

Various cargo door/depressurization accidents:

T96-01-51 BOEING

TRANSMITTED AS FOLLOWS IS TELEGRAPHIC AIRWORTHINESS DIRECTIVE T96-01-51 FOR IMMEDIATE TRANSMITTAL TO ALL OWNERS AND OPERATORS OF BOEING MODEL 747-100 SERIES AIRPLANES MODIFIED IN ACCORDANCE WITH SUPPLEMENTAL TYPE CERTIFICATES (STC) SA2322SO AND A MODEL 747-200 SERIES AIRPLANE MODIFIED IN ACCORDANCE WITH STC SA4227NM-D.

THE FAA HAS RECENTLY RECEIVED A REPORT THAT THE FLIGHTCREW ON A BOEING MODEL 747-100 SERIES AIRPLANE NOTED AN ABNORMAL CABIN ALTITUDE RATE OF CLIMB. ALTHOUGH THE PRESSURIZATION VENT DOOR LIGHT WAS NOT ILLUMINATED (WHICH INDICATED TO THE FLIGHTCREW THAT THE DOOR WAS CLOSED AND LOCKED), THE FLIGHTCREW WAS UNABLE TO PRESSURIZE THE AIRPLANE. THE FLIGHTCREW ALSO NOTED THAT THE MAIN DECK SIDE CARGO "DOOR UNLOCKED" LIGHT ILLUMINATED SHORTLY AFTER TAKEOFF. INVESTIGATION REVEALED THAT 11 OF THE 12 LATCHES ON THE MAIN DECK SIDE CARGO DOOR WERE UNLATCHED AND

UNLOCKED. HOWEVER, THE PRESSURIZATION VENT DOOR WAS CLOSED AND LOCKED, WHICH WOULD INDICATE A MALFUNCTION OF THE SAFETY INTERLOCK SYSTEM.

A PROPERLY FUNCTIONING SAFETY INTERLOCK SYSTEM ELECTRO-MECHANICALLY PREVENTS THE PRESSURIZATION VENT DOOR FROM CLOSING UNTIL ALL OF THE LATCHES ARE IN THE FULLY LATCHED AND LOCKED POSITION. IF THE PRESSURIZATION VENT DOOR IS NOT CLOSED THE AIRPLANE CANNOT BE PRESSURIZED.

ALTHOUGH THE ORIGINAL CAUSE OF THE FAILURE TO PROPERLY LATCH THE DOOR MAY BE ATTRIBUTABLE TO HUMAN ERROR, THE PURPOSE OF THE INTERLOCK SYSTEM IS TO ENSURE THAT SUCH ERRORS ARE DETECTED SO THAT THE AIRPLANE CANNOT BE PRESSURIZED UNLESS THE MAIN DECK SIDE CARGO DOOR IS PROPERLY LATCHED AND LOCKED. MALFUNCTION OF THE SAFETY INTERLOCK SYSTEM OF THE MAIN DECK SIDE CARGO DOOR, IF NOT CORRECTED, COULD RESULT IN AN IN-FLIGHT OPENING OF THE MAIN DECK SIDE CARGO DOOR, AND SUBSEQUENT RAPID DECOMPRESSION OF THE AIRPLANE.

THE AIRPLANE IN THE REPORTED INCIDENT WAS MODIFIED IN ACCORDANCE WITH SUPPLEMENTAL TYPE CERTIFICATE (STC) SA2322SO. THE MODIFICATION ENTAILED INSTALLATION OF A MAIN

DECK SIDE CARGO DOOR AS PART OF A CONVERSION THAT RECONFIGURED THE AIRPLANE FROM A PASSENGER CONFIGURATION TO A SPECIAL FREIGHTER CONFIGURATION.

SINCE STC SA2322SO FOR MODEL 747-100 SERIES AIRPLANES IS SIMILAR IN DESIGN TO STC SA4227NM-D FOR A MODEL 747-200 SERIES AIRPLANE, THE FAA HAS DETERMINED THAT THE UNSAFE CONDITION MAY ALSO EXIST ON A MODEL 747-200 SERIES AIRPLANE THAT HAS BEEN MODIFIED IN ACCORDANCE WITH STC SA4227NM-D. THIS STC CONVERTED A MODEL 747-200 SERIES AIRPLANE FROM A PASSENGER CONFIGURATION TO A SPECIAL FREIGHTER CONFIGURATION.

SINCE AN UNSAFE CONDITION HAS BEEN IDENTIFIED THAT IS LIKELY TO EXIST OR DEVELOP ON OTHER AIRPLANES OF THIS SAME TYPE DESIGN, THIS TELEGRAPHIC AIRWORTHINESS DIRECTIVE IS ISSUED TO REQUIRE REPETITIVE INSPECTIONS OF THE LATCH SAFETY PINS OF THE MAIN DECK SIDE CARGO DOOR.

THIS TELEGRAPHIC AD ALSO REQUIRES DEACTIVATION OF THE "LATCHES UNLOCKED" LIGHT AT THE DOOR OPERATING PANEL AND THE "DOOR UNLOCKED" LIGHT AT THE FLIGHT ENGINEER PANEL, AND FABRICATION AND INSTALLATION OF A PLACARD TO INDICATE THAT THE "DOOR UNLOCK" LIGHT AT THE FLIGHT ENGINEER (F/E) PANEL

HAS BEEN DEACTIVATED, IN ACCORDANCE WITH A METHOD APPROVED BY THE FAA.

THIS TELEGRAPHIC AD PROVIDES FOR TERMINATION OF THE REQUIREMENT TO REPETITIVELY INSPECT THE PINS AND REMOVAL OF THE PLACARD FOLLOWING ACCOMPLISHMENT OF A MODIFICATION THAT POSITIVELY ADDRESSES THE UNSAFE CONDITION AND THAT HAS BEEN APPROVED BY THE FAA.

THIS IS CONSIDERED TO BE INTERIM ACTION UNTIL FINAL ACTION IS IDENTIFIED, AT WHICH TIME THE FAA MAY CONSIDER FURTHER RULEMAKING.

THIS RULE IS ISSUED UNDER 49 U.S.C. SECTION 44701 (FORMERLY SECTION 601 OF THE FEDERAL AVIATION ACT OF 1958) PURSUANT TO THE AUTHORITY DELEGATED TO ME BY THE ADMINISTRATOR, AND IS EFFECTIVE IMMEDIATELY UPON RECEIPT OF THIS TELEGRAM.

T96-01-51 BOEING: TELEGRAPHIC AD ISSUED ON JANUARY 3, 1996. DOCKET NO. 96-NM-01-AD.

APPLICABILITY: MODEL 747-100 SERIES AIRPLANES HAVING SERIAL NUMBERS 19637, 19638, 19642, 19647, 19648, 19657, 19725, 20320, AND 20347, THAT HAVE BEEN MODIFIED IN

ACCORDANCE WITH SUPPLEMENTAL TYPE CERTIFICATE (STC) SA2322SO, AND MODEL 747-200 SERIES AIRPLANE HAVING SERIAL NUMBER 20010 THAT HAS BEEN MODIFIED IN ACCORDANCE WITH STC SA4227NM-D, CERTIFICATED IN ANY CATEGORY.

NOTE 1: THIS AD APPLIES TO EACH AIRPLANE IDENTIFIED IN THE PRECEDING APPLICABILITY PROVISION, REGARDLESS OF WHETHER IT HAS BEEN MODIFIED, ALTERED, OR REPAIRED IN THE AREA SUBJECT TO THE REQUIREMENTS OF THIS AD. FOR AIRPLANES THAT HAVE BEEN MODIFIED, ALTERED, OR REPAIRED SO THAT THE PERFORMANCE OF THE REQUIREMENTS OF THIS AD IS AFFECTED, THE OWNER/OPERATOR MUST USE THE AUTHORITY PROVIDED IN PARAGRAPH (D) OF THIS AD TO REQUEST APPROVAL FROM THE FAA. THIS APPROVAL MAY ADDRESS EITHER NO ACTION, IF THE CURRENT CONFIGURATION ELIMINATES THE UNSAFE CONDITION; OR DIFFERENT ACTIONS NECESSARY TO ADDRESS THE UNSAFE CONDITION DESCRIBED IN THIS AD. SUCH A REQUEST SHOULD INCLUDE AN ASSESSMENT OF THE EFFECT OF THE CHANGED CONFIGURATION ON THE UNSAFE CONDITION ADDRESSED BY THIS AD. IN NO CASE DOES THE PRESENCE OF ANY MODIFICATION, ALTERATION, OR REPAIR REMOVE ANY AIRPLANE FROM THE APPLICABILITY OF THIS AD.

COMPLIANCE: REQUIRED AS INDICATED, UNLESS ACCOMPLISHED

PREVIOUSLY.

TO PREVENT MALFUNCTION OF THE SAFETY INTERLOCK SYSTEM OF THE MAIN DECK CARGO DOOR AND SUBSEQUENT RAPID DECOMPRESSION OF THE AIRPLANE DUE TO IN-FLIGHT OPENING OF THE MAIN DECK SIDE CARGO DOOR, ACCOMPLISH THE FOLLOWING:

(A) NOTWITHSTANDING THE REQUIREMENTS OF PARAGRAPH E. OF AD 90-09-06, AMENDMENT 39-6581, WITHIN 3 DAYS AFTER RECEIPT OF THIS TELEGRAPHIC AD, DEACTIVATE THE "LATCHES UNLOCKED" LIGHT AT THE DOOR OPERATING PANEL AND THE "DOOR UNLOCKED" LIGHT AT THE F/E PANEL, AND FABRICATE AND INSTALL PLACARDS; IN ACCORDANCE WITH A METHOD APPROVED BY THE MANAGER, ATLANTA AIRCRAFT CERTIFICATION OFFICE (ACO), FAA, SMALL AIRPLANE DIRECTORATE.

(B) WITHIN 3 DAYS AFTER RECEIPT OF THIS TELEGRAPHIC AD, ACCOMPLISH THE REQUIREMENTS OF PARAGRAPHS (A)(1), (A)(2), (A)(3), (A)(4), (A)(5), AND (A)(6) OF THIS AD. REPEAT THESE PROCEDURES THEREAFTER PRIOR TO EACH FLIGHT. THESE PROCEDURES MUST BE PERFORMED BY PROPERLY TRAINED AND QUALIFIED MAINTENANCE PERSONNEL.

(1) CLOSE THE MAIN DECK SIDE CARGO DOOR IN ACCORDANCE WITH NORMAL OPERATIONS PROCEDURES.

(2) UNSCREW, LIFT, AND SECURE THE DOOR LOWER ACCESS PANELS IN THE "UP" POSITION.

(3) PERFORM A VISUAL INSPECTION OF ALL 12 LATCH AND LOCK ARMS TO ENSURE THAT THEY ARE OVERCENTER IN THE "LOCKED" POSITION AND THAT ALL ALIGNMENT MARKS LINE-UP CORRECTLY.

(4) PERFORM A DETAILED VISUAL INSPECTION TO ENSURE THAT THE TEN PHOTO SCANNER ALIGNMENT HOLES IN LATCHES 2 THROUGH 11 HAVE NO OBSTRUCTIONS.

(I) COUNTING FORWARD TO AFT, INSTALL PINS IN PHOTO SCANNER ALIGNMENT HOLES IN LATCH ASSEMBLIES 2 THROUGH 11. THE SAFETY PINS MUST ENGAGE LOCK ARM AND LATCH ARM LEVER AND GO COMPLETELY THROUGH LATCH ASSEMBLY.

(II) ALL LATCH SAFETY PINS MUST BE FASTENED TOGETHER WITH A SAFETY CABLE, AND THE SAFETY CABLE MUST BE ATTACHED TO THE MAIN DECK DOOR SILL PROTECTOR.

(III) LOWER AND SECURE THE LOWER ACCESS PANELS IN PLACE.

