage of the airplane, that the master door latch handle was stowed, and that the pressure relief doors were flush with the exterior skin of the cargo door. The dispatch mechanic stated that, in accordance with UAL procedures, he had performed a "circle check" prior to the airplane's departure from the HNL gate. This check included verification that the cargo doors were flush with the fuselage of the airplane, that the master latch lock handles were stowed, and that the

pressure relief doors were flush or within 1/2 inch of the cargo door's exterior skin. He said a flashlight was used during this inspection.'

SB-747-52-2097, "Pressure Relief Door Shroud Installation--Lower Lobe and Side Cargo Doors," was issued on June 27, 1975. Revision 1 to SB-747-52-2097 was issued November 14, 1975. In general, the SB recommended the installation of shrouds on the inboard sides of the cargo door pressure relief door openings. The purpose of the shrouds was to prevent the possibility of the pressure relief doors being rotated (blown) to the closed position during the pressurization cycle. This condition could only occur if the master latch lock handle had been left open and the flightcrew failed to note the cargo door open warning before takeoff.'

'UAL records for N4713U indicated that SB-747-52-2097 had been complied with and the shrouds had been installed on the forward and aft cargo doors. However, examination of the aft cargo door on N4713U revealed that the shrouds were not in place. UAL could not find records to verify if the shrouds had been installed or if they had been removed from either door.

There was no evidence of the pressure relief door shrouds found on the forward door; however, most of the inner door lining to which the shrouds attach was missing.'

'The lower two connecting rods between the lock sector torque tube and the torque tube below the pressure-relief doors were undamaged; however, the upper connecting rod had separated at the upper, tapered end. The torque tube below the pressure-relief doors were missing, and the pressure-relief door connecting rods had separated at the lower, tapered end. The remaining portion of each rod was undamaged, but the forward pressure-relief door was jammed open into the cutout.'

'The examination of the recovered forward cargo door did not provide confirmation that the pressure relief door shrouds were actually installed on the forward door, although UAL records showed that they had been installed on both cargo doors of N4713U, in accordance with SB-747-52-2097. However, the shrouds were found not to be installed on the aft door, contrary to UAL records, and therefore may not have been installed on the forward door. Without the shrouds, the pressure relief doors could have rotated shut during the pressurization cycle. Because the closure of the pressure relief doors would back-drive the lock sectors, this scenario would presume previous damage to the sectors, which would permit the sectors to move over the unlatched cams.'



Pan Am Flight 103 Forward cargo door showing missing aft and forward pressure relief doors.

No reference is made in AAIB AAR 2/90 for Pan Am Flight 103 to any pressure relief door in any cargo door for Pan Am Flight 103.



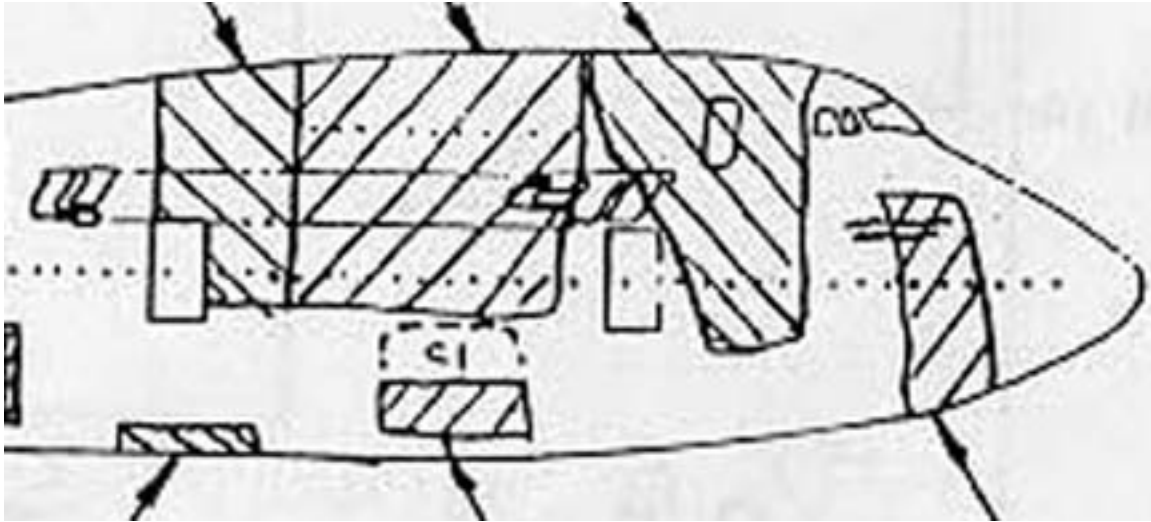
Trans World Airlines Flight 800 Forward cargo door showing missing aft pressure relief door.

