# List of <u>some</u> smoke-related accidents and serious incidents 1970-2008

One of the Federal Aviation Administration's (FAA) important "minimum" safety requirements states that the failure of any system or component shall not have catastrophic consequences more than once in one billion flight hours.

According to recent Boeing data (covering all prominent transport aircraft manufacturers in the western world), virtually the entire transport fleet of the western world has not flown one billion flight hours in the last half century. **Consequently, there should not have been a single accident due to the failure of equipment to enable pilots to see when there is accumulation of hazardous quantities of smoke in the cockpit.**

Nevertheless, scores of accidents over the last 50 years have resulted, in which unstoppable blinding smoke in the cockpit was a cause or a factor. Numerous serious incidents also attest to the unsafe conditions. Not being able to see to fly or land an aircraft is below basic minimum FAA safety standards and has catastrophic consequences.

21 FEB 70 An American-made 4-engine jet transport crashed, 47 dead. Last transmissions from aircraft: **"...emergency we have...smoke on board I can't see anything...is crashing...good bye everybody ... good bye everybody ...reducing power we cannot see anything can you give me a low altitude?"**

11 JUL 73 An American-made 4-engine jet transport crash landed, 122 dead. ALPA reported, **"...smoke in the cockpit made the situation so intolerable that the captain decided to make a forced landing. He had to open the sliding cockpit window to maintain ground reference."**

03 NOV 73 An American-made 4-engine jet transport crashed, crew died (no passengers, only cargo). Reports reveal: **"The smoke venting system didn't work well enough to clear the cockpit in time. The plane landed 262 feet short of the runway."**

06 OCT 76 An American-made 4-engine jet transport crashed, 73 dead. Final accident report: **"Finally it became impossible to see the flight instruments because of smoke." Recommendations from accident report: "The criteria for the certification of large Commercial aircraft should include requirement for a positive means of smoke removal, particularly from the cockpit area."**

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02 JUN 83 An American-made 2-engine jet transport made an emergency landing because of an in flight fire, 23 dead. The chairman of the National Transportation Safety Board testified during US congressional hearings: **"The smoke in the cockpit had by this time become so thick that the captain had difficulty seeing his airspeed indicator during final approach."**

23 SEP 83 An American-made 2-engine jet transport crashed, 111 dead. CAA report: **"CVR** (Cockpit Voice Recorder) **indicates crew unable to see instruments due (to) smoke."**

31 DEC 85 An American-made 2-engine private aircraft crashed, 7 dead. Reports indicate: **"There was smoke - and it filled the cockpit. The plane hit some high wires, then crashed into the ground and exploded."** Tower recording from pilot, just prior to crash: **"We have smoke in the cockpit! We have smoke in the cockpit!"**

02 JUL 86 A foreign-made 2-engine jet transport made a forced landing, 54 dead. CAA report: **"...smoke on flt deck & cabin forced (to) land in forest..."**

28 NOV 87 An American-made 4-engine jet transport crashed, 159 dead. Initial reports: **"Pilot radios of smoke in cockpit, then silence."** Final accident report, Article 4.15, possible cause of accident, **"...disorientation consequent on reduced cockpit visibility in smoke..."**

02 FEB 89 An American-made 2-engine jet transport made an emergency landing. Airline Incident Investigation Report: **"Smoke intensity on flight deck seriously impaired the Pilot's ability to see the flight instruments."**

17 DEC 89 A foreign-made 2-engine jet transport made an emergency landing (this aircraft type was certificated by FAA 6 months earlier, presumably in accordance with AC 25-9). ICAO Accident Summary: **"...in seconds thick smoke severely impaired vision on the flight deck...by this time neither pilot could see each other...a visual landing was carried out with very limited visibility...Damage to aircraft - substantial.**"

11 JUL 91 An American-made 4-engine jet transport crashed, 261 dead. Reports indicate: **"severe smoke conditions on board the aircraft shortly before the burning plane plowed into the ground at 250 m.p.h. and exploded...investigators have been unable to determine yet what caused the pilots to finally lose control..."**

20 DEC 94 An American made 4-engine jet transport crashed **"...the crew called to report smoke in the cockpit. There were no further messages from the crew."** The aircraft was later found in a marshy area 100 miles from the destination airport.

11 MAY 96 An American-made 2-engine jet transport crashed, 110 dead. The crew had <u>major</u> electrical failures when they reported **" Smoke in the cockpit" "smoke in the cabin"** and requested landing at closest available airport. FAA radar data shows the plane dove down and leveled off close to the ground. Eyewitnesses reported the plane flying level a few hundred feet above ground before it crashed at a steep angle into the Everglades. Experts say the CVR indicated the cockpit window was open. NTSB investigators found soot on cockpit and electrical bay wreckage. Subsequently **<u>the NTSB issued recommendation 97-61 for the FAA to take action on the cockpit emergency vision technology.</u>**

20 FEB 98 - An American B-1 bomber crashed. "…crew bailed when smoke filled cockpit" The crew described "…the smoke in the cockpit was so thick they weren't sure all had ejected safely…"

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02 SEP 98 - An American-made 3-engine jet transport crashed, 229 dead. The crew requested an emergency landing because of **"smoke in the cockpit".** The crew donned their oxygen masks. Six minutes after radio contact was lost, the plane crashed in the ocean.