(IV) OPEN CIRCUIT BREAKER HC5, LOCATED ON P-10, MAIN POWER CENTER-LEFT.

(5) TO CLOSE THE PRESSURE VENT DOOR ON THE MAIN DECK SIDE CARGO DOOR, ACCOMPLISH PARAGRAPHS (A)(5)(I),

(A)(5)(II), (A)(5)(III), AND (A)(5)(IV) OF THIS AD.

(I) REMOVE PRESSURE VENT DOOR COVER,

(II) MANUALLY RETRACT THE TWO SOLENOID VALVES

TO ALLOW PRESSURE VENT DOOR CLOSURE,

(III) CLOSE PRESSURE VENT DOOR, AND

(IV) REPLACE VENT DOOR COVER.

(6) ALL SAFETY PINS MUST BE REMOVED BEFORE OPENING

OR OPERATING CARGO DOOR, AND

(C) ACCOMPLISHMENT OF A MODIFICATION IN ACCORDANCE WITH

A METHOD APPROVED BY THE MANAGER, ATLANTA, ACO CONSTITUTES

TERMINATING ACTION FOR THE REQUIREMENTS OF THIS AD.

(D) AN ALTERNATIVE METHOD OF COMPLIANCE OR ADJUSTMENT OF

THE COMPLIANCE TIME THAT PROVIDES AN ACCEPTABLE LEVEL OF

SAFETY MAY BE USED IF APPROVED BY THE MANAGER, ATLANTA ACO.

OPERATORS SHALL SUBMIT THEIR REQUESTS THROUGH AN APPROPRIATE

FAA PRINCIPAL MAINTENANCE INSPECTOR, WHO MAY ADD COMMENTS

AND THEN SEND IT TO THE MANAGER, ATLANTA ACO.

NOTE 2: INFORMATION CONCERNING THE EXISTENCE OF

APPROVED ALTERNATIVE METHODS OF COMPLIANCE WITH THIS AD, IF

ANY, MAY BE OBTAINED FROM THE ATLANTA ACO.

(E) SPECIAL FLIGHT PERMITS MAY BE ISSUED IN ACCORDANCE

WITH SECTIONS 21.197 AND 21.199 OF THE FEDERAL AVIATION REGULATIONS (14 CFR 21.197 AND 21.199) TO OPERATE THE AIRPLANE TO A LOCATION WHERE THE REQUIREMENTS OF THIS AD CAN BE ACCOMPLISHED.

(F) INFORMATION PERTINENT TO THIS RULEMAKING ACTION MAY BE EXAMINED AT THE FAA, TRANSPORT AIRPLANE DIRECTORATE, 1601 LIND AVENUE, SW., RENTON, WASHINGTON; OR AT THE FAA, SMALL AIRPLANE DIRECTORATE, ATLANTA AIRCRAFT CERTIFICATION OFFICE, CAMPUS BUILDING, 1701 COLUMBIA AVENUE, SUITE 2-160, COLLEGE PARK, GEORGIA 30337-2748.

(G) TELEGRAPHIC AD T96-01-51, ISSUED ON JANUARY 3, 1996, BECOMES EFFECTIVE UPON RECEIPT.

FOR FURTHER INFORMATION CONTACT: RANDY AVERA, AEROSPACE ENGINEER, SYSTEMS AND EQUIPMENT BRANCH, ACE-130A, FAA, SMALL AIRPLANE DIRECTORATE, ATLANTA AIRCRAFT CERTIFICATION OFFICE, CAMPUS BUILDING, 1701 COLUMBIA AVENUE, SUITE 2-160, COLLEGE PARK, GEORGIA 30337-2748; TELEPHONE (404) 305-7381; FAX (404) 305-7348.

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-80-20

Last Updated: 09-21-94

[O] On March 8, 1980, a Swearingen SA-226 at, N720R, with a crew of two and six passengers, experienced a rapid decompression at 16,000 feet

when most of the aft cargo compartment door separated in flight. About 3/4 of the door along with interior furnishings, including an

unoccupied passenger seat, separated from the aircraft. Two passengers were injured slightly during the decompression and the empennage

was damaged slightly when some of the material from the cargo door or the cabin struck the upper fuselage and the vertical stabilizer. Some

of the material from the cabin lodged around the control surfaces in the empennage. A safe landing was made in Albany, New York. Although

ground search continues for the separated items, only baggage has thus far been recovered.

Recommendations:

A-80-20. Issue a telegraphic advisory requiring an immediate inspection of the door latching mechanism of the aft cargo doors on all Swearingen

SA-226 aircraft to assure proper adjustment and structural integrity.

Responses:

FAA LTR DTD: 05/13/80

Emergency telegraphic airworthiness directive (AD), no. T80sw14, applicable to operators of Swearingen model SA-226TC airplanes, was issued

march 15, 1980. The ad required an immediate inspection of the door latching mechanism of the aft cargo door to assure proper adjustment,

operation, and structural integrity, and prohibited flight operation with pressurized cabin. Later on 3/15, ad t80sw 14 was amended by adding a

clarifying paragraph requiring compliance prior to further flight. On 3/19, telegraphic ad t80sw 15 was issued, superseding ad t80sw 14, as

amended. This ad t80sw 15 includes the provisions of ad t80sw 14 and provides for inspection at 250-hour intervals to assure proper adjustment,

operation, an structural integrity of the door system. Enclosed are copies of all referenced ads. We are in receipt of the ntsb letter dated may 5

and note that recommenda- tions a-80-20 and 21 are now classified in a closed--acceptable action status.

NTSB LTR DTD: 05/05/80

The safety board has examined emergency telegraphic airworthiness directive (ad), no. 580sw14, dated march 15, 1980, as amended, and

emergency telegraphic ad t80sw15, dated march 19, 1980. We are satisfied that compliance with these ad's will fulfill safety recommendations

a-80-20 and 21, which are now classified in a closed-- acceptable action status.

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-80-21

Last Updated: 09-21-94

[O] On march 8, 1980, a swearingen sa-226 at, n720r, with a crew of two and sixpassengers, experienced a rapid decompression at 16,000 feet

when most of the aft cargo compartment door separated in flight. About 3/4 of the door along

with interior furnishings, including an

unoccupied passenger seat, separated from the aircraft. Two passengers were injured slightly during the decompression and the empennage

was damaged slightly when some of the material from the cargo door or the cabin struck the upper fuselage and the vertical stabilizer. Some

of the material from the cabin lodged around the control surfaces in the empennage. A safe landing was made in Albany, New York. Although

ground search continues for the separated items, only baggage has thus far been recovered.

Recommendations:

A-80-21. Issue an AD restricting the cabin pressure differential in Swearingen SA-226 aircraft until the cause of the aft cargo door failure can be

determined and an appropriate corrective action carried out.

Responses:

NTSB LTR DT: 05/05/80

The safety board has examined emergency telegraphic airworthiness directive (AD), no. T80sw14, dated March 15, 1980, as amended, and

emergency telegraphic AD, T80sw15, dated March 19, 1980. We are satisfied that compliance with these AD's will fulfill safety recommendations

A-80-20 and 21, which are now classified in a closed-- acceptable action status.

FAA LTR DTD: 05/13/80

Emergency telegraphic airworthiness directive (AD), no. T80sw14, applicable to operators of Swearingen model SA-226TC and SA-226AT airplanes,

was issued on March 15, 1980. The AD required an immediate inspection of the door latching mechanism of the aft cargo door to assure

proper adjustment, operation, and structural integrity, and prohibited flight operation with a

pressurized cabin. Later on march 15, ad t80sw 14

was amended by adding a clarifying paragraph requiring compliance prior to further flight. On march 19, telegraphic ad t80sw 15 was issued,

superseding ad t80sw 14 as amended. This ad t80sw 15 includes the provisions of ad t80sw 14 and provides for inspection at 250-hour intervals

to assure proper adjustment, operation, and structural integrity of the door system. Enclosed are copies of all referenced ads. We are in

receipt of the ntsb letter dated may 5 and note that recommendations a-80-20 and 21 are now classified in a closed--acceptable action status.

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-80-76

Last Updated: 09-21-94

[O] On march 8, 1980, a swearingen sa-226 at, n720r, with a crew of two and sixpassengers, experienced a rapid decompression at 16,000 feet

when most of the aft cargo compartment door separated in flight. About 3/4 of the door along with interior furnishings, including an

unoccupied passenger seat, separated from the aircraft. Two passengers were injured slightly during the decompression and the empennage

was damaged slightly when some of the material from the cargo door or the cabin struck the upper fuselage and thevertical stabilizer. Some

of the material from the cabin lodged around thecontrol surfaces in the empennage. A safe landing was made in albany, new york. Although

ground search continues for the separated items, only baggage has thus far been recovered.

Recommendations:

A-80-76. Issue a telert maintenance bulletin to alert operators of swearingen models sa226-at and sa226-tc aircraft of the dangers of machining

or filing any component of the latch or receptacle to ease the engagement.

Responses:

FAA LTR DTD: 10/30/80

The faa concurs with a-80-76 and 77. Our southwest region has issued a telert maintenance bulletin advising all regions to notify operators who

re operating swearingen models sa-226at and sa226tc aircraft of the dangers of machining or filing any component of the latching mechanisms

to ease engagement. Further, we have included in this bulletin instructions to advise operators of unsafe conditions which can result from

forcing the latching mechanism during operations when the latches are mis- aligned or not properly adjusted. In addition, a general aviation

airworthiness alert has been prepared for in ac 43-16 which willreflect the information contained in both recommenda-tions. A copy of both

these documents is enclosed. The faa considers action on a-80-76 and 77 completed.

NTSB LTR DTD: 12/03/80

The safety board is pleased to note that on october 2, 1980, the faa issued a telert maintenance bulletin a-80-76, and that a general aviation

airworthiness alert has been prepared for insertion in ac 43-16 to fulfill a-80-77. Both these recommendation are now classified in a

closed--acceptable action status.

NTSB Accident/Incident Brief

Data_Source: NTSB Aviation Accident/Incident Data

Rprt_Nbr: DCA89MA035

Event_Lcl_Date: 03/18/1989

Time (Lcl): 216 CST

Loc_State_Code: TX

Loc_City_Name: SAGINAW

Loc_Arpt_Name: CARSWELL AFB

Loc_Arpt_Id_Code: FWH

Event_Acdnt_Incdnt_Code: ACCIDENT

Inj_Hi_Deg_Code: FATAL

Rprt_Status_Code: FINAL

Event_Mid_Air_Code: No

--- Aircraft Information ---

Opn_Cat_Code: SCH121

Acft_Type_Code: AIRPLANE

Acft_Dmg_Code: DESTROYED

Flt_Phase_Code: 580 MANEUVERING

Acft_Manf_Name: MCDONNELL-DOUGLAS

Acft_Series_Name: DC-9-33F

Aic_Make_Id: DOUG

Aic_Ac_Id: DC-9-33F

Acft_Hm_Built_Flag: No

Oprtr_Biz_Name:

Oprtr_Name:

Oprtr_Desigtr_Code:

Owner_Name: EVERGREEN INTL AIRLINES

--- Narrative ---

AS THE ACFT ROTATED FOR TKOF, THE CARGO DOOR (CD) OPENED. THE CREW
CONTD

TKOF & TURNED TO A DWNWND LEG TO LND ON RWY 17. THEY ANSWERED TWR
INSTRNS

TO RPRT "BASE." THIS WAS THE LAST TMTN THEY RCVD, THO THEY TRIED SVRL
TIMES TO CTC TWR OR APCH CTL. AS THE ACFT TURNED ON BASE LEG (WITH A
TAIL

WND AT TFC PATTERN ALT), RADAR DATA INDCD ACFT WOULD CROSS THE
RWY

CENTERLINE. RADAR CTC WAS THEN LOST; THE ACFT CRASHED IN A STEEP
DSCNT.