No reference is made to any pressure relief door in any cargo door in NTSB AAR 00/03 for Trans World Airlines Flight 800.



Trans World Airlines Flight 800 Forward cargo door showing separated and replaced forward pressure relief door.

No reference is made to any pressure relief door in any cargo door in NTSB AAR 00/03 for Trans World Airlines Flight 800.



Air India Flight 182 Forward cargo door showing missing top half of door including the aft and forward pressure relief doors.

No reference to any pressure relief door in any cargo door in CASB and Kirpal AAR for Air India Flight 182

From the Canadian Aviation Occurrence Report: '2.11.4.6 All cargo doors were found intact and attached to the fuselage structure except for the forward cargo door which had some fuselage and cargo floor attached. This door, located on the forward right side of the aircraft, was broken horizontally about one-quarter of the distance above the lower frame. The damage to the door and the fuselage skin near the door appeared to have been caused by an outward force. The fractured surface of the cargo door appeared to have been badly frayed. Because the damage appeared to be different than that seen on other wreckage pieces, an attempt to recover the door was made by CCGS John Cabot. Shortly after the wreckage broke clear of the water, the area of the door to which the lift cable was attached broke free from the cargo door, and the wreckage settled back onto the sea bed. An attempt to relocate the door was unsuccessful.'

9. Port and Starboard side of Trans World Airlines Flight 800 examined in detail.

Below photographs from NTSB sources reveal in detail the relatively smooth port side forward of the wing and the shattered starboard side of Trans World Airlines Flight 800 which rules out a center explosion event and rules in an explosive decompression forward of the wing on the right side.



The left side of the plane

Nose to left.



The left front of the reconstruction at LF4

Nose to left.



Left front of the plane

Nose to left.



The right side of the plane

Nose to right



The right side of plane, nose to right.



Right front of the plane

Nose to right.



The right front of the reconstruction

Nose to right.



The front cargo bay area in the red zone

Red zone is area where pieces departed Trans World Airlines Flight 800 first.



Right side of aircraft, nose to right, forward cargo door area revealing red paint smears found only in this area of Trans World Airlines Flight 800.



Two pictures of forward cargo door forward midspan latch area right side of aircraft, nose to right revealing outward peeled in petal shape and strange red paint smears.



Right side of plane, aft midspan latch of forward cargo door area revealing outward, petal shaped rupture at aft midspan latch and red paint smears.



Right side above forward cargo door hinge, nose to right.

10. Conclusions:

A. The four forward cargo door areas on the starboard side just forward of the wing on the four aircraft reveal in photographs and text outwardly peeled skin, vertical tears in fuselage skin, missing critical pieces, and a generally shattered appearance which is unlike any other damage seen in the wreckage of the four aircraft and not seen in any other hull loss of a Boeing 747.

B. The four door areas show a rupture in flight by an outward force. The door itself appears to be at the start of the breakup. The specific location in the door that ruptures first appears to be at the midspan latches with the aft midspan latch the most likely to rupture first.

C. The port side opposite the forward cargo door is stated in text and photographs to be relatively smooth which rules against a bomb explosion on the port side or a center fuel tank explosion in the center of Trans World Airlines Flight 800.

D. The shattered areas of the forward cargo door occurred at the initial event time as determined by the sudden loud sound on the cockpit voice recorder on all four aircraft. The sudden loud sound cause has been linked from Air India Flight 182 to a DC-10 explosive decompression event of an opened cargo door in flight. Pan Am Flight 103 has been linked to Air India Flight 182. Trans World Airlines Flight 800 has been linked to Pan Am Flight 103. These links establish a probable cause of the sudden loud sound as an explosive decompression when a cargo door inadvertently ruptured open in flight probably caused by faulty wiring or switch.

E. The missing and jammed pressure relief doors in the forward cargo doors of aircraft that suffer an explosive decompression in the forward cargo compartment indicate that the mechanical linkage has turned them to the open position at the same time the linkage was turning the locking sectors to the open position. The pressure relief doors are not designed to blow out if abnormal internal pressure detected. They are mechanically linked to the latching mechanisms. If the latches inadvertently turn towards the unlatched position in flight, the pressure relief doors would slightly open also.