31 Mar 99: DOUGLAS DC-9. NEAR TOP OF CLIMB, CREW HEARD A LOUD POP AND SAW A FLASH OF LIGHT FROM THE EPC CIRCUIT BREAKER PANEL. NO BREAKERS WERE TRIPPED. MINUTES LATER ANOTHER POP AND FLASH CAME FROM THE EPC CIRCUIT BREAKER PANEL. AN ACRID SMELL OF BURNING INSULATION WAS NOTED AT FL 30. MAINTENANCE SUBSEQUENTLY REPAIRED DAMAGED POWER PORT FEEDER CABLE. Part causing difficulty: Chafed wire. (SDR: AALA990461)

18 Apr 99: DOUGLAS DC-873F ON FINAL APPROACH TO MIA , HEARD LOUD POPPING NOISE BEHIND S/O PANEL, F/O REPORTED SMOKE AND S/O SAW FLAMES BEHIND PANEL. USED HALON EXTINGUISHER TO PUT OUT FIRE. ACCOMPLISHED EMERGENCY LANDING. Part causing difficulty: Cockpit panel on fire. (SDR: DHL99807002)

02 Sep 99: BOMBARDIER CL600-2B19 DURING TAXI OUT, THE TOILET SMOKE EICAS MESSAGE ILLUMINATED. THE AIRCRAFT WAS STOPPED AND THE FLGIHT ATTENDANT WAS INSTRUCTED TO INSPECT THE LAVATORY WHILE THE COCKPIT CREW EXECUTED THE APPROPRIATE CHECKLIST. THE CREW WAS INFORMED THAT THERE WAS SMOKE IN THE CABIN AND IT WAS MOVING FORWARD. CAPTAIN OPENED THE COCKPIT DOOR AND VISUALLY SAW THICK SMOKE IN CABIN, EVACUATED THE PASSENGERS, REQUESTED FIRE FIGHTING EQUIPMENT, AND SHUTDOWN THE AIRCRAFT. Part causing difficulty: ACM failed. (SDR: ASOA99088)

15 Sep 99: TEN MILES FROM MEL, SMOKE EVIDENT IN COCKPIT. CRWE REQUESTED PRIORITY TO LAND AND FIRE EQUIPMENT. SMOKE CLEARED FROM AIRCRAFT. UPON SHUTDOWN, FIRE CREW AND STATION AGENTS OBSERVED SMOKE 'BELLOWING' NEAR LEFT ACM. Part causing difficulty: Unknown, smoke in cockpit. (SDR: ASOA990998)

17 Sep 99: Part 121. McDonald Douglas MD-88. On departure climb, the flight attendants smelled something burning. Then a passenger noticed a 'glow' in the right side air vent near his feet and reported that the cabin floor was warm. Halon was sprayed into the vent, and the glow disappeared. The pilot declared an emergency and returned to the departure airport. The airplane was stopped on the runway and based upon reports from emergency personnel, an emergency evacuation was performed. (NTSB)

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21 Sep 99: BOEING 757 MADE AIR TURNBACK - CARGO FIRE WARNING WITH ACRID SMOKE. CARGO FIRE SWITCH DEPRESSED. ACFT EVACUATED ON TAXIWAY AFTER LANDING. Part causing difficulty: Engine.(SDR: UPS99530652)

28 Mar 00: Part 121. Airbus 300-600. While on final approach to the airport, the flight declared an emergency due to smoke in the cockpit. Shortly after declaring the emergency, the aircraft landed without further incident. Probable cause: An oil leak from the aircraft's APU that subsequently contaminated the aircraft's environmental system. (NTSB)

17 Jul 00: Part 135. Approximately 7 minutes after the flight departed while flying at 6,000 feet mean sea level (msl), the pilot radioed the controller advising, "star check four eighty four we're gonna shut the master switch off we've got a electrical fire." The controller asked the pilot to repeat the transmission to which he again reported he was going to shut off the master switch. The controller advised the pilot of the location of a nearby airport to which the pilot replied, "standby." Approximately 20 seconds after the pilot first advised the controller of an electrical fire, the pilot declared an emergency and advised the controller the flight was descending. The controller advised the pilot of a nearby grass airstrip to which the pilot questioned the location and, "...we need to land immediately." The controller again advised the pilot of the location of the grass strip; there were no further communications from the accident pilot. Witnesses located near the accident site reported seeing smoke or what was described as "vapor trail" or "dust" trailing the airplane before it impacted the water on Arkabutla Lake. Probable cause: The arcing of an electrical wire behind the instrument panel and the associated cracking of fuel and oil lines. Also causal was the pilot's inappropriate remedial action not in accordance with the emergency checklist. Pilot killed.

(NTSB)

08 Aug 00 Part 121. McDonald Douglas DC-9-32. Crewmembers executed an emergency landing at Greensboro Piedmont-Triad International Airport (GSO) shortly after declaring an emergency due to an in-flight fire and smoke in the cockpit. An emergency evacuation was performed. Of the 58 passengers and 5 crewmembers on board, 3 crewmembers and 5 passengers received minor injuries from smoke inhalation. Five passengers and one ground crewmember received minor injuries during the evacuation. The airplane sustained substantial fire, heat, and smoke damage. Examination of the airplane revealed severe smoke and heat damage around the electric power center (EPC) and within the cockpit. Removal of the forward and aft EPC panels revealed heavy sooting, melted wire insulation, visibly broken wires, and localized heat damage. The lowest point of the fire damage on the cabin (aft) side of the EPC was in the upper compartment where it was noted that the aluminum stanchion brace that runs the length of that compartment was destroyed along with the AC bus feeder wires and numerous other airplane wiring bundles. No fire damage was noted in the lower aft compartment. Probable cause: Anomalies in the R2-53 and R2-54 relays. (NTSB)

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01 Oct 00: Part 121. McDonald Douglas MD-80. According to the pilot, approximately 15 minutes into the flight, the cockpit filled with smoke and he heard a loud popping sound and saw sparks emitting from the jump seat area. The jump seat rider reported that he heard an explosion and leaned forward to avoid heat, which he felt on his left shoulder. When the jump seat rider looked at his left shoulder, he noticed that his shirt was burning. He extinguished the fire on his shirt, and put on his oxygen mask, since the cockpit was filled with smoke. The pilot declared an emergency and initiated a descending right turn. The flight diverted into Birmingham, Alabama, and landed without further incident. (Note: Four 50 amp CBs tripped.). Probable cause: Failure of maintenance personnel to follow campaign directive on how to install a certificate holder. (NTSB)