THERE WAS EVIDENCE THAT BFR FLT, THE 1ST OFFICER MISINTERPRETED THE
EXTERNAL LOCKPIN MANUAL CTL HANDLE PSN TO MEAN THE CD WAS LOCKED
(AS A

RESULT OF INCORRECT MARKINGS). ALSO, THERE WAS A MALFUNCTION OF A
CD OPEN

WARNING LGT SW, PREVENTING OPN OF THE WARNING LGT. ADDITIONALLY,
SVRL SVC

BULLETINS (SB'S) CONCERNING THE CD HAD NOT BEEN COMPLIED WITH. THESE
SB'S

WOULD HAVE PROVIDED AN EXTRA SAFETY FEATURE OF THE CD WARNING
LGT SYS, A

DOOR VENTING SYS & A LOCKPIN VIEWING WINDOW FOR THE DOOR. THERE WAS NO

EMERG PROC OR SPECIFIC GUIDANCE TO AID DC-9 CREWS FOR THIS SITUATION, THOUGH SVRL CD OPENINGS HAD OCCURRED. (SEE: NTSB/AAR-90/02)

--- Sequence of Events ---

Occurrence #: 1 130 AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION

Phase of Operation: 501 STANDING - PRE-FLIGHT

----- Findings -----

Subj - Mod - Pers C/F

1b. 24119(S) - 3124(M) - 4121(P) Factor

MAINTENANCE, SERVICE BULLETINS - NOT FOLLOWED - COMPANY/OPERATOR MANAGEMENT

1ind. 90000(S) - 6110(P) Factor

INADEQUATE SURVEILLANCE OF OPERATION - FAA (ORGANIZATION)

2a. 10505(S) - 1213(M)

DOOR, CARGO/BAGGAGE - NOT SECURED

3a. 12015(S) - 1134(M)

ELECTRICAL SYSTEM, ELECTRIC SWITCH - FAILURE, PARTIAL

4a. 13107(S) - 1150(M)

WARNING SYSTEM (OTHER) - INOPERATIVE

6b. 24032(S) - 3115(M) - 4121(P) Factor

PROCEDURES/DIRECTIVES - INADEQUATE - COMPANY/OPERATOR MANAGEMENT

6ind. 91200(S) - 6110(P) Factor

INSUFFICIENT STANDARDS/REQUIREMENTS, AIRCRAFT - FAA (ORGANIZATION)

Occurrence #: 2 430 MISCELLANEOUS/OTHER

Phase of Operation: 522 TAKEOFF - INITIAL CLIMB

----- Findings -----

Subj - Mod - Pers C/F

1a. 10505(S) - 1202(M) Factor

DOOR, CARGO/BAGGAGE - DISENGAGED

Occurrence #: 3 250 LOSS OF CONTROL - IN FLIGHT

Phase of Operation: 563 APPROACH - VFR PATTERN - BASE LEG/BASE TO FINAL

----- Findings -----

Subj - Mod - Pers C/F

1b. 25000(S) - 3001(M) - 4001(P) Cause

REASON FOR OCCURRENCE UNDETERMINED - -

4a. 21103(S) - 2104(M) Factor

AIRCRAFT MANUALS, PROCEDURE INFORMATION - INADEQUATE

4b. 24032(S) - 3115(M) - 4123(P) Factor

PROCEDURES/DIRECTIVES - INADEQUATE - MANUFACTURER

Occurrence #: 4 230 IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: 553 DESCENT - UNCONTROLLED

----- Findings -----

Subj - Mod - Pers C/F

--- Probable Cause ---

THE LOSS OF CONTROL OF THE AIRPLANE FOR UNDETERMINED REASONS
FOLLOWING THE

INFLIGHT OPENING OF THE IMPROPERLY LATCHED CARGO DOOR.
CONTRIBUTING TO

THE ACCIDENT WERE: INADEQUATE PROCEDURES USED BY EVERGREEN
AIRLINES AND

APPROVED BY THE FAA FOR PREFLIGHT VERIFICATION OF CARGO DOOR
SECURITY,

EVERGREEN'S FAILURE TO MARK PROPERLY THE AIRPLANE'S EXTERNAL
CARGO DOOR

LOCKPIN MANUAL CONTROL HANDLE, AND THE FAILURE OF MCDONNELL
DOUGLAS TO

PROVIDE FLIGHTCREW GUIDANCE AND EMERGENCY PROCEDURES FOR AN
INFLIGHT

OPENING OF THE CARGO DOOR. ALSO CONTRIBUTING TO THE ACCIDENT WAS
THE

FAILURE OF THE FAA TO MANDATE MODIFICATION TO THE DOOR-OPEN
WARNINGSYSTEM

FOR DC-9 CARGO-CONFIGURED AIRPLANES, GIVEN THE PREVIOUS KNOWN
OCCURRENCES

OF INFLIGHT DOOR OPENINGS.

Acft_Nbr_Seat_Qty: 3

Opn_Biz_Code: Code Not Found

Opn_Biz_Otr_Desc:

Fltcdct_Code: 14 CFR 121

Fltcdct_Otr_Desc:

Opn_Sked_Code: SCHEDULED

Opn_Dom_Intnl_Code: DOMESTIC

Opn_Psgr_Cargo_Code: CARGO

Regist_Nbr: 931F

Owner_Cert_Held_Flag: Code Not Found

Oprtr_Cert_Acr_Type_Code: FLAG CARRIER/DOMESTIC (121)

Oprtr_Cert_Otr_Acft_Flag: Code Not Found

Oprtr_Cert_Rotor_Ag_Code: Code Not Found

Acft_Fire_Code: ON GROUND

Injuries

Fatal Serious Minor None

Crew 2 0 0 0

Pass 0 0 0 0

Other 0 0 0 0

Invlvd 2 0 0 0

Lndgr_Type_Fix_Code: TRICYCLE-RETRACTABLE

Acft_Crtfyd_Max_Wt_Lb_Qty: 114000

Eng_Manf_Name: P&W

Eng_Model_Name: JT8D-9A

Acft_Nbr_Eng_Qty: 2

Eng_Typ_Code: TURBO FAN

Eng_Rated_Pwr_Hpwr_Qty: 0

Eng_Rated_Pwr_Thrust_Lb_Qty: 14500

Elt_Instld_Flag: No

Elt_Oprtd_Flag: Code Not Found

Stall_Warn_Instl_Flag: Yes

--- Environment/Operations Information ---

Wx_Brfg_Srce_Code:

Wx_Brfg_Mthd_Code:

Wx_Brfg_Cmplt_Code: WEATHER NOT PERTINENT

Wx_Flt_Cond_Code: VISUAL METEOROLOGICAL CONDITIONS (VMC)

Wx_Wind_From_Vrbl_Flag: Code Not Found

Wx_Wind_Degm_Qty: 320

Wx_Wind_Type_Code: Code Not Found

Wx_Wind_Spd_Kt_Qty: 6

Wx_Vis_Sm_Qty: 10

Wx_Vis_Rvr_Ft_Qty: 0

Wx_Vis_Rvv_Sm_Qty: 0

Wx_Cloud_Code: THIN BROKEN

Wx_Cloud_Hgt_Agl_Ft_Qty: 25000

Wx_Cig_Code: NONE

Wx_Cig_Hgt_Agl_Ft_Qty: 0

Wx_Vis_Rstr_Fix_Code: NONE

Wx_Precip_Type_Fix_Code: NONE

Wx_Cond_Lgt_Code: NIGHT (DARK)

Dep_Point_Flag: Yes

Dep_Point_Arpt_Id_Code: FWH

Dep_Point_City_Name:

Dep_Point_State_Code:

Destn_Same_Lcl_Code: Code Not Found

Destn_Arpt_Id_Code: TIK

Destn_City_Name: OKLAHOMA CITY

Destn_State_Code: OK

Fltplan_Filed_Code: INSTRUMENT FLIGHT RULES (IFR)

Clnc_Atc_Type_Code: IFR

Apch_Vfr_Fix_Code: TRAFFIC PATTERN

Loc_Event_Code: OFF AIRPORT/AIRSTRIP

Rwy_Used_Id_Sffx_Code:

Rwy_Used_Id_Code: 17

Rwy_Len_Ft_Qty: 12000

Rwy_Wid_Ft_Qty: 300

Rwy_Sfc_Type_Fix_Code: CONCRETE

Rwy_Status_Type_Fix_Code: DRY

--- Personnel Information ---

Plt_Cert_Type_Code: COMMERCIAL, AIRLINE TRANSPORT

Pltrng_Plane_Code: SINGLE ENGINE LAND, MULTIENGINE LAND

Pltrng_Non_Plane_Code: NONE

Pltrng_Inst_Code: AIRPLANE

Plt_Bfr_Flag: Yes

Plt_Last_Bfr_Mo_Qty: 2

Plt_Bfr_Acft_Make_Name: SIMULATOR

Plt_Bfr_Acft_Model_Name: DC9 SI

Plt_Med_Cert_Code: CLASS 1

Plt_Med_Cert_Vldty_Code: VALID MEDICAL-NO WAIVERS/LIMITATIONS

Flight Time (Hours)

Total : 7238 Last 24 Hrs : 4

Make/Model: 1938 Last 30 Days: 0

Instrument: 0 Last 90 Days: 0

Multi-Eng : 0 Rotorcraft : 0

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-90-86

Last Updated: 09-21-94

[O] On March 18, 1989, an Evergreen International Airlines McDonnell Douglas DC-9-33F, registered in the United States as N931F, crashed

during the turn to final approach as the pilot was attempting to return to Carswell Air Force Base (AFB), Fort Worth, Texas after a cargo door

opened. This cargo flight was on an instrument flight rule (IFR) flight plan and was being operated in accordance with Title 14 Code of Federal

Regulations (CFR) Part 121. Night visual meteorological conditions existed at the time of the accident. The captain and first officer, the only

persons onboard, were killed.

Recommendations:

A-90-86. Require that McDonnell Douglas amend its DC-9 Flight Crew Operating Manual "Cargo Door Opens After Takeoff" procedure to

include the fact that the possibility exists that variations in indicated airspeed and altitude can exist during flight with an open cargo door.

Responses:

FAA LTR DTD: 8/28/90

The FAA agrees with the intent of these safety recommendations, but cannot "require" that changes or revisions be made to the Flight Crew

Operations Manual. Since the operations manual is not an FAA-approved document, the FAA has no direct control over the content of the

information contained in these manuals. The FAA will consider the issuance of an airworthiness directive (AD) to require a revision to the

Airplane Flight Manual to include the information requested in Safety Recommendation A-90-86. If an AD is issued, the FAA will request that

the manufacturer amend the Flight Crew Operations Manual to reflect the changes made to the

Airplane Flight Manual.

I will provide the Board with a copy of any document that may be issued.

NTSB LTR DTD: 11/5/90

The Safety Board notes that the FAA agrees with the intent of these safety recommendations and is considering the issuance of an

airworthiness directive (AD) to require a revision to the airplane flight manual. If the AD is issued, the FAA will request that the manufacturer

amend the flight crew operational manual to reflect the changes made to the airplane flight manual. Pending the FAA's further report, these

safety recommendations are classified as "Open--Acceptable Response."

FAA LTR DTD: 2/15/91

The McDonnell Douglas Aircraft Corporation revised its DC-9 Flight Crew Operating Manual to incorporate a revision to the emergency

procedure when the main cargo door opens after takeoff. I have enclosed a copy of the manual revision for the Board's information.

I consider the FAA's action to be completed on this safety recommendation.

NTSB LTR DTD: 5/7/91

The Safety Board notes that McDonnell Douglas has revised the DC-9 Flight Crew Operating Manual to meet the intent of Safety

Recommendation A-90-86. Based on the above information, Safety Recommendation A-90-86 is reclassified as "Closed--Acceptable Action."

