Engine detector fire, Boeing 747-100, October 2, 2003

Micro-summary: A fire in the engine fire detection system results in a diversion for this Boeing 747-100.

Event Date: 2003-10-02 at 740 UTC

Investigative Body: National Transportation Safety Board (NTSB), USA

Investigative Body's Web Site: http://www.ntsb.gov/

Cautions:

1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).

2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. Your company's flight operations manual is the final authority as to the safe operation of your aircraft!

3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.

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National responsibility Based FACIE AL REPORT NTBB ID: SEA044010 Aurcraft Registration Number: N479EV Occurrence Type: Most Critical Injuny: None Incestigned By: NTSB Location/Time Incest Coll Incest Coll National Transport/Airstrip Distance From Landing Facility: Direction From Airport Aircraft Manufacturer Distance From Landing Facility: Direction From Airport Sightseing Flight: No Art Medical Transport Flight: No Type of Aircraft Narradit Sightseing Flight: No Art Medical Transport Flight: No Narradit Sightseing Flight: No Art Medical Transport Flight Incertains and increasting provimately 0740 Thit Versal Time Coordinated (UTC), a Boeing 747-100, N17957 Bed maratic Statemer of facts, conditions and coursenance preferent to be academicidated (UTC), a Boeing 747-100, N17957 Sightseing Flight: No Aircraft Nan United to the heart first damage within the card file while in cruitse Flight approximately 0740 Thit Versal Time Coordinated (UTC), a Boeing 747-100, N17957 Bed maratic Statemer of facts, conditions and coursenance preferent to the accordinated (UTC), a Boeing 747-100, N17957 Statemartic Statemer of facts, conditions and coursenance preferent to the accordinated (UTC), a Boeing 747-100, N17957 Statemartic Statemer of facts, conditions and coursenance preferent accordinated (UTC), a Boeing 747-100, N17957										
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Vertuality Declaration type: Models International type: Models Location/Time State Zip Code Local Time Time Zone Lyon Distance From Landing Facility: Direction From Airport: Airport Proximity: Off Airport/Airstrip Distance From Landing Facility: Direction From Airport: Aircraft Information Summary Model/Series Type of Aircraft Boeing 747-100 Airplane Sightseeing Flight: No Air Medical Transport Flight: No Aircraft flight fire in the fire detection card file while in cruise flight approximately 747-100, N4798V Representation of an infight fire in the fire detection card file while in cruise flight approximately 747-100, N4798V Representation Summary Sightseeing Flight: No Air Medical Transport Flight: No Narrative Bend arms estament of facts, conditions and counstances pertinent to be acodent/indent Tom Ooc flight fire in the fire detection card file while in cruise flight approximately 747-100, N4798V Sightseeing Flight: No Air Medical Transport Flight: No Narrative Bend arms estament of acts, conditions and counstances pertinent the aircorat flie while in cruise flight approximately 747-100, N4798V Karpenein Time Coordinated (UTCI), a Boeing 747-100, N4798V Representation an IFF f	FACTUAL REPORT	Occur	rrence Date: 1	0/02	2/2003	Most Critical Injury: None				
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Bosing747-100AirplaneSightseeing Flight NoAir Medical Transport Flight NoNarrativeDefermance statement of facts, conditions and circumstances perfinent to the accident/incidentOn October 2, 2003, approximately 0740 Universal Time Coordinated (UTC), a Boeing 747-100, N479EV experienced an in-flight fire in the fire detection card file while in cruise flight approximately 35 miles from Lyon, France. None of the three crew members on board were injured, and the damage to the aircraft was limited to the heat/fire damage within the card file container. The aircraft, which is owned and operated by Evergreen International Airlines, was in visual meteorological conditions at the time of the incident. The aircraft was on an IFR flight plan from Kuwait City, Kuwait, to Frankfurt, Germany. The aircraft departed Kuwait City at 0148 UTC.According to Evergreen Airlines, while the aircraft was in cruise flight at flight level 400, the right wing overheat light illuminated. The crew accomplished the appropriate checklist, and then about five minutes later the engine number three and engine number four B Loop fire indicators illuminated. Soon thereafter an acrid odor was detected by the flight crew, and smoke was seen coming from behind the P-6 circuit breaker panel. The crew then became aware of a small fire in the fire detection card file was then returned to, the united States for analysis. After landing at Lyon, Prior to the aircraft's departue from Lyon, the entire card file was replaced. The fire detection card file was eventually shipped to Boeing Equipment Quality Analysis (SDA), where a series of inspection and test activities were performed under the guidance of the NTSB.The initial inspection of the fire detection card file (Boeing P/N 65B47509-33) revealed severe thermal discoloration to card A16 (engine numb	Aircraft Information Summary									