29 Nov 00: Part 121. McDonald Douglas , DC-9-82. During initial climb-out, the airplane was struck by lightning. Shortly thereafter, dark smoke entered the forward area of the passenger cabin. The crew declared an emergency and the flight attendants, with a passenger's assistance, cut a hole in the overhead panel, and discharged the contents of two hand held fire extinguishers. The airplane landed uneventfully and an emergency evacuation was conducted without incident. Probable cause: Operator's inadequate maintenance procedure to disconnect the Omega navigational system, which resulted in coaxial cables being cut and not properly protected. Lightning strike was a factor in the incident. (NTSB)

06 DEC 00: DOUGLAS DC DC-871F. HAD SMOKE & BURNING SMELL IN COCKPIT COMING FROM OVERHEAD PANEL AROUND THE AREA OF THE #4 FIRE HANDLE. TURNED OFF ALL INSTRUMENT LIGHTING INPANEL. SMOKE STOPPED. SHORTLY THERE AFTER HAD STRONG BURNING SMELL. REMAINED, AND CREWW NEEDED TO WEAR O2 MASKS LAST 40 MIN OF FLT FROM SLC TO RNO. Part causing difficulty: SWITCH FAILURE. (SDR: RRXA001085)

29 Dec 00: Part 121. Lockheed L-1011. The air transport aircraft was cruising 2 hours after departure at 32,000 feet in clouds when it experienced an electrical discharge near the co-pilot's over window panel. Just prior to the discharge event, the flight crew observed a phenomenon known as St. Elmo's Fire, during which time loud popping noises were heard in the radios. After the discharge, sparks, smoke, and a strong acrid smell of electrical burning were noted from near the co-pilot's over window panel. The smoke and fume checklist was performed, halon was applied on two separate occasions, and the relative circuit breakers and electrical switches were opened. The flight landed uneventfully 45 minutes later. (NTSB)

04 Jan 01: KHNL - Boeing 747-273C. AT FL 340, EXPERIENCED SMOKE IN THE COCKPIT COMING FROM AFT END OF CENTER CONSOLE. ACCOMPLISHED FIRE/SMOKE PROCEDURES AND RETURNED TO HNL.

FOUND DIMMER IN CENTER PEDISTAL (LOWER) OVERHEATED CAUSING SMOKE. (SDR: EIAA2001004, also see NTSB below dated 05 Jan 01)

05 Jan 01 Part 121. Boeing 747-200F. The airplane developed an electrical burning odor about 1 hour after departure while at an altitude of 34,000 feet msl. The flight engineer noted smoke emanating from the center console. Following an uneventful landing, mechanics and FAA inspectors found a hot lower incandescent lamp dimmer, which burned the mechanic nearly 2 hours after electrical power was removed from the component. The dimmer and its corresponding circuit breakers were removed and examined. Scorching was noted around the dimmer LV1 lead and on the lower side of both circuit breaker covers.(NTSB, also see SDR above EIAA2001004)

26 Mar 01 (CAN) Bombardier CL-6012A12. A TECHNICIAN WAS WORKING IN AFT FUSELAGE SECTION,PAINTING AROUND APU EXHAUST OUTLET WHEN HE 1ST SMELLED SMOKE.HE THEN SAW A WIRE BUNDLE ERUPTING INTO SPARKS & FIRE EVEN THOUGH THERE WAS NO CONTACT WITH WIRE BUNDLE WHEN EVENT OCCURRED.THE BATTERY WAS CONNECTED BUT A/C POWER WAS OFF.IT IS ASSUMED THAT THERE WAS AN EXISTING CHAFING CONDITION & THAT WIRE BUNDLE HAD BEEN DISTURBED DURING APU EXHAUST REMOVAL. Part causing difficulty: Harness chafed. (SDR CA010706020)

14 May 01: Part 135. The pilot reported that while in cruise flight at 9,000 feet and in instrument meteorological conditions, he smelled a burning order, then observed a flame coming from the main circuit breaker panel on the right side. While the pilot was talking to air traffic control, the flame extinguished leaving smoke in the cockpit. The pilot diverted to a nearby airport and landed without further incident. Maintenance personnel found that a 1/4 inch hole had burned through the circuit breaker panel surface fascia. The fire was apparently caused by an internal short in the backlighting panel immediately under the fascia panel. The backlight panel contains numerous small-gage wires and grain-of-wheat light bulbs. The malfunction did not draw sufficient current to trip a circuit breaker. Probable cause: A short to electrical wiring while in cruise flight. (NTSB)

25 May 01: Part 121. Boeing 727-233. While a mechanic was performing a “Pre-dispatch Ops Check” on the airplane from the cockpit, ground personnel notified him that smoke was observed coming from the aft stairwell. Fire extinguishing agents were applied to the area and the fire was contained. Probable cause: Inadvertent misrouting of a wire harness by maintenance personnel, which resulted in chafing to a hydraulic line and electrical wire, and subsequent fire.(NTSB)

08 Jun 01: AIRCRAFT WAS TAXING TO THE RUNWAY FOR TAKE OFF WHEN THE PILOTS SMELLED A BURNING ODOR, THEN SAW SMOKE COMING FROM THE COCKPIT HEADLINER. THEY NOTIFIED THE TOWER THAT THEY HAD SMOKE IN THE COCKPIT, PULLED OFF TO THE SIDE AND ASKED FOR THE

FIRE TRUCKS TO STANDBY (PRECAUTIONARY). THE AIRCRAFT WAS TOWED TO THE FBO. THE CAUSE OF THE SMOKE WAS DETERMINED TO BE THE EMERGENCY LIGHTING BATTERY PACK.
(SDR: OIB2001F00000)