<WEBMASTER>

NTSB Accident/Incident Brief

Data_Source: NTSB Aviation Accident/Incident Data

Rprt_Nbr: FTW89MA047

Event_Lcl_Date: 02/09/1989

Time (Lcl): 100 MST

Loc_State_Code: UT

Loc_City_Name: SALT LAKE CITY

Loc_Arpt_Name:

Loc_Arpt_Id_Code:

Event_Acdnt_Incdnt_Code: ACCIDENT

Inj_Hi_Deg_Code: FATAL

Rprt_Status_Code: FINAL

Event_Mid_Air_Code: No

Opn_Cat_Code: SCH121

Acft_Type_Code: AIRPLANE

Acft_Dmg_Code: NONE

Flt_Phase_Code: 530 CLIMB

Acft_Manf_Name: MCDONNELL DOUGLAS

Acft_Series_Name: DC-9-32F

Aic_Make_Id: DOUG

Aic_Ac_Id: DC-9-32F

Acft_Hm_Built_Flag: No

Oprtr_Biz_Name:

Oprtr_Name:

Oprtr_Desigtr_Code: EIAA

Owner_Name: EVERGREEN INTL AIRLINES

--- Narrative ---

AS 1ST OFFICER (FO) WAS FLYING ACFT, DRG CLB AFTER TKOF, CABIN WOULDNT

PRESSURIZE. HE BGN LVL OFF AT 16,000', BUT CAPT ORDERED HIM TO CONT CLBG

TO ASSIGNED FLT LVL (FL 330), WHILE HE (THE CAPT) WENT AFT TO FND PRBLM.

FO DISLIKED THE ORDER, BUT COMPLIED RATHER THAN CONFRONT CAPT. CAPT LEFT

COCKPIT WITH PORTABLE "ON DEMAND" OXYGEN (O2) SYS, WHICH HAD 15 MIN SUPPLY

OF O2. WHEN CAPT DIDN'T RTRN, FO TRIED SIGNALING HIM. THO RELUCTANT TO

COUNTERMAND CAPT'S ORDER, FO MADE SERIES OF DSCNTS TO 13,000'. AFTER ABT

30 MIN, HE LEFT COCKPIT & FND CAPT UNCONSCIOUS & UNRESPONSIVE IN FWD CARGO

AREA WITH O2 MASK ON HIS FACE. CAPT'S FOOT WAS ENTANGLED IN CARGO NET

WHICH CVRD A PALLET. FO TRIED TO REVIVE CAPT, TO NO AVAIL, THEN DECLARED

EMERG & LNDD AT LUBBOCK. CAPT WAS RUSHED TO HOSPITAL, BUT WAS DEAD ON

ARRIVAL. EXAM REVEALED AFT PRESSURE BULK- HEAD WAS NOT INSTALLED. IT HAD

BEEN REMOVED FOR MAINT BFR FLT. PORTABLE O2 SYS WAS STILL FULL,
INDCG CAPT

HAD LITTLE OR NO USE OF O2; IT WAS TESTED & FUNCTIONED NMLY. GROUP
OF 8

FORENSIC PATHOLOGISTS CONCLUDED CAPT DIED FM HYPOXIC HYPOXIA.

--- Sequence of Events ---

Occurrence #: 1 430 MISCELLANEOUS/OTHER

Phase of Operation: 530 CLIMB

----- Findings -----

Subj - Mod - Pers C/F

1a. 10510(S) - 1205(M) Factor

DOOR, INSPECTION - NOT INSTALLED

1b. 24102(S) - 3115(M) - 4107(P) Factor

MAINTENANCE, INSPECTION OF AIRCRAFT - INADEQUATE - COMPANY
MAINTENANCE PERSONNEL

2a. 10003(S) - 1163(M) Factor

FUSELAGE, CABIN - NO PRESSURE

3b. 24010(S) - 3109(M) - 4000(P) Cause

IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND

4b. 24527(S) - 3102(M) - 4001(P) Factor

CLIMB - CONTINUED -

6b. 24624(S) - 3136(M) - 4000(P) Factor

CREW/GROUP COORDINATION - POOR - PILOT IN COMMAND

7b. 23308(S) - 3110(M) - 4000(P) Cause

OXYGEN SYSTEM - IMPROPER USE OF - PILOT IN COMMAND

7dir. 33211(S) - 5000(P) Cause

INCAPACITATION (ANOXIA/HYPOXIA) - PILOT IN COMMAND

--- Probable Cause ---

IMPROPER IN-FLIGHT PLANNING/DECISION BY THE CAPTAIN (PILOT-IN-COMMAND)

AND HIS IMPROPER USE OF THE PORTABLE OXYGEN SYSTEM, WHICH RESULTED IN HIS

INCAPACITATION DUE TO HYPOXIA. FACTORS RELATED TO THE ACCIDENT WERE:

INADEQUATE MAINTENANCE/INSPECTION OF THE AIRCRAFT BY COMPANY MAINTENANCE

BY FAILING TO REINSTALL THE AFT PRESSURE BULKHEAD HATCH (INSPECTION DOOR)

AND POOR CREW COORDINATION.

--- Detail ---

Acft_Nbr_Seat_Qty: 2

Opn_Biz_Code: Code Not Found

Opn_Biz_Otr_Desc:

Fltndct_Code: 14 CFR 121

Fltndct_Otr_Desc:

Opn_Sked_Code: SCHEDULED

Opn_Dom_Intnl_Code: DOMESTIC

Opn_Psgr_Cargo_Code: CARGO

Regist_Nbr: 935F

Owner_Cert_Held_Flag: Code Not Found

Oprtr_Cert_Acr_Type_Code: SUPPLEMENTAL

Oprtr_Cert_Otr_Acft_Flag: Code Not Found

Oprtr_Cert_Rotor_Ag_Code: Code Not Found

Acft_Fire_Code: NONE

Injuries

Fatal Serious Minor None

Crew 1 0 0 1

Pass 0 0 0 0

Other 0 0 0 0

Invlvd 1 0 0 1

Lndgr_Type_Fix_Code: TRICYCLE-RETRACTABLE

Acft_Crtfyd_Max_Wt_Lb_Qty: 108000

Eng_Manf_Name: P&W

Eng_Model_Name: JT8D-9A

Acft_Nbr_Eng_Qty: 2

Eng_Typ_Code: TURBO FAN

Eng_Rated_Pwr_Hpwr_Qty: 0

Eng_Rated_Pwr_Thrust_Lb_Qty: 14000

Elt_Instld_Flag: No

Elt_Oprtd_Flag: Code Not Found

Stall_Warn_Instl_Flag: Yes

--- Environment/Operations Information ---

Wx_Brfg_Srce_Code: MILITARY

Wx_Brfg_Mthd_Code: IN PERSON

Wx_Brfg_Cmplt_Code: WEATHER NOT PERTINENT

Wx_Flt_Cond_Code: VISUAL METEOROLOGICAL CONDITIONS (VMC)

Wx_Wind_From_Vrbl_Flag: Code Not Found

Wx_Wind_Degm_Qty: 120

Wx_Wind_Type_Code: Code Not Found

Wx_Wind_Spd_Kt_Qty: 8

Wx_Vis_Sm_Qty: 15

Wx_Vis_Rvr_Ft_Qty: 0

Wx_Vis_Rvv_Sm_Qty: 0

Wx_Cloud_Code: CLEAR

Wx_Cloud_Hgt_Agl_Ft_Qty: 0

Wx_Cig_Code: NONE

Wx_Cig_Hgt_Agl_Ft_Qty: 0

Wx_Vis_Rstr_Fix_Code: NONE

Wx_Precip_Type_Fix_Code: NONE

Wx_Cond_Lgt_Code: NIGHT (DARK)

Dep_Point_Flag: Code Not Found

Dep_Point_Arpt_Id_Code: KHIF

Dep_Point_City_Name: OGDEN

Dep_Point_State_Code: UT

Destn_Same_Lcl_Code: Code Not Found

Destn_Arpt_Id_Code: KSKF

Destn_City_Name: SAN ANTONIO

Destn_State_Code: TX

Fltplan_Filed_Code: INSTRUMENT FLIGHT RULES (IFR)

Clnc_Atc_Type_Code: IFR

Apch_Vfr_Fix_Code: PRECAUTIONARY LANDING

Loc_Event_Code: OFF AIRPORT/AIRSTRIP

Rwy_Used_Id_Sffx_Code:

Rwy_Used_Id_Code: 0

Rwy_Len_Ft_Qty: 0

Rwy_Wid_Ft_Qty: 0

Rwy_Sfc_Type_Fix_Code:

Rwy_Status_Type_Fix_Code:

--- Personnel Information ---

Plt_Cert_Type_Code: AIRLINE TRANSPORT, FLIGHT INSTRUCTOR

Pltrtng_Plane_Code: SINGLE ENGINE LAND, MULTIENGINE LAND

Pltrtng_Non_Plane_Code: NONE

Pltrtng_Inst_Code: AIRPLANE

Plt_Bfr_Flag: Yes

Plt_Last_Bfr_Mo_Qty: 4

Plt_Bfr_Acft_Make_Name: DOUGLAS

Plt_Bfr_Acft_Model_Name: DC-9

Plt_Med_Cert_Code: CLASS 1

Plt_Med_Cert_Vldty_Code: VALID MEDICAL-NO WAIVERS/LIMITATIONS

Flight Time (Hours)

Total : 11000 Last 24 Hrs : 5

Make/Model: 232 Last 30 Days: 62

Instrument: 0 Last 90 Days: 152

Multi-Eng : 10000 Rotorcraft : 0

<WEBMASTER>

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-80-77

Last Updated: 09-21-94

[O] On march 8, 1980, a swearingen sa-226 at, n720r, with a crew of two and sixpassengers, experienced a rapid decompression at 16,000 feet

when most of the aft cargo compartment door separated in flight. About 3/4 of the door along with interior furnishings, including an

unoccupied passenger seat, separated from the aircraft. Two passengers were injured slightly during the decompression and the empennage

was damaged slightly when some of the material from the cargo door or the cabin struck the upper fuselage and the vertical stabilizer. Some

of the material from the cabin lodged around the control surfaces in the empennage. A safe landing was made in Albany, New York. Although

ground search continues for the separated items, only baggage has thus far been recovered.

Recommendations:

A-80-77. Issue an addition to the general aviation airworthiness alerts, Advisory Circular 43-16, to alert operators of SA-226 aircraft to the unsafe

condition which can result from forcing the latching mechanism while the latches are not properly engaged.

Responses:

FAA LTR DTD: 10/30/80

The FAA concurs with A-80-76 and 77. Our Southwest region has issued a teletype maintenance bulletin advising all regions to notify operators who

are operating Swearingen models SA-226A and SA-226TC aircraft of the dangers of machining or filling any component of the latching

mechanisms to ease engagement. Further, we have included in this bulletin instructions to advise operators of the unsafe conditions which

can result from forcing the latching mechanism during operations, when the latches are misaligned or not properly adjusted. In addition, a

general aviation airworthiness alert has been prepared for insertion in AC 43-16 which will

reflect the information contained in both

recommendations. A copy of both these documents is enclosed. The faa considers action on a-80-76 and 77 completed.

NTSB LTR DTD: 12/03/80

The safety boards is pleased to note that on october 2, 1980, the faa issued a telert maintenance bulletin fulfilling a -80-76, and that a general

aviation airworthiness alert has been prepared for insertion in ac 43-16 to fulfill a-80-77. Both these recommendations are now classified in a

closed--acceptable action status.