Sightseeing Flight: No Air Medical Transport Flight: No Narrative Bread narrative statement of facts, conditions and dicumstances pertinent to the accident/incident: On October 2, 2003, approximately 0740 Universal Time Coordinated (UTC), a Boeing 747-100, N479EV experienced an in-flight fire in the fire detection card file while in cruise flight approximately 35 miles from Lyon, France. None of the three crew members on board were injured, and the damage to the aircraft was limited to the heat/fire damage within the card file container. The aircraft, which is owned and operated by Evergreen International Airlines, was in visual meteorological conditions at the time of the incident. The aircraft was on an IFR flight plan from Kuwait City, Kuwait, to Frankfurt, Germany. The aircraft departed Kuwait City at 0148 UTC. According to Evergreen Airlines, while the aircraft was in cruise flight at flight level 400, the right wing overheat light illuminated. The crew accomplished the appropriate checklist, and then about five minutes later the engine number three and engine number four B Loop fire indicators illuminated. Soon thereafter an acrid odor was detected by the flight crew, and smoke was seen coming from behind the P-6 circuit breaker panel. The crew then became aware of a small fire in the fire detection card file, which they extinguished with a hand-held fire extinguisher. The crew then diverted to Lyon, France, where an uneventful normal landing was executed. After landing at Lyon, Frienc civil aviation personnel came aboard the aircraft, interviewed the crew, and then departed. Prior to the aircraft's departure from Lyon, the entire card file was removed and an airworthy unit was installed, and circuit breaker (2431, which protects the Alf card, was replaced. The fire detection card file was then returned to the United States for analysis. After	Aircraft Manufacturer Model/Series Type of Aircraft									
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<pre>the card (see photo #2). The area of maximum thermal distress on the card was located in an area between the inboard half of the K2 relay and the inboard ends of the third and fourth card-to-file connecting pins at the K2 end of the card. In addition to the damage to card A16 itself, there was also severe thermal damage to the card file electrical harness socket connector that the A16 card was connected to. This damage included</pre>	experienced an in-flight fire 35 miles from Lyon, France. Nor the aircraft was limited to which is owned and operated conditions at the time of the Kuwait, to Frankfurt, Germany. 7 According to Evergreen Airlin right wing overheat light if about five minutes later the illuminated. Soon thereafter coming from behind the P-6 circ fire detection card file, which diverted to Lyon, France, whe French civil aviation personne Prior to the aircraft's departer was installed, and circuit H detection card file was then United States, the card file where a series of inspection and The initial inspection of the thermal discoloration to comp Kidde (S/N 4538) and is ide included melted/burned circuit destruction of a number of itself (see photo #1). In a orange residue in the area of the point where one of the dest the card (see photo #2). The between the inboard half of the connecting pins at the K2 end of In addition to the damage to car	in the fine of the the heat by Even the incider of the the heat by Even the incider of the aircrast the the the the the the the the the th	ire detect three cre at/fire da rgreen Im nt. The ai aft depart e the airc d. The cre number t d odor w ker panel. tinguished eventful m board the Cyon, the C431, whi to the Um entually s ctivities detection 16 (engin adjacent as Boeing f failed I d-to-file there was royed card unecting p maximum t ay and the d. tself, the	ion w mmag ter rcr ed raf w a hre ar hre ar hre ar hre air to hip wer car con set to (con set to) (con set to) (con ter ter ter ter ter ter ter ter ter ter	card file whi members on boar e within the c national Airli aft was on an Kuwait City at t was in cruis ccomplished th e and engine n detected by th e crew then be th a hand-held al landing was craft, intervi ire card file protects the d States for a ped to Boeing e performed un d file (Boeing number four this card. Ca N 60B00023-96. transient prot necting pins, vere dishing u ns, and two gl attached to i mal distress c board ends of	le in cruis d were inju ard file co nes, was ir IFR flight 0148 UTC. e flight at e appropria umber four e flight cr came aware fire extir executed. ewed the cr was removed Al6 card, nalysis. Af Equipment (der the gui P/N 65B475 B Loop fire rd Al6 was The therma ection) dev and burning nder portic obs of unic ts circuit n the card the third a	se flig ared, a plan f visua plan f fligh ate che B Loop cew, ar date che B Loop cew, ar date che a s of a s nguishe After awas re ter it Quality dance sogo-33) detec manufa al dist vices, g of th ons of lentifi trace was lo and fou damage	the approximately and the damage to ber. The aircraft, al meteorological from Kuwait City, the level 400, the ecklist, and then of fire indicators and smoke was seen small fire in the er. The crew then landing at Lyon, and then departed. an airworthy unit eplaced. The fire is arrival in the of the NTSB. The revealed severe thion), and minor actured by Walter cress on card A16 partial or total he phenolic board the K2 relay, an ed material near near the edge of ocated in an area arth card-to-file		