26 Jun 01: ON APU START ATTEMPT AT THE GATE IN SNA. SMOKE WAS OBSERVED COMING FROM APU COMPARTMENT. MTC OPENED COMPT AND OBSERVED THE STARTER GLOWING RED. FIRE DEPT DISCHARGED HALON INTO COMPT. CTC MTC ADVISED THERE WERE FLAMES INITIALLY WHEN DOOR WAS OPENED. Part causing malfunction: Starter malfunctioned. (SDR: DLM90011069

12 Jul 01: Part 121. McDonald Douglas MD-83. Aircraft experienced a catastrophic failure of the left engine while flying at 31,000 feet. The flightcrew heard a thud and noticed that the left engine was surging. White smoke filled the cabin and cockpit. The flightcrew donned their oxygen masks, declared an emergency and initiated an emergency descent to Kansas City International Airport (MCI), Kansas City, Missouri. While descending towards MCI, the flight crew changed their emergency landing destination to Whiteman Air Force Base (SZL), Knob Noster, Missouri, when they were approximately 18 miles north of SZL. Probable cause: Separation of a fan blade due to fatigue failure which led to case separation and loss of engine power in the left engine. (NTSB)

02 May 02: McDonald Douglas DC-982. EN ROUTE MEX-DFW, NOTICED HEAVY SMOKE IN CABIN RIGHT AFTER TAKEOFF AT MEX. RAN CABIN FIRE AND SMOKE CHECKLIST, SMOKE DISSIPATED WHEN PACKS AND RECIRCULATION FAN TURNED OFF. RETURNED AND LANDED MEX WITHOUT INCIDENT.
(SDR AALA20020889

07 May 02 <http://en.wikipedia.org/wiki/China_Northern_Flight_6136>. A McDonald Douglas MD-82 operated by China Northern Airlines was due to land at Dalian Airport at 9:40pm local time while on a flight from Beijing. At 9:20, the Captain reported a 'cabin fire' to air traffic controllers, and four minutes later, at 9:24, radio contact was lost as the aircraft disappeared from radar. The aircraft crashed into the Yellow Sea about 6 miles off the Dalian coast. All 103 passengers and 9 crew members were killed.

The Chinese government, on December 7, 2002, issued a report which blamed the crash on a fire started intentionally by passenger Zhang Pilin, a terminally ill cancer patient. Before the flight, Pilin reportedly purchased seven flight insurance policies totaling more than 1.5 million RMB ($187,500 US Dollars). Additionally, investigators searching Pilin's apartment found a number of mineral water bottles filled with gasoline.

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13 May 02: (CAN) Boeing 767-3Y0 ON FINAL APPROACH AFT CARGO FIRE AND WARNING INDICATED. QUICK REFERENCE HANDBOOK PROCEDURE CARRIED OUT, FIRE EXTINGUISHING SYSTEM ACTIVATED AND EMERGENCY DECLARED. EMERGENCY CREWS FOUND SMOKE PRESENT WITH FIRE HAVING BEEN PREVIOUSLY EXTINGUISHED. AIRCRAFT PARKED JUST SHORT OF GATE AND PASSENGERS DISEMBARKED VIA AIRSTAIRS. AFT CARGO FUSELAGE FRAME STA 1395, RBL 0 TO 36 FOUND BADLY WARPED AND HEAT DAMAGED ALSO LOWER SIDE OF CARGO FLOOR PANEL AT SAME LOCATION FOUND SCORCHED. Part Causing Difficulty: Structure damaged. (SDR CA020528010)

27 Jun 02: Beech 300. WHITE SMOKE FILLED CABIN FROM BACK. OBSERVER SAID IT WAS NOT COMING FROM EQUIPMENT RACKS. SMELLED LIKE BURNING WOOD OR PAPER . FIRE DEPARTMENT FOUND NO UNUSUAL HOT SPOTS. RUNWAY 18R WAS CLOSED FOR APPROX 20 MIN WHILE FIRE DEPARTMENT INVESTIGATED. AIRCRAFT WAS THEN TAXIED WITHOUT INCIDENT. FOUND K3 CONDENSER BLOWER RELAY (PN MS24166D1) BURNED. Part causing difficulty: Relay burned.(SDR: RU3A02004)

02 Jul 02: Part 121. Boeing 767-300 Aircraft was at cruise altitude when the crew and passengers noticed a strong electrical odor. There was also hazy smoke in the cabin near the over wing emergency exits. The flight crew declared an emergency, dumped fuel, and diverted to Asuncion without further incident. Post-flight examination failed to reveal the origin of the problem, which could not be duplicated. Paraguay officials are investigating. (NTSB)

05 Jul 02: Piper PA34200. ON APPROACH TO LANDING, PILOT REPORTED ELECTRICAL FIRE UNDER INSTRUMENT PANEL. COCKPIT FILLED WITH SMOKE AND FLAMES WERE NOTED UNDER PANEL BEHIND GLOVE BOX. PILOT WAS ABLE TO LAND THE AIRCRAFT BUT THE FIRE DESTROYED THE AIRCRAFT. THE POWER WIRE FROM THE RELAY ON THE FIREWALL WAS BURNED FROM THE RELAY TO THE POINT WHERE IT GOES THROUGH THE FIREWALL. Part causing difficulty: Wire shorted. (SCR 2002FA0000851)

25 Sep 02: McDonald Douglas DC871F WHILE ENROUTE FROM STL TO ELP, SMOKE STARTED TO EMIT FROM THE CENTER CONSOLE AFTER THE AUTO PILOT WAS ENGAGED. THE FLIGHT CREW NOTICED SMALL FLAMES AND EXTINGUISHED THEM WITH A HALON FIRE BOTTLE. THE FLIGHT CREW PULLED AND COLLERED THE CIRCUIT BREAKERS TO THE AUTO PILOT TRIM AND DECLARED AN EMERGENCY LANDING AT ELP. Part causing difficulty: Light panel burned and melted. (SDR IXXA0200074O)