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-74-27

Last Updated: 09-21-94

[O] The ntsb is investigating an accident involving an american airlines mcdonnell douglas dc-10-10, n103aa, which occurred shortly after

takeoff from detroit metropolitan-wayne county airport on june 12, 1972. The aft left-hand cargo door opened while the aircraft was at

approximately 12,000 feet. The cabin floor over this cargo compartment then failed as a result of depressurization loading, and the floor

dropped partially into the cargo compartment. This displacement of the floor caused serious disruption of the control cables which are routed

through the floor beams to the empennage control systems and the engine controls. With the exception of the right rudder pedal cable, all of

the cables on the left side of the fuselage broke. The cable guides tore from their attachments to the floor beams, and the cables were

deflected downward by the floor structure.

Recommendations:

A-74-27. Require that the provisions of the McDonnell-Douglas Service Bulletin 52-49 entitled doors-cargo-install revised 'closed loop' cargo

door locking mechanism be made mandatory by the immediate issuance of an airworthiness directive.

Responses:

FAA LTR DTD: 04/04/74

On march 22, 1974, the faa issued their second ad which included the requirement for compliance with the mcdonnell douglas service bulletin

(sb) 52-49 by july 1, 1974. Prior to the issuance of the ad, sb 52-49 would not have been completed on all aircraft for another 20-24 months.

NTSB LTR DTD: 04/26/74

Closed--acceptable action.

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-72-97

Last Updated: 09-21-94

[O] The ntsb is investigating an accident involving an american airlines mcdonnell douglas dc-10-10, n103aa, which occurred shortly after

takeoff from detroit metropolitan-wayne county airport on june 12, 1972. The aft left-hand cargo door opened while the aircraft was at

approximately 12,000 feet. The cabin floor over this cargo compartment then failed as a result of depressurization loading, and the floor

dropped partially into the cargo compartment. This displacement of the floor caused serious disruption of the control cables which are routed

through the floor beams to the empennage control systems and the engine controls. With the exception of the right rudder pedal cable, all of

the cables on the left side of the fuselage broke. The cable guides tore from their attachments to the floor beams, and the cables were

deflected downward by the floor structure.

Recommendations:

A-72-97. Require a modification to the DC-10 cargo door locking system to make it physically impossible to position the external locking

handle and vent door to their normal door locked positions unless the locking pins are fully engaged.

Responses:

FAA LTR DTD: 07/07/72

Additional modifications to the cargo door locking and pressurization systems are being considered as part of a continued investigation

effort. While a preliminary investigation indicates that it may not be feasible to provide complete venting between cabin and cargo

compartments, your recommendations will be considered with respect to further action taken.

NTSB LTR DTD: 12/11/74

The safety board is aware of your continued efforts toward modifying the dc-10 cargo compartment doors to insure the integrity of fuselage

pressure containment. However, the safety board believes that critical control systems must be protected against a loss of cargo compartment

pressurization, which may occur for any reason. Therefore, we are specifically interested in

corrective actions to strengthen the passenger

compartment floor, to vent or partially vent the aft cargo compartment, and to isolate or otherwise protect critical systems which pass through

the passenger compartment floor structure. The safety board would appreciate a status report on actions taken or contemplated by the faa to

implement safety recommendation a-72-98.

NTSB LTR DTD: 06/01/75

Closed--acceptable action.

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-72-98

Last Updated: 09-21-94

[O] The ntsb is investigating an accident involving an american airlines mcdonnell douglas dc-10-10, n103aa, which occurred shortly after

takeoff from detroit metropolitan-wayne county airport on june 12, 1972. The aft left-hand cargo door opened while the aircraft was at

approximately 12,000 feet. The cabin floor over this cargo compartment then failed as a result of depressurization loading, and the floor

dropped partially into the cargo compartment. This displacement of the floor caused serious disruption of the control cables which are routed

through the floor beams to the empennage control systems and the engine controls. With the exception of the right rudder pedal cable, all of

the cables on the left side of the fuselage broke. The cable guides tore from their attachments to the floor beams, and the cables were

deflected downward by the floor structure.

Recommendations:

A-72-98. Require the installation of relief vents between the cabin and aft cargo compartment to minimize the pressure loading

depressurization of the cargo compartment.

Responses:

FAA LTR DTD: 07/07/72

Additional modifications to the cargo door locking and pressurization system are being considered as part of a continued investi- gation

effort. While a preliminary investigation indicates that it may not be feasible to provide complete venting between cabin and cargo compart-

ments, your recommendations will be considered with respect to further action taken.

NTSB LTR DTD: 02/23/73

With respect to recommendation a-72-98, you observed that a preliminary investigation indicated that it may not be feasible to provide

complete venting between cabin and cargo compartments. When your investigation is complete, the board would appreciate knowing if the

installation of vents similar to those on other dc-10 cargo compartments is feasible in the aft cargo compartment. If complete venting is not

possible, partial venting would be beneficial. Such venting could prevent the collapse of the aft cabin floor, or it could reduce the amount of

floor deflection, and attendant control cable damage in a dc-10.

FAA LTR DTD: 03/15/73

We have requested that the manufacturer reassess the dc-10 with regard to the effects on safety of probable large openings in the pressurized

fuselage. The manufacturer is to consider rerouting of vital systems, reinforcement of the floor

as well as incorporation of additional venting

between compartments. These alternatives will include consideration of various degrees of venting as recommended in your letter.

FAA LTR DTD: 01/17/75

Major discussions were held with mcdonnell-douglas on march 15, april 30, june 6 and 7, september 25, october 2, 3, and 4, 1974, and most

recently on january 7. We have also reviewed the l-1011 and b727 designs with lockheed and boeing representatives on april 30 and may 1,

1974. These many discussions covered specific design improvements including external door designs, floor structure and strengthening,

intercompartment venting and isolation of critical systems, and other features. We can advise you shortly of the results of our investigation

and the corrective measures to be required. This should be prior to january 31.

NTSB LTR DTD: 06/01/75

Closed--acceptable action.

NTSB Accident/Incident Brief

Data_Source: NTSB Aviation Accident/Incident Data

Rprt_Nbr: NYC92IA030

Event_Lcl_Date: 11/13/1991

Time (Lcl): 445 EST

Loc_State_Code: OH

Loc_City_Name: TOLEDO

Loc_Arpt_Name:

Loc_Arpt_Id_Code:

Event_Acdnt_Incdnt_Code: INCIDENT

Inj_Hi_Deg_Code: NONE

Rprt_Status_Code: FINAL

Event_Mid_Air_Code: No

--- Aircraft Information ---

Opn_Cat_Code: NSC121

Acft_Type_Code: AIRPLANE

Acft_Dmg_Code: MINOR

Flt_Phase_Code: 530 CLIMB

Acft_Manf_Name: DOUGLAS

Acft_Series_Name: DC-8-63

Aic_Make_Id: DOUG

Aic_Ac_Id: DC-8-63

Acft_Hm_Built_Flag: No

Oprtr_Biz_Name:

Oprtr_Name: FLAGSHIP EXPRESS

Oprtr_Desigtr_Code: RAXA

Owner_Name: AERO LEASE FINANCIAL GROUP INC

--- Narrative ---

THE MAIN CARGO DOOR OPENED IN FLIGHT AND THE AIRPLANE RETURNED FOR
A

NORMAL LANDING. OF THE TWO CIRCUIT BREAKERS REQUIRED TO BE PULLED PRIOR

TO TAKEOFF, ONE WAS FOUND STILLENGAGED. A CONFORMITY INSPECTION ON THE

CARGO DOOR INSTALLATION REVEALED SEVERAL AREAS OF NONCONFORMITY INCLUDING

DOOR LOCKS OF LESS THAN REQUIRED STRENGTH, LACK OF PAINT ON DOOR LOCKS

WHICH IS USED FOR VISUAL IDENTIFICATION, AND DAMAGED WIRES IN A BUNDLE.

THE WIRES WERE PART OF THE DOOR CLOSING, DOOR LOCKED INDICATING SYSTEM.

THE INVESTIGATION REVEALED IT WAS POSSIBLE FOR THE DOOR TO BE NOT

COMPLETELY CLOSED AND HAVE THE DOOR WARNING LIGHT GO OUT, INDICATING IT

WAS FULLY LOCKED.

--- Sequence of Events ---

Occurrence #: 1 140 DECOMPRESSION

Phase of Operation: 531 CLIMB - TO CRUISE

----- Findings -----

Subj - Mod - Pers C/F

1a. 10505(S) - 1147(M) Factor

DOOR, CARGO/BAGGAGE - IMPROPER

1b. 24111(S) - 3109(M) - 4108(P) Factor

MAINTENANCE, INSTALLATION - IMPROPER - OTHER MAINTENANCE PERSONNEL

2a. 12013(S) - 1113(M) Factor

ELECTRICAL SYSTEM, ELECTRIC WIRING - CHAFED

2b. 24002(S) - 3109(M) - 4102(P) Cause

AIRCRAFT PREFLIGHT - IMPROPER - FLIGHT ENGINEER

--- Probable Cause ---

THE FAILURE OF THE FLIGHT ENGINEER TO CONDUCT A PROPER PREFLIGHT INSPECTION AND ENSURE THE MAIN CARGO DOOR WAS FULLY CLOSED AND LOCKED.

FACTORS RELATED TO THE ACCIDENT WERE THE DAMAGED WIRES IN THE BUNDLE, AND

THE IMPROPER MAIN CARGO DOOR INSTALLATION.

--- Detail ---

Acft_Nbr_Seat_Qty: 0

Opn_Biz_Code: Code Not Found

Opn_Biz_Otr_Desc:

Fltndct_Code: 14 CFR 121

Fltndct_Otr_Desc:

Opn_Sked_Code: NON-SCHEDULED

Opn_Dom_Intnl_Code: DOMESTIC

Opn_Psgr_Cargo_Code: CARGO

Regist_Nbr: 794AL

Owner_Cert_Held_Flag: Code Not Found

Oprtr_Cert_Acr_Type_Code: SUPPLEMENTAL

Oprtr_Cert_Otr_Acft_Flag: Code Not Found

Oprtr_Cert_Rotor_Ag_Code: Code Not Found

Acft_Fire_Code: NONE

Injuries

Fatal Serious Minor None

Crew 0 0 0 3

Pass 0 0 0 0

Other 0 0 0 0

Invlvd 0 0 0 3

Lndgr_Type_Fix_Code: TRICYCLE-RETRACTABLE

Acft_Crtfyd_Max_Wt_Lb_Qty: 355000

Eng_Manf_Name: PRATT & WHITN

Eng_Model_Name: JT3D-7

Acft_Nbr_Eng_Qty: 4

Eng_Typ_Code: TURBO FAN

Eng_Rated_Pwr_Hpwr_Qty: 0

Eng_Rated_Pwr_Thrust_Lb_Qty: 19000

Elt_Instld_Flag: Code Not Found

Elt_Oprtd_Flag: Code Not Found

Stall_Warn_Instl_Flag: Yes

--- Environment/Operations Information ---

Wx_Brfg_Srce_Code: COMPANY

Wx_Brfg_Mthd_Code:

Wx_Brfg_Cmplt_Code: WEATHER NOT PERTINENT

Wx_Flt_Cond_Code: VISUAL METEOROLOGICAL CONDITIONS (VMC)

Wx_Wind_From_Vrbl_Flag: Code Not Found

Wx_Wind_Degm_Qty: 0

Wx_Wind_Type_Code: Code Not Found

Wx_Wind_Spd_Kt_Qty: 0

Wx_Vis_Sm_Qty: 0

Wx_Vis_Rvr_Ft_Qty: 0

Wx_Vis_Rvv_Sm_Qty: 0

Wx_Cloud_Code: Code Not Found

Wx_Cloud_Hgt_Agl_Ft_Qty: 0

Wx_Cig_Code: Code Not Found

Wx_Cig_Hgt_Agl_Ft_Qty: 0

Wx_Vis_Rstr_Fix_Code:

Wx_Precip_Type_Fix_Code: NONE

Wx_Cond_Lgt_Code: NIGHT (DARK)