FACTUAL REPORT - AVIATION

TRANSP National Transportation Safety Board	NTSB ID: SEA04IA010	
FACEUAL REPORT	Occurrence Date: 10/02/2003	
AVIATION ETYBON	Occurrence Type: Incident	
Narrative (Continued)		

Further investigation determined that the proper fire detection element was installed on engine number four of the subject aircraft, and that the C431 circuit breaker installed in the aircraft at the time of the event was of the correct 2.5 amp rating. In addition it was determined that the two globs found on the card, as well as the orange residue, where consistent with material used to manufacture the card, and not consistent with evidence indicating foreign materials. It was also determined that there was no clear evidence of an initiating short in the aircraft's systems, the card file, or the card itself. The investigation was also not able to find any indication that the aircraft had been struck by lightning during this flight, or that a lightning strike had contributed to the initiation of the card fire. Furthermore, regardless of the fact that card A16 displayed indications of extreme heat distress, there was no clear evidence indicating that an anomaly or malfunction in any of the sub-components contained on the card itself initiated the sequence that lead to the overheat event.

After a series of follow-up conference calls and additional tests, the investigative team determined that they were not able to identify a specific component or event that initiated the sequence that lead to the card fire. According to Evergreen Airlines, the subject aircraft has continued in service since the time of this event, and has generated no other maintenance discrepancies known to be directly related to the fire detection card files.