06 Nov 02: Piper PA31350. PILOT NOTICED SMOKE AND FIRE IN CABIN DURING CLIMBOUT. PILOT DECLARED EMERGENCY, SHUT OFF ALL ELECTRIC

POWER AND LANDED AIRCRAFT, WITHOUT FURTHER INCIDENT, NO PASSENGERS ON BOARD. FOUND PASSENGER ENTERTAINMENT SPEAKER LOCATED RIGHT SIDE PAX CABIN AT STATION 209, BURNED OUT. FIRE DAMAGE TO SURROUNDING INTERIOR PANEL FABRIC APPROX 12 SQ INCHES AND ADJACENT PAX SEAT CUSHION. Part causing difficulty: Entertainment system speaker burned. (SDR: F2P2002F00001)

28 Dec 02: Douglas MD-11. DECLARED INFLIGHT EMERGENCY, SMOKE IN COCKPIT. SOURCE OF SMOKE WAS BELIEVED TO BE AIR CONDITIONING SYSTEM. NOTICED A DIRTY SOCK ODOR DURING TAXI. IN FLIGHT, THE SMOKE KEPT INCREASING, RETURNED TO BASE. USED EMERGENCY ESCAPE SLIDE TO EGRESS ON RUNWAY. Part causing difficulty: AC pack valve leaking. (SDR 02FDEA00979)

11 Jan 03: Part 121. Boeing 757-222. The passenger jet was at a cruise altitude of 37,000 feet msl and approximately 95 nautical miles south of Salt Lake City (SLC), when a flight attendant called from the aft cabin and stated there was a fire in the left aft lavatory, and that another flight attendant was fighting the active flames with a Halon extinguisher. The captain declared an emergency, requested priority handling for landing at SLC, and made an uneventful landing. An examination of the airplane revealed the lavatory toilet water level sensor was charred and melted. On further examination, the top left corner of the circuit board in the sensor was melted and consumed. Portions of several wires that had solder attachments to the circuit board at the melted area, including a 115-volt AC input wire and a 28-volt DC ground wire were melted and consumed. The left side of the circuit relay, adjacent to the consumed area of the circuit board, was melted and had melted solder on its exterior. The left hexagon-shaped screw, one of the two screws that mount the relay to the circuit board, was also melted. The manufacturer determined the melting point of the screw was between 2,550 and 2,650 degrees F. The investigation team determined that for these temperatures to occur, one of the wires in the area of the left screw would have had to arc. Probable cause: Arcing wires in the lavatory sensor that resulted in the subsequent fire. (NTSB)

10 Apr 03: Part 121. Airbus A300F4-605R. During climb out, the fight crew declared an emergency due to smoke in the cockpit and returned to the departure airport for a normal landing, after which the emergency evacuation slides failed to inflate. Probable cause: The cause of the cabin/cockpit smoke was contamination of the air conditioning packs. (NTSB)

13 Aug 03 Part 121. Bombardier CL6002B19. Shortly after takeoff from the Charleston International Airport, the crew experienced smoke in the cockpit. The flight diverted to Raleigh Durham International Airport, and landed without further incident. Maintenance personnel found heat damage that centered around the left utility bus electrical relay. The laboratory's examination revealed that all of the thermal damage, melting, charring and arcing, evidence showed that thermal

event originated internally or on an external relay terminal. The source of the smoke was found to be the failure of a Hartman electrical relay. Probable cause: Failure of a utility bus relay which resulted in an electrical fire and subsequent smoke in the cockpit. (NTSB)

24 Sep 03: Sikorsky S-76A (helicopter). IN CRUISE FLIGHT, SMELLED SMOKE AND SAW SMOKE FLOWING OUT OF OVERHEAD QUADRANT FRONT BY FIRE HANDLES. EXECUTED TURN AROUND TO INTRACOASTAL AND SMOKE STOPPED. FIRE EXTINGUISHER CIRCUIT BREAKERS POPPED. RETURNED TO INTRACOASTAL, EVERYTHING ELSE NORMAL INDICATIONS. Part causing difficulty: wire shorted. (SDR: ALG2003F00102)

25 Sep 03: Part 121. McDonald Douglas, MD-80. The airliner experienced fumes and smoke in the cabin after powering back from the gate. The airplane was about 200 feet from the jetway when the captain initiated an emergency evacuation. The airplane was not damaged, and 8 of the 89 passengers sustained minor injuries during the evacuation. During the emergency evacuation, the tailcone slide deployed but did not automatically inflate. Probable cause: Improper maintenance of the tailcone evacuation system, which prevented the evacuation slide from inflating during an evacuation due to smoke/fumes in the cabin. (NTSB)

16 Jan 04 SEA - FLIGHT 2431 - Bombardier DHC8401. FLIGHT ATTENDANT NOTICED SMOKE AND A ONE INCH FLAME COMING FROM THE MAIN CABIN DOOR HINGE BRUSH GUARD. TWO FIRE EXTINGUISHERS WERE USED TO PUT FLAME OUT. MAINTENANCE INSPECTED THE AIRCRAFT AND MAIN CABIN DOOR. A CHAFED WIRE TO THE MAIN CABIN DOOR LIGHTING WAS FOUND AND REPAIRED. Part causing difficulty: Wire chafed.
(SDR: QXEA200400035)

21 Mar 04 McDonald Douglas, DC-931. COCKPIT CREW REPORTED HEAVY SMOKE AND SPARKS COMING FROM THE CENTER CONSOLE WHILE AT CRUISE. FLIGHT DIVERTED TO AN UNEVENTFUL SAFE LANDING AT GRR. Part causing difficulty: Autopilot control panel shorted. SDR MALA040561

