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

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

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**Event Date: 2003-10-02 at 740 UTC**

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


**Investigative Body's Web Site: <http://www.nts.gov/>**

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		NTSB ID: SEA04IA010		Aircraft Registration Number: N479EV	
		Occurrence Date: 10/02/2003		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Lyon		State	Zip Code	Local Time 0740	Time Zone UTC
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 747-100		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>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.</p> <p>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, French 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 C431, which protects the A16 card, was replaced. The fire detection card file was then returned to the United States for analysis. After its arrival in the United States, the card file was eventually shipped to Boeing Equipment Quality Analysis (EQA), where a series of inspection and test activities were performed under the guidance of the NTSB.</p> <p>The initial inspection of the fire detection card file (Boeing P/N 65B47509-33) revealed severe thermal stress/destruction to card A16 (engine number four B Loop fire detection), and minor thermal discoloration to components adjacent to this card. Card A16 was manufactured by Walter Kidde (S/N 4538) and is identified as Boeing P/N 60B00023-96. The thermal distress on card A16 included melted/burned circuit traces, failed IO (transient protection) devices, partial or total destruction of a number of the card-to-file connecting pins, and burning of the phenolic board itself (see photo #1). In addition there was severe dishing under portions of the K2 relay, an orange residue in the area of the destroyed card pins, and two globs of unidentified material near the point where one of the destroyed connecting pins attached to its circuit trace near the edge of 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.</p> <p>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 melting/burning of the connector structure, loose sockets still connected to their associated wires, missing sockets, and open wires that had been attached to sockets that were now missing (see photo #3).</p>					
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National Transportation Safety Board

## FACTUAL REPORT

AVIATION

NTSB ID: SEA04IA010


Occurrence Date: 10/02/2003


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, were 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 led 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 led 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.

 <b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: SEA04IA010				
		Occurrence Date: 10/02/2003				
		Occurrence Type: Incident				
<b>Landing Facility/Approach Information</b>						
Airport Name		Airport ID:	Airport Elevation Ft. MSL	Runway Used	Runway Length	Runway Width
Runway Surface Type:						
Runway Surface Condition:						
Type Instrument Approach: Unknown						
VFR Approach/Landing: Unknown						
<b>Aircraft Information</b>						
Aircraft Manufacturer Boeing		Model/Series 747-100		Serial Number 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	
Engine Type: Turbo Fan		Engine Manufacturer: Pratt & Whitney		Model/Series: JT9-7A	Rated Power: 46150 LBS	
- Aircraft Inspection Information						
Type of Last Inspection Continuous Airworthiness		Date of Last Inspection 04/2002	Time Since Last Inspection Hours		Airframe Total Time 98622 Hours	
- Emergency Locator Transmitter (ELT) Information						
ELT Installed? Yes		ELT Operated? No		ELT Aided in Locating Accident Site? No		
<b>Owner/Operator Information</b>						
Registered Aircraft Owner Evergreen International Airlines		Street Address 3850 3 Mile Lane				
		City McMinnville		State OR	Zip Code 97128	
Operator of Aircraft Same as Reg'd Aircraft Owner		Street Address Same as Reg'd Aircraft Owner				
		City		State	Zip Code	
Operator Does Business As:				Operator Designator Code: EIAA		
- Type of U.S. Certificate(s) Held:						
Air Carrier Operating Certificate(s): Flag Carrier/Domestic						
Operating Certificate:			Operator Certificate:			
Regulation Flight Conducted Under: Part 121: Air Carrier						
Type of Flight Operation Conducted: Scheduled; International; Cargo						
FACTUAL REPORT - AVIATION						

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: SEA04IA010
	Occurrence Date: 10/02/2003
	Occurrence Type: Incident

<b>First Pilot Information</b>				
Name On File	City On File	State On File	Date of Birth On File	Age 53

Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
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Certificate(s): Airline Transport

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

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 Medical--no waivers/lim.	Date of Last Medical Exam: 05/2003
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- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	11783	6253								
Pilot In Command(PIC)										
Instructor										
Last 90 Days	115	115								
Last 30 Days	35	35								
Last 24 Hours	7	7								

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
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**Flight Plan/Itinerary**

Type of Flight Plan Filed: IFR	
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Departure Point Kuwait City	State	Airport Identifier OKBK	Departure Time 0148	Time Zone UTC
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Destination Frankfurt	State	Airport Identifier FRA	
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Type of Clearance: IFR

Type of Airspace: Class A

**Weather Information**

Source of Briefing: Unknown

Method of Briefing: Unknown

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**Weather Information**

WOF ID	Observation Time	Time Zone	WOF Elevation  Ft. MSL	WOF Distance From Accident Site  NM	Direction From Accident Site  Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			25000 Ft. AGL		Condition of Light: Day
Lowest Ceiling: None			Ft. AGL	Visibility: 20 SM	Altimeter: "Hg
Temperature: °C	Dew Point: °C	Wind Direction: Variable			Density Altitude: Ft.
Wind Speed: Light and Variable		Gusts:	Weather Conditions at Accident Site: Visual Conditions		
Visibility (RVR): Ft.	Visibility (RVV)	SM	Intensity of Precipitation:		
Restrictions to Visibility: None					
Type of Precipitation: None					

**Accident Information**

Aircraft Damage: Minor	Aircraft Fire: In-flight	Aircraft Explosion: None
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Classification: U.S. Registered/U.S. Soil

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer				1	1
Cabin Attendants					
Other Crew					
Passengers					
- TOTAL ABOARD -				3	3
Other Ground					
- GRAND TOTAL -				3	3

National Transportation Safety Board

**FACTUAL REPORT**

**AVIATION**



NTSB ID: SEA04IA010

Occurrence Date: 10/02/2003

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

Orrin K. Anderson

Additional Persons Participating in This Accident/Incident Investigation:

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