National Transportation Safety Boar	d	NTSB II	D: SEA04	4IA010							
FACTUAL REPORT		Occurrence Date: 10/02/2003									
AVIATION		Occurrence Type: Incident									
Landing Facility/Approach Inform											
Airport Name		Ai	rport ID:	Airport Eleva	tion	Run	way Used	Runwa	y Length	n Rui	nway Width
				Ft	. MSL						
Runway Surface Type:											
Runway Surface Condition:											
Type Instrument Approach: Unknown											
VFR Approach/Landing: Unknown											
Aircraft Information											
							Serial N 19898				
Airworthiness Certificate(s): Transport											
Landing Gear Type: Retractable - Tricycle											
Homebuilt Aircraft? No Number of Seats: 8 Certified Max Gross Wt. 750000 LBS Number of Engines: 4							es: 4				
Engine Type: Turbo Fan	Engine Manufacturer:Model/Series:Pratt & WhitneyJT9-7A							Rated Power: 46150 LBS			
- Aircraft Inspection Information											
Type of Last Inspection Date of Last Inspection Time Since Last Inspection Airframe Total Time											
Continuous Airworthiness)4/2002					Ho	ours	ç	8622 Hours
- Emergency Locator Transmitter (ELT)	Information										
ELT Installed? Yes	ELT Operated	I? No			ELT A	Aided i	n Locating Ac	cident S	ite? No		
Owner/Operator Information											
Registered Aircraft Owner	Street Address 3850 3 Mile Lane										
Evergreen International Airlines				City State							Zip Code
McMinnville OR 9712 Street Address							97128				
Operator of Aircraft	Same as Reg'd Aircraft Owner										
Same as Reg'd Aircraft Owner City State Z							Zip Code				
Operator Does Business As: Operator Designator Code: EIAA											
- Type of U.S. Certificate(s) Held:											
Air Carrier Operating Certificate(s): Fla	g Carrier/Dome	stic									
Operating Certificate:				Operator 0	Certifica	te:					
Regulation Flight Conducted Under: Pa	Regulation Flight Conducted Under: Part 121: Air Carrier										
Type of Flight Operation Conducted: So	Type of Flight Operation Conducted: Scheduled; International; Cargo										
FACTUAL REPORT - AVIATION Page 2											

Natior	TRANS	Safety Board	1	NTSB ID	: SEA04IA	010								
F	ACTUAL RI	PORT	-	Occurrence Date: 10/02/2003										
1	AVIATION Occurrence Type: Incident													
L	ot Information					City					Chata	Data	4 Diath	A
	Name City State Date of Birth Age On File On File On File On File File File											-		
On File	On File On File On File 53													
Sex: M Seat Occupied: Left Principal Profession: Civilian Pilot Certificate Number: On File														
Certificate(s): Airline Transport														
Airplane R	ating(s): Mult	i-engine Lai	nd; Single-	engine Lanc	1									
Rotorcraft/	Glider/LTA: None	e												
Instrument	t Rating(s): Airpl	ane												
Instructor Rating(s): None														
Type Rating/Endorsement for Accident/Incident Aircraft? Yes Current Biennial Flight Review? 10/2003														
Medical Cert.: Class 1 Medical Cert. Status: Valid Medicalno waivers/lim. Date of Last Medical Exam: 05/2003														
- Flight Tir	- Flight Time Matrix All A/C This Make and Model Airplane Single Engine Mult-Engine Mult-Engine Night Instrument Actual Simulated Glider Than Air									-				
Total Time		11783	6253								_			
	ommand(PIC)													
Instructor											_			
Last 90 Da		115	115			_					_			
Last 30 Da	-	35	35											
			-	s Used2 Ver	<u> </u>		Toxic	L ology P	erformed?	No		Second	Pilot? Vo	[
Seatbelt Used? Yes Shoulder Harness Used? Yes Toxicology Performed? No Second Pilot? Yes														
Eliabt Dk	on/Itinorony													
	an/Itinerary ight Plan Filed: IF													
Departure	-	R												
							State	;	Airport Ide	entifier		arture T		Time Zone
Kuwait City OKBK 0148 UTC														
Destinatio	n						State	;	Airport Id	entifie	r			
Frankfurt FRA														
Type of Cl	learance: IFR													
Type of Ai	rspace: Class	A												
Weather	Information													
Source of	Briefing: Unkno	wn												
Method of	f Briefing: Unkno	wn												
				FACTUA	L REPORT	- AVL	ΑΤΙΟΙ	N						Page 3