Dep_Point_Flag: Yes

Dep_Point_Arpt_Id_Code:

Dep_Point_City_Name:

Dep_Point_State_Code:

Destn_Same_Lcl_Code: Code Not Found

Destn_Arpt_Id_Code: LAX

Destn_City_Name: LOS ANGELES

Destn_State_Code: CA

Fltplan_Filed_Code: INSTRUMENT FLIGHT RULES (IFR)

Clnc_Atc_Type_Code: IFR

Apch_Vfr_Fix_Code: PRECAUTIONARY LANDING

Loc_Event_Code: OFF AIRPORT/AIRSTRIP

Rwy_Used_Id_Sffx_Code:

Rwy_Used_Id_Code: 0

Rwy_Len_Ft_Qty: 0

Rwy_Wid_Ft_Qty: 0

Rwy_Sfc_Type_Fix_Code: Code Not Found

Rwy_Status_Type_Fix_Code:

--- Personnel Information ---

Plt_Cert_Type_Code: COMMERCIAL, AIRLINE TRANSPORT

Pltrng_Plane_Code: SINGLE ENGINE LAND, MULTIENGINE LAND

Pltrng_Non_Plane_Code: NONE

Pltrtng_Inst_Code: AIRPLANE

Plt_Bfr_Flag: Yes

Plt_Last_Bfr_Mo_Qty:

Plt_Bfr_Acft_Make_Name: DOUGLAS

Plt_Bfr_Acft_Model_Name: DC-8

Plt_Med_Cert_Code: CLASS 1

Plt_Med_Cert_Vldty_Code: VALID MEDICAL-NO WAIVERS/LIMITATIONS

Flight Time (Hours)

Total : 8000 Last 24 Hrs : 0

Make/Model: 6300 Last 30 Days: 0

Instrument: 0 Last 90 Days: 0

Multi-Eng : 0 Rotorcraft : 0

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-72-78

Last Updated: 09-21-94

[O] A fatal aircraft accident, which the ntsb is currently investigating, and a recent aircraft incident have indicated to the board that a safety

problem exists on twin-engined general aviation aircraft which have baggage compartments located in the nose section.

Recommendations:

A-72-78. Provide for double failure protection by means of a secondary locking device or cargo restraint system on those cargo doors where

inadvertent opening in flight would seriously jeopardize the safety of flight of the aircraft or the safety of its occupants on all so affected aircraft.

Responses:

FAA LTR DTD: 07/13/72

With respect to the beechcraft 99 inadvertent door opening incident, proposed rulemaking action is being considered to require a thirdcargo

door latch device which is in addition to the two existing latches now in use. The new double failure protection device is provided in accordance

with beech service instruction 051-113 sent to all owners and operators on 20 june 1972. With the proposed modification to the beech 99, and

with proper maintenance, the cargo compartments of both the beech 65 and the beech 99 should adequately restrain cargo and fulfill the

requirements of the regulation. Therefore, we do not concur that rulemaking under part 135 be recommended.

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-89-94

Last Updated: 11-06-96

[O] On February 24, 1989, United Airlines, Inc., (UAL), Flight 811, a Boeing 747-122, N4713U, with 3 flight crewmembers, 15 cabin crewmembers,

and 337 passengers on board, experienced an explosive decompression as a result of the in-flight loss of the right forward lower lobe cargo

compartment door and a part of the right cabin fuselage.

Recommendations:

A-89-94. Require that fail-safe design considerations for non-plug cargo doors on present and future transport category airplanes account for conceivable human errors in addition to electrical and mechanical malfunctions.

Responses:

FAA LTR DTD: 11/3/89

The FAA will determine its course of action to address this safety recommendation as soon as its review in response to Safety

Recommendation A-89-93 is completed.

As stated in our response to Safety Recommendation A-89-93, 14 CFR 25.783 and AC 25.783-1 consider human factors in the routine operation

of closing and locking doors to ensure that the latch and lock systems are fail-safe. To emphasize the importance of human factors, the FAA

has developed a training program for FAA certification personnel to enhance their knowledge of human factors in aircraft design. This

training program will be offered to approximately 100 certification personnel during the next year. I believe that this training program will

result in more effective review of designs for human factor considerations as required by present regulations.

I will keep the Board apprised of the FAA's progress on this safety recommendation.

NTSB LTR DTD: 4/16/90

The FAA responded to Safety Recommendations A-89-93 and -94 describing action to review all outward opening (nonplug) doors and all

jet-powered transport category airplanes to determine what, if any, modifications are needed to ensure that these doors will not open in flight.

The FAA pointed out that the door latch indicating system is to be only part of the review and that door designs will be evaluated against

criteria specified in 14 CFR 25.783 as amended by Amendment 25-54, and the policy material published in Advisory Circular 25.783.1, adopted

in 1980 and will take into account human factors involved in the routine operation of closing and locking doors to ensure that the latch and lock

systems are fail-safe. Further, to emphasize the importance of human factors, the FAA has developed a training program for FAA certification

personnel to enhance their knowledge of human factors in aircraft design. This training program will be offered to approximately 100

certification personnel during the next year. Based on this response, Safety Recommendations A-89-93 and -94 have been classified as

"Open--Acceptable Action." The Safety Board believes it necessary to point out that this hazard exists for any pressurized aircraft using

non-plug doors and that the FAA should not be limiting this review to only those transports which are jet-powered.

FAA LTR DTD: 6/29/93

The FAA is considering the issuance of an NPRM to address this safety recommendation. The FAA has asked the Aviation Rulemaking

Advisory Committee to participate in the drafting of this document.

I will provide the Board with a copy of any document that may be issued.

FAA LTR DTD: 9/5/96

The Federal Aviation Administration (FAA) asked the aircraft industry to form an industry task group to review cargo door designs on the

fleet of transport airplanes and to provide the FAA with recommendations regarding any deficiencies found as a result of the review.

Subsequently, the FAA issued airworthiness directives (AD's) in accordance with the recommendations received from the task group to

prevent nonplug cargo doors from opening in flight. Copies of the AD's were provided to the Board in response to Safety Recommendation

A-89-93. The FAA is satisfied that the task group reviewed these designs in an effective and comprehensive manner and that the resultant

AD's ensure that human factors considerations in both 14 CFR 25.783 (as amended by Amendment 25-72) and Advisory Circular 25.783-1 are

adequate for the current fleet of transport category airplanes.

The FAA also developed a training course for aircraft certification engineers to address the fail-safe design requirements and the human

factors aspects of proper door locking and latching mechanisms. All certification engineers assigned to work on door issues have received the

training.

I believe that the FAA has taken appropriate action to address this safety recommendation, and I consider the FAA's action to be completed.

NTSB LTR DTD: 10/29/96

The Safety Board notes that the FAA urged the aircraft industry to form a task group to review cargo door designs and to provide the FAA

with recommendations regarding any deficiencies noted during the review. Subsequently, the FAA issued airworthiness directives in response

to the recommendations developed by the task group to prevent non-plug cargo doors from opening in flight. The FAA also developed a

training course for all aircraft certification engineers to address the fail-safe design requirements and the human factors aspects of proper

door locking and latching mechanisms. All certification engineers assigned to work on door issues have received the training.

In view of the actions taken by the FAA, the Safety Board classifies Safety Recommendation A-89-94 "Closed Acceptable Action."

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-92-21

Last Updated: 09-21-94

[O] On February 24, 1989, United Airlines flight 811, a Boeing 747-122 (B-747), N4713U, was operating as a regularly scheduled flight from Los

Angeles, California, to Sydney, Australia, with intermediate stops in Honolulu, Hawaii, and Auckland, New Zealand. There were 3 flight

crewmembers, 15 flight attendants, and 337 passengers aboard the airplane.

The flightcrew's first indication of a problem was while the airplane was climbing between 22,000 and 23,000 feet at an indicated airspeed of 300

knots. They heard a sound, described as a "thump," which shook the airplane. This sound was followed immediately by a "tremendous

explosion." The airplane had experienced an explosive decompression. Power was lost from the Nos. 3 and 4 engines because of damage from

foreign object ingestion.

The airplane made a successful emergency landing in Honolulu, and the occupants evacuated the airplane. An examination of the evidence

at the time revealed that the forward lower lobe cargo door had separated in flight, causing extensive damage to the fuselage and cabin

structure adjacent to the door. As a result, nine of the passengers were ejected from the airplane and lost at sea.

Recommendations:

A-92-21. Require that the electrical actuating systems for nonplug cargo doors on transport-category aircraft provide for the removal of all

electrical power from circuits on the door after closure (except for any indicating circuit power necessary to provide positive indication that the

door is properly latched and locked) to eliminate the possibility of uncommanded actuator movements caused by wiring short circuits.

Responses:

FAA LTR DTD: 6/22/92

The FAA has initiated a review of all outward opening nonplug cargo doors on transport-category airplanes. One aspect of this review is to

verify that all electrical power to the doors (except for any indicating circuit power necessary to provide positive indication that the door is

properly latched and locked) is removed in flight. The FAA has completed its review of the Boeing Models 747, 757, 767, 737, and 727 and

concluded that the power is removed from the doors in flight. Consequently, the FAA does not plan to initiate mandatory action on these

models.

I will keep the Board apprised of the FAA's progress on its review of other transport category airplanes.

NTSB LTR DTD: 8/31/92

Safety Recommendation A-92-21 states that the FAA should require that the electrical actuating systems for nonplug cargo doors on

transport category aircraft provide for the removal of all electrical power from circuits on the door after closure (except for any indicating

circuit power necessary to provide positive indication that the door is properly latched and locked) to eliminate the possibility of

uncommanded actuator movements caused by wiring short circuits. The Safety Board notes that the FAA has completed its review of one

aspect of this recommendation and has concluded that electrical power is removed from the circuit on the doors in flight on Boeing Models

747, 757 767, 737, and 727. However, the intent of this safety recommendation is to insure that no electrical power is available to actuating

systems for nonplug cargo doors on transport-category aircraft after closure of the doors.

The Safety Board stated in the accident report involving United Airlines flight 811 that 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. The Safety Board believes that by requiring that all electrical power be removed from door actuating circuits after

closure, the possibility of uncommanded actuator movements caused by wiring short circuits that might occur between the time that the door

is closed and the time that the airplane takes off is eliminated. Pending further information, the Safety Board classifies Safety

Recommendation A-92-21 as "Open--Await Response."

FAA LTR DTD: 4/20/93

The FAA has completed its review of this safety recommendation and agrees with the intent. The FAA has evaluated the door designs of all

large transport category airplanes for isolation of power to the doors during flight. All of the nonplug doors on these category airplanes have

been modified as necessary to achieve this objective. Nonplug doors already have a separate power switch at the door operator's station that

removes power from the door. Some switches operate directly while others, such as the power switches on the Boeing Models 737, 747, and 767,

are operated by the lock handle. The Boeing Models 727 and 757 have separate disarm switches. On the lighter transport category airplanes,

the outward opening doors without powered latches and locks do not have the potential safety problems associated with inadvertent operation

due to electrical shorts.

Additional automatic protection against electrical shorts is provided on the Boeing Model 747 airplanes. The ground handling bus is the sole

source of electrical power for all of the airplanes' nonplug doors. During departure from the gate once ground power has been disconnected

from the airplane and an engine generator has been placed on line, power is removed from the ground handling bus. Additional protection

against an inadvertent power source is provided by the operation of a relay which opens when the main landing gear leaves the ground and

the air-ground squat switch opens.

The current policy as stated in Advisory Circular 25.783-1 requires an additional warning for doors that could create a hazard in the event they

open during takeoff. These doors require a red light to announce an unsafe door condition and some configurations may require an aural

warning during the initial takeoff run.