05 Mar 04 Part 121. Boeing 717-200. According to the captain, during the climb out from runway 26L at approximately 200 feet, the number 6 display unit on the pilot's instrument panel went blank and the engine alert display left generator off alert displayed. The first officer requested radar vectors from the Atlanta Tower. After contacting the tower the airplane had a complete electrical power failure, and communications with the Atlanta Tower was lost. Emergency electrical power was restored shortly after the electrical failure. The flight attendants advised the captain that there was smoke in the aft part of the cabin area. The captain and first officer "smelled an electrical burning smell", and declared an emergency. The captain returned to the airport and made an emergency landing, and evacuated the airplane on runway 9R. Probable cause: Failure of the tantalum

capacitor and the permanent magnet generator input transformer which resulted in total electrical system failure. (NTSB)

27 Apr 04 Fokker, F-27MK500. Part 121. Fedex flight 7145, an F-27-500, N715FE, operated by Mountain Air Cargo, Inc., departed Buenos Aires, Argentina, for Porto Alegre, Brazil, at approximately 0450Z on 4-27-04. About 45 minutes into the flight while in cruise at 17,000 feet, the flight crew received information about an onboard fire. The jumpseater, who was also a company F-27 captain, went to the rear of the airplane and reported fire toward the rear of the cargo compartment. The flight crew declared an emergency and requested vectors to the nearest airport. Air traffic control suggested Montevideo, Uruguay, which was 92 miles away, but the flight crew requested a closer airport.

The jumpseater went back to the cargo compartment with a hand-held fire extinguisher to deal with the fire, which was burning between zones "E" and "F". ATC eventually notified the flight of a small airport in Melo, Uruguay. After some delay the lights of the airport were turned on by an individual at the airport, and the flight landed on runway 07. The crew evacuated the airplane through the cockpit emergency exit due to the heat and smoke in the cargo area.

The local fire department responded and hosed the cargo compartment through the forward crew door. The rear door was opened enough to insert a hose, and the fire was eventually put out. Once the flights were extinguished, the cargo was removed.

The investigation is being conducted by officials from the government of Uruguay. The NTSB has assisted the investigation with readouts of the flight recorders and examination of some of the burned debris.
(NTSB and SDR 0400469960)

18 Aug 04 EZE - Boeing 767-323. TEN MINUTES AFTER TAKEOFF STRONG ELECTRICAL SMOKE SMELL IN COCKPIT. PERFORMED ELECTRICAL FIRE AND SMOKE EMERGENCY CHECKLIST BUT SMOKE NEVER ABATED. RETURNED TO EZE AND LANDED WITHOUT INCIDENT. FOUND SOURCE OF SMOKE IN J5 TERMINAL AT RIGHT HAND WINDSHIELD.
(SDR: AALA20040866)

23 Aug 04 Boeing 757-223. ON LANDING RT RECIRCULATION FAN FAILED AT TOUCHDOWN AND ON TAXI IN SMOKE IN CABIN AND UNABLE TO CLEAR. FOUND EVIDENCE OF A FIRE IN THE CENTER EQUIPMENT BAY THAT BURNED THE INSULATION BLANKETS IN THE BAY. Part causing difficulty: Right Recirculation fan failed. (SDR AALA20040900)

10 Sep 04 Embraer 110P1. FLIGHT WITH CARGO ON BOARD, PILOT SAID RADAR SCREEN WENT BLANK. SHORTLY AFTER HE SAID THE COCKPIT STARTED TO FILL UP WITH SMOKE. RADIOED TOWER AND DIVERTED

FROM INTENDED DESTINATION TO CLOSEST AIRPORT. LANDED WITHOUT INCIDENT WITH THE LOCAL FIRE DEPT STANDING BY. MECHANIC DROVE TO INSPECT THE AIRCRAFT. FOUND WHEN POWER WAS APPLIED WITH THE RADAR ON. THE INDICATOR WOULD START TO SMOKE SIGNIFICANTLY.

(SDR BQT2004F00000)

23 Feb 05 Boeing 737B7. AFTER LANDING CREW STOPPED A/C ON TAXIWAY & REPORTED TO INBOUND RAMP, FIRE & SMOKE IN COCKPIT. CREW STATED, "ON TAXI-IN, FIRE ERUPTED FROM F/O LWR C/B PNL. USED PORTABLE HALON FIRE EXTINGUISHER & EVACUATED A/C. ENG 1 & 2 & APU FIRE EXTINGUISHER BOTTLES DISCHARGED. ALL 4 ESCAPE SLIDES ACTIVATED FOR EVACUATION." Probable cause: Circuit breaker burned.

SDR: SB05032 )

27 Feb 05 MCO - Boeing 757-223. AFTER INTERMEDIATE LEVEL OFF AT FL220 SMOKE IN COCKPIT VERY SUDDEN & EVIDENT. FIRST CLASS F/A SMELLED SMOKE, ROW 26 PASSENGER INFORMED AFT F/A SMOKE SMELLED. ACCOMPLISHED CABIN SMOKE FIRE PROCEDURE TURNING OFF BOTH UTILITY BUS SWITCHES, BOTH RECIRCULATION FAN SWITCHES & RT PACK CONTINUE SELECT. SMOKE PERSISTED 20 PLUS MINUTES THROUGH LANDING. SMOKE DETECTED COCKPIT THEN FIRST CLASS F/A THEN MID CABIN. F/A REPORTED SEEING HAZE IN CABIN. Part causing difficulty: APU malfunctioned. (SDR: AALA20050161)

20 Apr 05 Part 135. Cessna T210N. The pilot lowered the landing gear on a 3.5 mile extended left base. He said that he was cleared to land by air traffic control (ATC). He checked the landing gear down indication lights, and when he looked up again, black smoke was coming from the dash. He looked down at the control pedestal and saw smoke and fire; he said black smoke immediately eliminated outside visibility. The pilot said that the passenger reported seeing the runway out his open window. The pilot landed the airplane, which bounced, and on the second touchdown the front nose gear collapsed and the airplane skidded to a stop. He and the passenger exited the airplane, which subsequently was consumed by the ensuing fire.