Courrence Date: 10/02/2003 Courrence Type: Incident Weather Information Work Information Incident WOF ID Observation Time Time Zone WOF Elevation WOF Distance From Accident Site Direction From Accident Site SkyLowest Cloud Condition: Scattered FL MSL NM Deg. Mag. SkyLowest Cloud Condition: Scattered 25000 Ft. AGL Condition of Light: Day Lowest Ceiling: None FL AGL Visibility: 20 SM Altimeter: "Hig Temperature: °C Dew Point: °C Wind Direction: Variable Density Altitude: Ft. Visibility (RVR): FL Visibility (RVV) SM Intensity of Precipitation: Altimeter: "High Accident Information Aircraft Fire: In-flight Aircraft Ere: In-flight Aircraft Explosion None Classification: U.S. Registered/U.S. Soil Minor None TOTAL Income First Pliot I Serious Minor None TOTAL Income First Pliot Serious Minor None TOTAL Income Income First Pliot <th>Nationa</th> <th>al Transportation Safety</th> <th>Board</th> <th>NTSB ID:</th> <th>SEA04</th> <th>IA010</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	Nationa	al Transportation Safety	Board	NTSB ID:	SEA04	IA010						
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Restrictions to Visibility: None Type of Precipitation: None Accident Information Aircraft Fire: In-flight Aircraft Explosion None Aircraft Damage: Minor Aircraft Explosion None Classification: U.S. Registered/U.S. Soil Aircraft Explosion None - Injury Summary Matrix Fatal Serious Minor None TOTAL First Pilot 1 1 1 1 Second Pilot 2 1 1 Student Pilot 2 2 2 2 Flight Instructor 2 2 2 2 Flight Instructor 2 2 1 1 Check Pilot 2 2 2 2 Flight Engineer 2 1 1 Other Crew 2 2 2 2 Passengers 2 2 3 3	Wind Spee	ed: Light and Variable	Gusts:		Weath	ner Condt	ions at Acc	ident S	ite: Visual (Cond	itions	
Type of Precipitation: None Accident Information Aircraft Fire: In-flight Aircraft Explosion None Aircraft Damage: Minor Aircraft Fire: In-flight Aircraft Explosion None Classification: U.S. Registered/U.S. Soil Aircraft Explosion None - Injury Summary Matrix Fatal Serious Minor None TOTAL First Pilot Image: Minor None TOTAL Image: Minor None TOTAL Second Pilot Image: Minor Image: Minor Image: Minor Image: Minor TotAL Student Pilot Image: Minor Image: Minor Image: Minor Image: Minor Image: Minor Flight Instructor Image: Minor Image: Minor Image: Minor Image: Minor Image: Minor Flight Engineer Image: Minor Image: Minor Image: Minor Image: Minor Image: Minor Other Crew Image: Minor Image: Minor Image: Minor Image: Minor Image: Minor Other Crew Image: Minor Image: Minor Image: Minor Image: Minor Image: Minor Other Crew Image: Minor Image: Minor <td>Visibility (F</td> <td>RVR): Ft.</td> <td>Visibility (R</td> <td>VV)</td> <td>SM</td> <td>Intensit</td> <td>/ of Precip</td> <td>itation:</td> <td></td> <td></td> <td></td> <td></td>	Visibility (F	RVR): Ft.	Visibility (R	VV)	SM	Intensit	/ of Precip	itation:				
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Other Crew Image: Comparison of the second	Flight E	Engineer				1		1				
Passengers Image: Constraint of the second	Cabin /	Attendants						1				
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				FACTUAL	REPO	RT - AV	IATION					Page 4

National Transportation Safety Board FACTUAL REPORT	NTSB ID: SEA04IA010	
FACTŲAL REPÕRT	Occurrence Date: 10/02/2003	
AVIATION	Occurrence Type: Incident	
Administrative Information	1	
Investigator-In-Charge (IIC)		
Orrin K. Anderson		
Additional Persons Participating in This Accident/Incic	lent Investigation:	
Terry Wilmeth Portland FSDO 1800 NE 25th Ave Hillsboro, OR 97124		
Mark Smith The Boeing Company P.O. Box 3707 Seattle, WA 98124		
Kirk Carrillo Evergreen Airlines 3850 Thgree Mile Lane McMinnville, OH 97128		