The FAA's review of the nonplug door configurations currently installed on the large transport category airplanes showed that electrical power

is removed from all of these doors before the airplane leaves the gate. On some of these airplanes, all of the electrical power to the door

operating controls is removed as soon as an engine is started and its associated generator placed on-line. In addition, the warning systems on

the doors of these airplanes meet the policies contained in Advisory Circular 25.783-1. Any inadvertent change of the positioning of the door

lock mechanisms would be annunciated to the flightcrew. Based on these data, the FAA believes that the present door configuration provides

adequate protection against the possibility of an inadvertent power application caused by an electrical short.

I consider the FAA's action to be completed on this safety recommendation.

NTSB LTR DTD: 8/10/93

The Safety Board notes that during the past year the FAA has worked with and encouraged the airline industry in the development of new

methods for removal of electrical power from nonplug cargo door actuating systems on transport-category aircraft. Furthermore, the FAA has

reviewed the nonplug cargo door configurations currently installed on large transport-category airplanes and found that electrical power is

removed from all of these doors before the airplane leaves the gate.

Additionally, on some of these airplanes, all electrical power to the door operating controls is removed as soon as an engine is started and its

associated generator is placed on-line. Any inadvertent change in the position of the door lock mechanisms that occurred before the removal

of electrical power would be annunciated to the flightcrew. The review verified that the warning systems on the doors of these airplanes meet

the policies contained in Advisory Circular 25.783-1.

The Safety Board accepts the FAA position that removal of electrical power from door circuits before taxi in conjunction with redundant and

reliable lock position warning systems as described in the AC meet the intent of Safety Recommendation A-92-21. Thus, Safety

Recommendation A-92-21 is classified "Closed--Acceptable Alternate Action."

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-89-92

Last Updated: 09-21-94

[O] On February 24, 1989, United Airlines, Inc., (UAL), Flight 811, a Boeing 747-122, N4713U, with 3 flight crewmembers, 15 cabin crewmembers,

and 337 passengers on board, experienced an explosive decompression as a result of the in-flight loss of the right forward lower lobe cargo

compartment door and a part of the right cabin fuselage.

Recommendations:

A-89-92. Issue an Airworthiness Directive (AD) to require that the manual drive units and electrical actuators for Boeing 747 cargo doors have

torque-limiting devices to ensure that the lock sectors, modified per AD-88-12-04, cannot be overridden during mechanical or electrical

operation of the latch cams.

Responses:

FAA LTR DTD: 11/3/89

The FAA evaluated this safety recommendation and has determined that Boeing 747 cargo doors with lock sectors, modified in compliance

with Airworthiness Directive (AD) 88-12-04, cannot be overridden during mechanical or electrical operation of the latch cams because the

latch cam actuators incorporate at least one torque-limiting device. Based on this information, the FAA does not plan to issue an AD as

requested by this safety recommendation.

NTSB LTR DTD: 4/16/90

The FAA responded to Safety Recommendations A-89-92 through -94 on November 3, 1989. During its evaluation of Safety Recommendation

A-89-92, the FAA determined that Boeing 747 cargo doors with lock sectors, modified in compliance with Airworthiness Directive (AD)

88-12-04, cannot be overridden during mechanical or electrical operation of the latch cams because the latch cam actuators incorporate at

least one torque-limiting device. The Safety Board has reviewed AD 88-12-04 and has confirmed the FAA's findings. Based on this, Safety

Recommendation A-89-92 has been classified as "Closed--Reconsidered."

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-89-93

Last Updated: 09-21-94

[O] On February 24, 1989, United Airlines, Inc., (UAL), Flight 811, a Boeing 747-122, N4713U, with 3 flight crewmembers, 15 cabin crewmembers,

and 337 passengers on board, experienced an explosive decompression as a result of the in-flight loss of the right forward lower lobe cargo

compartment door and a part of the right cabin fuselage.

Recommendations:

A-89-93. Issue an Airworthiness Directive for non-plug cargo doors on all transport category airplanes requiring the installation of positive

indicators to ground personnel and flightcrews confirming the actual position of both the latch cams and locks, independently.

Responses:

FAA LTR DTD: 11/3/89

The FAA is reviewing all outward opening (nonplug) doors on all jet-powered transport category airplanes to determine what, if any,

modifications are needed to ensure that these doors will not open in flight. The door latch indicating system is only part of this review. Door

designs are being evaluated against criteria specified in 14 CFR 25.783 as amended by Amendment 25-54, and the policy material published in

Advisory Circular (AC) 25.783-1, Fuselage Doors, Hatches, and Exits. These standards were adopted in 1980 and account for human factors

involved in the routine operation of closing and locking doors to ensure that the latch and lock systems are fail-safe.

I will keep the Board apprised of the FAA's progress on this safety recommendation.

NTSB LTR DTD: 4/16/90

The FAA responded to Safety Recommendations A-89-93 and -94 describing action to review all outward opening (nonplug) doors and all

jet-powered transport category airplanes to determine what, if any, modifications are needed to ensure that these doors will not open in flight.

The FAA pointed out that the door latch indicating system is to be only part of the review and that door designs will be evaluated against

criteria specified in 14 CFR 25.783 as amended by Amendment 25-54, and the policy material published in Advisory Circular 25.783.1, adopted

in 1980 and will take into account human factors involved in the routine operation of closing and locking doors to ensure that the latch and lock

systems are fail-safe. Further, to emphasize the importance of human factors, the FAA has developed a training program for FAA certification

personnel to enhance their knowledge of human factors in aircraft design. This training program will be offered to approximately 100

certification personnel during the next year. Based on this response, Safety Recommendations

A-89-93 and -94 have been classified as

"Open--Acceptable Action." The Safety Board believes it necessary to point out that this hazard exists for any pressurized aircraft using

non-plug doors and that the FAA should not be limiting this review to only those transports which are jet-powered.

FAA LTR DTD: 6/29/93

The FAA has issued five final rules and one notice of proposed rulemaking (NPRM) which address this safety recommendation. On

November 28, 1989, the FAA issued a final rule applicable to certain McDonnell Douglas DC-9 series airplanes, and on February 27, 1990, the

FAA issued a final rule applicable to certain DC-8 series airplanes. These two rules require installation of a main cargo door hydraulic

isolation valve; installation of an additional (and modification of an existing) door-open indicating system; installation of a main cargo door

lock pin viewing window; installation of a main cargo door vent system; installation of a "vent door-open" indicating system; installation of a

main cargo door hinge pin retainer; and modification to the main cargo door latch operating mechanism.

Effective May 29, 1990, the FAA issued Airworthiness Directive 90-09-06 applicable to certain B-747 series airplanes to prevent the inadvertent

opening of lower lobe forward and aft cargo doors and main side cargo doors. The terminating action includes inspections, repairs, tests,

and placard installations.

On August 14, 1990, the FAA issued a final rule applicable to certain DC-10 series airplanes to require the installation of a main deck cargo

door "vent door-open" indicating system and installation of cargo door hinge pin retainers. On September 25, 1992, the FAA issued a final

rule applicable to certain B-737 series airplanes to require modification of the main deck cargo door lock, viewing windows, and warning indication system.

I have enclosed copies of these final rules for the Board's information.

On March 10, 1993, the FAA issued an NPRM applicable to certain Lockheed Model L-1011 series airplanes. This NPRM proposes to require

inspection of the cargo door components for cracks and corrosion and require modification, rework, or replacement of discrepant parts.

I have also enclosed a copy of the NPRM for the Board's information. I will provide the Board with a copy of the final document as soon as it is

issued.

FAA LTR DTD: 7/20/94

In response to this safety recommendation, the Federal Aviation Administration (FAA) reviewed all outward opening (nonplug) doors on all

jet-powered transport category airplanes for both design deficiencies and for service-related safety problems. The nonplug door review

included an examination of the door latch indicating system, as well as all other design criteria specified in 14 CFR 25.783 and the policy

material published in Advisory Circular 25.783-1, Fuselage, Doors, Hatches, and Exits. As a result of this review, the FAA issued five final rules

that addressed different aspects of nonplug doors on transport category aircraft. The final rules, which were provided to the Board on June 29,

1993, addressed McDonnell Douglas DC-9, DC-10, and certain DC-8 series airplanes, and Boeing 747 and 737 series airplanes. On December

6, 1993, the FAA issued Airworthiness Directive (AD) 93-24-12 applicable to the L-1011-385 series airplane. The issuance of AD 93-24-12

completes the FAA's action to prevent nonplug cargo doors from opening in flight. I have enclosed a copy of AD 93-24-12 for the Board's information.

The FAA's review of this issue included only jet-powered transport category airplanes. The service history of nonjet-powered transport category airplanes does not indicate safety issues that needed to be addressed through the door review effort.

The actions taken by the FAA address the full intent of this safety recommendation. Consequently, I consider the FAA's action to be completed, and I plan no further action on this issue.

NTSB LTR DTD: 8/30/94

The Safety Board notes that the FAA has completed a review of all non-plug doors on jet-powered transport-category airplanes. The review resulted in the issuance of five rules that addressed changes to the McDonnell Douglas DC-9, DC-10, and DC-8; Boeing 737 and 747; and Lockheed L-1011-385 series airplanes.

The Safety Board agrees that these actions address the intent of Safety Recommendation A-89-93 and classifies this recommendation "Closed Acceptable Action."

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-91-84

Last Updated: 03-13-95

[O] On June 13, 1991, United Airlines (UAL) maintenance personnel were unable to electrically open the aft cargo door on a Boeing 747-222B,

N152UA, at John F. Kennedy Airport (JFK), Jamaica, New York. The airplane was one of two used exclusively on nonstop flights between Narita, Japan, and JFK. This particular airplane had accumulated 19,053 hours and 1,547 cycles at the time of the occurrence.

Recommendations:

A-91-84. Evaluate the design, installation, and operation of the forward cargo door flexible conduits on Boeing 747 airplanes so equipped and

issue, if warranted, an Airworthiness Directive for inspection and repair of the flexible conduit and underlying wiring bundle, similar to the

provisions recommended in A-91-83.

Responses:

FAA LTR DTD: 11/01/91

The FAA agrees with the intent of these safety recommendations and is considering the issuance of a notice of proposed rulemaking to

address these issues. I will provide the Board with a copy of any document that may be issued.

NTSB LTR DTD: 11/27/91

These recommendations were issued as a result of the Board's investigation of an incident in which the rear cargo door on a Boeing 747-222B

initially would not open electrically and then opened electrically without activation of the door open switches. Your letter indicates that the

Federal Aviation Administration agrees with the intent of these recommendations and is considering the issuance of a notice of proposed

rulemaking to address these issues. The Board urges the FAA to move expeditiously on the recommendations. Pending receipt of additional

information concerning the action to be taken by the Federal Aviation Administration, the Safety Board is classifying Safety

Recommendations A-91-83 and -84 as "Open--Acceptable Action."

FAA LTR DTD: 4/5/93

The Federal Aviation Administration (FAA) agrees with the intent of these recommendations. On February 18, 1992, the FAA issued a notice of

proposed rulemaking (NPRM) applicable to certain Boeing Model 747 series airplanes. This NPRM proposed to require inspection of the

flexible conduit, wiring, and support brackets between the fuselage and the forward and aft cargo doors. Since the issuance of this NPRM, the

FAA has further reviewed the circumstances surrounding this door opening incident and has confirmed that an inadvertent in-flight opening

of the cargo door cannot be caused solely by wire chafing. The FAA has determined that in addition to chafing at least four independent

failures must also occur in order to drive the door latches to the open position. In light of these findings, the FAA determined that the

requirements proposed by the NPRM were unnecessary. On December 21, 1992, the FAA withdrew the NPRM. I have enclosed a copy of the

notice of withdrawal for the Board's information.