Probable cause: An airborne fire which was fueled by leaking hydraulic fluid (the ignition source for the fire was undetermined) from the landing gear hydraulic system located under the cockpit instrument panel due to inadequate maintenance from other maintenance personnel. Contributing factors were the hydraulic fluid and the pilot's hard landing due the airplane's control not being possible subsequent to the loss of external visibility caused by smoke in the cockpit. (NTSB)

07 Feb 06 Part 121. McDonald Douglas, DC-8-71F. UPS Aircraft landed at its destination airport, Philadelphia International Airport, after a cargo smoke indication in the

cockpit during the approach. The captain, first officer, and flight engineer evacuated the airplane after landing. The flight crewmembers sustained minor injuries, and the airplane and most of the cargo were destroyed by fire after landing.

Probable cause: An in-flight cargo fire that initiated from an unknown source, which was most likely located within cargo container 12, 13, or 14. Contributing to the loss of the aircraft were the inadequate certification test requirements for smoke and fire detection systems and the lack of an on-board fire suppression system. (NTSB)

19 Mar 06 Part 121. Bombardier CL-600-2B19. While climbing through 17,000 feet, the captain smelled smoke. A few seconds later flames and smoke started shooting out of the lower left windshield. The captain believed it was the windshield heat unit. The first officer turned off the windshield heat and the flames went out, but the smoke persisted. The captain declared an emergency with air traffic controllers and returned to the Asheville Regional Airport. Probable cause: Improper installation of the pilot's windshield by company maintenance personnel, which resulted in flame and smoke in the cockpit, and subsequent emergency ldg. (NTSB)

02 Jul 06 Cessna 525. WHILE TAXIING NOTICED A SMELL OF ELECTRICAL SMOKE THAT DISSIPATED. A GREEN LIGHT FOR THE A/C SYS NOT ILLUM, & RT GENERATOR INDICATED A 10 AMP LOAD. FRESH AIR SELECTED OFF, ACFT WAS SHUT DOWN. SMELL APPEARED TO BE COMING FROM LT GENERATOR, WHEN REAR BAGGAGE COMPARTMENT DOOR WAS OPENED, COMPARTMENT WAS FULL OF SMOKE & ELECTRICAL SMELL. WHEN BATTERY ACCESSED MORE SMOKE ENCOUNTERED. AFTER CHECKING ACFT MX FOUND NO SIGNS OF FIRE, DISCOVERED A/C MOTOR HAD STOPPED, HAD STRONG ELECTRICAL SMELL. A/C MOTOR & A 100 AMP CURRENT LIMITER REPLACED. Part causing difficulty: Motor failed. (SDR DJFA2006279

15 Sep 06 Boeing 737. WHILE MAINTENANCE PERSONNEL WERE PERFORMING A ROUTINE POST FLIGHT INSPECTION, A TECHNICIAN DISCOVERED A PROBLEM. ACFT POWERED BY EXTERNAL POWER, AND CABIN ENTERTAINMENT SYS OPERATING (PLAYING A DVD MOVIE) WITH THE AUDIO SYSTEM VOLUME AT A LOW LEVEL. AFTER A FEW MINUTES OF OPERATION, A TECHNICIAN NOTICED SMOKE AND FUMES COMING FROM TWO OF THE FORWARD CABIN SPEAKERS (LOUNGE AREA). ONE SPEAKER EMITTED A FLAME APPROXIMATELY 2 TO 3 INCHES IN LENGTH. THE TECHNICIAN QUICKLY SHUT DOWN ALL AIRCRAFT ELECTRICAL POWER, AND RETURNED TO THE DAMAGED SPEAKER AREA WITH AN ONBOARD FIRE EXTINGUISHER. THE FLAME HAD SELF EXTINGUISHED, HOWEVER, THE CABIN WAS VERY SMOKEY AT THAT POINT. UPON FURTHER EXAMINATION, (2) SPEAKERS HAD... Part causing difficulty: Amplifier fire. (SDR: 2006FA0000922)

# List of some smoke-related accidents and serious incidents 1970-2008

11 Jun 07 Part 135. Piper PA-32-300. On the flight prior to the accident flight, the passengers complained of a smell the pilot thought might be exhaust. After landing, he examined the engine for exhaust leaks. Finding none, he proceeded with the return flight. While departing the airport he heard a loud bang, the passenger cabin started to fill with smoke, and he saw fire at his feet. He reduced the throttle, and landed on the airport runway. In his haste to depart the airplane, he did not turn the fuel off, and he left the electric fuel boost pump on. He said after exiting the airplane, he saw a large pool of fuel forming under the airplane, and smoke continued to emanate from the passenger cabin door. The pooled fuel ignited, burning the airplane. The passengers said they first noticed the smoke in the rear of the passenger cabin, and that the smoke propagated forward until they could no longer see the pilot.

Probable cause: A fractured exhaust manifold, which resulted in an in-flight fire, and the inadequate inspection of the airplane by the operator's maintenance personnel. (NTSB)

10 Jul 07 Part 91. Cessna CE-310R. On 10 July 2007, about 0835 eastern daylight time, a Part 91. CE-310R. Cessna Aircraft Company 310R, N501N, part of the fleet operated by the National Association for Stock Car Auto Racing (NASCAR) corporate aviation division, crashed while performing an emergency diversion to Orlando Sanford International Airport, Orlando, Florida. The two pilots on board the airplane (a commercial pilot and an airline transport pilot) and three people on the ground were killed. Four people on the ground received serious injuries. The airplane and two homes were destroyed by impact forces and a postcrash fire. The personal flight was operating under the provisions of 14 Code of Federal Regulations Part 91 on an instrument flight rules flight plan. Visual meteorological conditions prevailed at the time of the accident.

Probable cause(s) of this accident as follows:

Actions and decisions by National Association for Stock Car Auto Racing's corporate aviation division's management and maintenance personnel to allow the accident airplane to be released for flight with a known and unresolved discrepancy, and the accident pilots' decision to operate the airplane with that known discrepancy, a discrepancy that likely resulted in an in-flight fire.