Airworthiness Directive (AD) 90-09-06 (Docket No. 89-NM-148-AD) mandates the installation of a door warning switch located on the lock

sector, as well as a reinforcement of the lock sector to ensure that the latches remain locked against backdriving of the latches by the latch

power drive unit. Failure of lock sectors that are reinforced in accordance with AD 90-09-06 has been shown to be unlikely and, even in the

event of such a failure, an indication by means of the door warning switch will warn the flightcrew of the problem. The modifications, tests, and

inspections required in AD 90-09-06 provide an acceptable level of safety to preclude inadvertent actuation of the cargo door power drive unit

and possible injury to maintenance or cargo handling personnel. I have enclosed a copy of the AD for the Board's information. The FAA

believes that the current requirements of AD 90-09-06 address the full intent of these safety recommendations to preclude an uncommanded

opening of the forward and aft cargo doors.

I consider the FAA's action to be completed, and I plan no further action on Safety Recommendations A-91-83 and -84.

NTSB LTR DTD: 11/8/93

The National Transportation Safety Board has reviewed the Federal Aviation Administration (FAA) response of April 5, 1993, to Safety

Recommendations A-91-83 and -84. These recommendations asked that the FAA issue an airworthiness directive applicable to all Boeing 747

airplanes with a flexible conduit protecting the wiring bundle between-the-fuselage and aft cargo door to require an expedited inspection of:

(1) the wiring bundle in the area normally covered by the conduit for the presence of damaged insulation (using either an electrical test

method or visual examination); (2) the conduit support bracket and attached standoff pin-on the upper arm of the forward lift actuator

mechanism; (3) the flexible conduit for the presence of cracking in the convoluted innercore.

The Board further recommended that wires with damaged insulation be repaired before further service. Damage to the flexible conduit,

conduit support bracket, and standoff pin should result in an immediate replacement of the conduit as well as. the damaged parts. The

inspection should be repeated at an appropriate cyclic interval.

The Safety Board then asked, in Safety Recommendation A-91-84, that the FAA evaluate the design, installation, and operation of the forward

cargo door flexible conduits on Boeing 747 airplanes so equipped and issue, if warranted, an airworthiness directive for inspection and repair

of the flexible conduit and underlying wiring bundle, similar to the provisions recommended in Safety Recommendation A-91-83.

The FAA's April 5, 1993, response listed a number of findings of an FAA review of the circumstances surrounding the subject door opening.

Among the findings, the FAA confirmed that an inadvertent inflight opening of the cargo door cannot be caused solely by wire chafing.

Further, the FAA determined that at least four independent failures must occur to drive the door latches to the open position. The FAA also

stated that failure of lock sectors that are reinforced in accordance with AD 90-09-06 has been shown to be unlikely and, even in the event of

such a failure, the door warning switch would warn the flightcrew, of the problem.

Based on these findings, the FAA has decided that the requirements of AD 90-09-06 address the full intent of these recommendations-to

preclude an uncommanded opening of the forward and aft cargo doors.

FAA staff has also expressed concern that the recommended inspections could result in damage to the wire bundle insulation during the

intrusive inspection. Therefore, based on the level of redundancy that now exists to prevent inadvertent door opening in flight, the Safety

Board has classified Safety Recommendations A-91-83 and -84 as "Closed-Reconsidered. The Board will closely monitor incidents related to

the uncommanded opening of cargo doors on 747 airplanes to further document this position.

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-91-83

Last Updated: 03-13-95

[O] On June 13, 1991, United Airlines (UAL) maintenance personnel were unable to electrically open the aft cargo door on a Boeing 747-222B,

N152UA, at John F. Kennedy Airport (JFK), Jamaica, New York. The airplane was one of two used exclusively on nonstop flights between

Narita, Japan, and JFK. This particular airplane had accumulated 19,053 hours and 1,547 cycles at the time of the occurrence.

Recommendations:

A-91-83. Issue an Airworthiness Directive applicable to all Boeing 747 airplanes with a flexible conduit protecting the wiring bundle between

the fuselage and aft cargo door to require an expedited inspection of:

(1) the wiring bundle in the area normally covered by the conduit for the presence of damaged insulation (using either an electrical test

method or visual examination);

(2) the conduit support bracket and attached standoff pin on

the upper arm of the forward lift actuator mechanism;

(3) the flexible conduit for the presence of cracking in the

convoluted innercore.

Wires with damaged insulation should be repaired before further service. Damage to the flexible conduit, conduit support bracket and

standoff pin should result in an immediate replacement of the conduit as well as the damaged parts. The inspection should be repeated at an

appropriate cyclic interval.

Responses:

FAA LTR DTD: 11/1/91

The FAA agrees with the intent of these safety recommendations and is considering the issuance of a notice of proposed rulemaking to

address these issues. I will provide the Board with a copy of any document that may be issued.

NTB LTR DTD: 11/27/91

These recommendations were issued as a result of the Board's investigation of an incident in which the rear cargo door on a Boeing 747-222B

initially would not open electrically and then opened electrically without activation of the door open switches. Your letter indicates that the

Federal Aviation Administration agrees with the intent of these recommendations and is considering the issuance of a notice of proposed

rulemaking to address these issues. The Board urges the FAA to move expeditiously on the recommendations. Pending receipt of additional

information concerning the action to be taken by the Federal Aviation Administration, the Safety Board is classifying Safety

Recommendations A-91-83 and -84 as "Open--Acceptable Action."

FAA LTR DTD: 4/5/93

The Federal Aviation Administration (FAA) agrees with the intent of these recommendations. On February 18, 1992, the FAA issued a notice of

proposed rulemaking (NPRM) applicable to certain Boeing Model 747 series airplanes. This NPRM proposed to require inspection of the

flexible conduit, wiring, and support brackets between the fuselage and the forward and aft cargo doors. Since the issuance of this NPRM, the

FAA has further reviewed the circumstances surrounding this door opening incident and has confirmed that an inadvertent in-flight opening

of the cargo door cannot be caused solely by wire chafing. The FAA has determined that in addition to chafing at least four independent

failures must also occur in order to drive the door latches to the open position. In light of these findings, the FAA determined that the

requirements proposed by the NPRM were unnecessary. On December 21, 1992, the FAA withdrew the NPRM. I have enclosed a copy of the

notice of withdrawal for the Board's information.

Airworthiness Directive (AD) 90-09-06 (Docket No. 89-NM-148-AD) mandates the installation of a door warning switch located on the lock

sector, as well as a reinforcement of the lock sector to ensure that the latches remain locked against backdriving of the latches by the latch

power drive unit. Failure of lock sectors that are reinforced in accordance with AD 90-09-06 has been shown to be unlikely and, even in the

event of such a failure, an indication by means of the door warning switch will warn the flightcrew of the problem. The modifications, tests, and

inspections required in AD 90-09-06 provide an acceptable level of safety to preclude inadvertent actuation of the cargo door power drive unit

and possible injury to maintenance or cargo handling personnel. I have enclosed a copy of the AD for the Board's information. The FAA

believes that the current requirements of AD 90-09-06 address the full intent of these safety recommendations to preclude an uncommanded

opening of the forward and aft cargo doors.

I consider the FAA's action to be completed, and I plan no further action on Safety Recommendations A-91-83 and -84.

NTSB LTR DTD: 11/8/93

The National Transportation Safety Board has reviewed the Federal Aviation Administration (FAA) response of April 5, 1993, to Safety

Recommendations A-91-83 and -84. These recommendations asked that the FAA issue an airworthiness directive applicable to all Boeing 747

airplanes with a flexible conduit protecting the wiring bundle between-the-fuselage and aft cargo door to require an expedited inspection of:

- (1) the wiring bundle in the area normally covered by the conduit for the presence of damaged insulation (using either an electrical test method or visual examination); (2) the conduit support bracket and attached standoff pin-on the upper arm of the forward lift actuator mechanism; (3) the flexible conduit for the presence of cracking in the convoluted innercore.

The Board further recommended that wires with damaged insulation be repaired before further service. Damage to the flexible conduit,

conduit support bracket, and standoff pin should result in an immediate replacement of the conduit as well as. the damaged parts. The

inspection should be repeated at an appropriate cyclic interval.

The Safety Board then asked, in Safety Recommendation A-91-84, that the FAA evaluate the design, installation, and operation of the forward

cargo door flexible conduits on Boeing 747 airplanes so equipped and issue, if warranted, an airworthiness directive for inspection and repair

of the flexible conduit and underlying wiring bundle, similar to the provisions recommended in Safety Recommendation A-91-83.

The FAA's April 5, 1993, response listed a number of findings of an FAA review of the

circumstances surrounding the subject door opening.

Among the findings, the FAA confirmed that an inadvertent inflight opening of the cargo door cannot be caused solely by wire chafing.

Further, the FAA determined that at least four independent failures must occur to drive the door latches to the open position. The FAA also

stated that failure of lock sectors that are reinforced in accordance with AD 90-09-06 has been shown to be unlikely and, even in the event of

such a failure, the door warning switch would warn the flightcrew, of the problem.

Based on these findings, the FAA has decided that the requirements of AD 90-09-06 address the full intent of these recommendations-to

preclude an uncommanded opening of the forward and aft cargo doors.

FAA staff has also expressed concern that the recommended inspections could result in damage to the wire bundle insulation during the

intrusive inspection. Therefore, based on the level of redundancy that now exists to prevent inadvertent door opening in flight, the Safety

Board has classified Safety Recommendations A-91-83 and -84 as "Closed-Reconsidered. The Board will closely monitor incidents related to

the uncommanded opening of cargo doors on 747 airplanes to further document this position.

NTSB Safety Recommendation Brief

Data_Source: U.S. NTSB Safety Recommendations

Rprt_Nbr: A-70-53

Last Updated: 09-21-94

[O] Our staff member who participated in the irish/british investigation of the aer lingus b-707-

349c depressurization incident that occurred en

route shannon to london on september 24, 1970, has briefed your flight standards personnel on details of the involved fuselage skin fractures,

and has supplied your personnel with photographs of the fracture area. As you know, a 3- by 4-foot section of the fuselage sidewall blew out

while the aircraft was flying at 25,000 feet, at a cabin pressure differential of 8.2p.S.I., causing a rapid depressurization of the cabin and

deployment of the passenger oxygen masks. The crew initiated an emergency descent and landed the aircraft at london without further

incident. The royal aeronautical establishment metallurgical laboratory at farnborough has confined the presence of fatigue in the fracture of

the outer main cargo doorskin in the area between fuselage station 540 and 560. Multiple fatigue nuclei were found at numerous rivet holes

near the center of the approximate 22-inch primary fracture line. Heavy nicotine staining on the skin and adjacent frames indicated that cabin

air had been exiting through the skin crack for some time. The area had last been inspected 368 hours before the depressurization incident.

The total aircraft time was 20,820 hours.

Recommendations:

A-70-53. 1) that the faa issue an Airworthiness Directive requiring the inspection of all b-707 and b-727 cargo doors for evidence of fatigue

cracking at 150-hour intervals. 2) that faa reevaluate the design safety features of the single, actuator-type door, and assess the need for and

feasibility of incorporation of a dual actuator system to reduce door flexing loads.

[variousdooraccidents.html](#) Accounts of various cargo door accidents/incidents.

[forwardcargodoorpict.html](#) Contents to links on door on site

[Schematic1](#) Door Drawing

[Schematic2 Door Drawing](#)

[Schematic3 Door Drawing](#)

[Boeing 747 nose pics right side cargo door](#)

[cargodoorfaraway.html](#) Pictures near, close and faraway

[811doordraw](#) 747 argo cdoor drawing from 811 report

[811picture](#) UAL 811 cargo door hole picture

[More pictures of UAL 811 cargo door hole](#)

Comment Doors open all the time with varying degrees of consequence.

[Boeing747historycontents.html](#)

[DC-10crashcontents.html](#)

[103reportcontents.html](#)

[811reportcontentpage.html](#)

[AirIndiareportcontents.html](#)

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