The Safety Board's full report is available at http://www.ntsb.gov/publictn/A_Acc1.htm. The Aircraft Accident Report number is NTSB/AAR-09-01. (NTSB)

20 Aug 07 Part 121. Boeing 767-323. While en route, the flight crew received overheat status messages accompanied by popped circuit breakers. The flight crew followed proper procedures. When on the ground at FRA, while taxiing to the gate, the crew started the airplane's auxiliary power unit. Shortly after starting

the APU smoke began to appear in the cabin. The flight crew proceeded immediately to the gate and expedited getting the passengers off the airplane.

Probable cause: Investigators for the German BFU discovered "ruptured" wires adjacent to a wire clamp in the airplane's aft cargo compartment. The sheathing around the wire bundles, the adjacent cargo compartment bulkhead walls and compartment insulated padding were charred and partially consumed. (NTSB)

25 Sep 07 Cessna 152. (CAN) DURING TAKEOFF, ODOR NOTICED IN COCKPIT. FLIGHT CONTINUED. SMOKE AND SPARKS NOTICED FROM BEHIND AREA WHERE LANDING LIGHT SWITCH IS LOCATED. MASTER TUNRED OFF AND AC RETURNED TO FIELD. DURING THIS TIME, A FIRE HAD STARTED RIGHT BEHIND THE LANDING LIGHT SWITCH AND WAS EXTINGUISHED USING THE ONBOARD FIRE EXTINGUISHER. AC LANDED WITHOUT FURTHER INCIDENT. Part causing difficulty: Wire failed. (SDR: CA071002003)

01 Nov 07 Boeing 757-224. THERE WAS A REPORT THAT THE WINDOW AREA AT THE LT FORWARD OVERWING EXIT GOT HOT ENOUGH TO SCORCH THE SHADE AND PILLOW AT THE PASSENGER SEAT. NO SMOKE, FIRE, OR ODOR WAS OBSERVED. THE LEFT OVERWING HATCH AREA WAS INSPECTED AND SOME BROWN DISCOLORATION WAS FOUND. THERE WAS A SPOT AFT OF THE EXIT ON FUSELAGE INTERIOR THAT GOT EXCEPTIONALLY HOT. THE HATCH HEATERS CHECKED NORMAL. THE WINDOW SHADE WAS REMOVED AND REPLACED IAW MM 52-22-02. THE OVERTEMPERATURE THERMOSTATS WERE ALSO CHECKED AND FOUND NORMAL IAW MM 21-45-00. OPEN
Part causing difficulty: Shade burned. (SDR: CALA0700665)

14 Dec 07 Part 121. Boeing 777-222. Aircraft sustained minor damage when smoke entered the cabin during approach for landing at O'Hare International Airport (ORD). The captain stated that while on approach for landing, about 13 miles from the runway threshold at 5,000 feet mean seal level (msl), he was informed that the cabin was filling with smoke. The flight attendant commented that she could not see the aft end of the airplane due to the density and that it was getting worse. The cabin crew was unable to determine the source of the smoke. The captain elected to declare an emergency and to get the airplane on the ground ASAP. 1 serious injury.

Probable cause: #2 bearing failure in engine. The compressor gas path exhibited oil deposits consistent with oil migration into the airplane's environmental system. (NTSB)

30 Jan 08 Part 121. Boeing 757-200. During cruise flight the crew experienced smoke in the cockpit, none of it coming from an obvious place, followed by the fracture of the inner pane of the first officer's windshield. They declared an emergency and diverted the airplane to a local airport where an uneventful landing was made.

Examination of the widow revealed evidence of arcing at the upper, aft (J1) and upper, forward (J4) windshield heat terminal locations and inner pane fracture initiation beneath the upper, forward (J4) terminal block. The initiation point for the arcing at both terminal locations could not be identified due to the damage sustained.

Probable cause: Emergency evacuation due to dense smoke in the cabin and the possibility of an on-board fire, which resulted in a serious injury to one of the 264 passengers and crew. An additional cause was the failure of an engine bearing, allowing oil to migrate into the environmental system, and resulted in the smoke in the cabin. (NTSB)

14 Apr 08 Boeing 757-222. WHEN CHECKING FIRST OFFICERS WIPER MOTOR FOR OPERATION, FOUND STRONG ELECTRICAL ODOR AND SMOKE COMING FROM BACK OF FIRST OFFICER'S INSTRUMENT PANEL. EXTINGUISHED FLAMES WITH FIRE EXTINGUISHER BOTTLE. FOUND SHORTED WIRING IN HARNESS LEADING TO WIPER MOTOR. FOUND FO'S WIRE HARNESS BURNED BEHIND CENTER UPPER DISPLAY PANEL. REPLACED ALL WIRING IN AFFECTED HARNESS AND REPLACED CB AS WELL.

Part causing difficulty: Wire damaged. (SDR: 2008UALA02158)

27 Jun 08 (CAN) Bombardier, BD1001A10. CREW REPORTS THEY WERE ON TAXI WAY, HAVING JUST LEFT THE FBO WHEN THICK GREY SMOKE STARTED ROLLING OUT OF THE VENTS. THE CABIN FILLED UP QUICKLY ENOUGH THEY WERE STARTING TO HAVE TROUBLE BREATHING. ONLY THING THEY MANAGED TO DO WAS SHUT DOWN AND GET OUT OF ACFT. RAMP AGENT FOR THE FBO DROVE UP IN A TRUCK, SAW WHAT WAS GOING ON, AND CALLED THE FIRE DEPARTMENT. FD USED THERMAL IMAGING TO DETERMINE THERE WAS NO FIRE AND LEFT. NO EMERGENCY WAS DECLARED.

Part causing difficulty: ACM impeller bearing dragging. (SDR: CA080711004)

End of Partial Listing