NTSB National Transportation Safety Board

An update from NTSB

Robert L. Sumwalt
NTSB Board Member
May 12, 2010

The Board

- 5 Members, appointed by the President, with advice and consent of the Senate

Nominated,
Not confirmed

Chris Hart
Vice Chairman

Debbie Hersman
Chairman

Robert Sumwalt
Member

Nominated,
Not confirmed

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The million dollar question?

- Are you prepared to interface with NTSB if there is an accident in your organization?
  - Do you understand the party system?
  - Who will be your party coordinator?
  - Are you familiar with NTSB's rules and practices?

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Corporate Aviation / Part 135 – Fatal Accidents since last CASS

Accident Date	Operator	Location	Aircraft Type	Fatalities
Jan 5, 2010	Royal Air Freight	Prospect Heights, IL	Lear 35A	2
Jan. 18, 2010	Part 91	Elyria, OH	MU-2B-60	4

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Corporate Aviation / Part 135 – NTSB Board Meetings since last CASS

Accident Date	Operator	Location	Aircraft Type
June 4, 2007	Marlin Air	Milwaukee, WI	Citation 550
March 4, 2008	Interstate Helicopters (Illegal charter)	Oklahoma City, OK	Citation 500
Helicopter EMS Special Investigation Report			
Sept 19, 2008	Global Exec Aviation	Columbia, SC	Learjet 60
Sept. 27, 2008	Maryland State Police (Public Use Aircraft)	District Heights, MD	Aerospatiale (Eurocopter) Dauphine

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Part 121- NTSB Board Meetings since last CASS

Accident Date	Operator	Location	Aircraft Type
Jan. 15, 2009	US Airways	Hudson River	Airbus A320
Feb. 12, 2009	Colgan Air	Clarence Center, NY	DHC-8-400

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Runway Overrun

Learjet 60, N999LJ
Global Exec Aviation
Columbia, South Carolina
September 19, 2008

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Links in Accident Chain

- Charter company did not properly maintain tire pressure.
- Led to tires overheating and failing during takeoff.
- Captain rejected the takeoff after V1 speed.

Continued…

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Links in Accident Chain

- Tire debris struck and disabled a switch on landing gear strut, placing aircraft in the “air” mode.
- Because aircraft went to “air” mode, thrust reversers automatically stowed.
- Design of the Lear 60 allowed engines to produce high forward thrust even though the pilot was commanding for reverse thrust.

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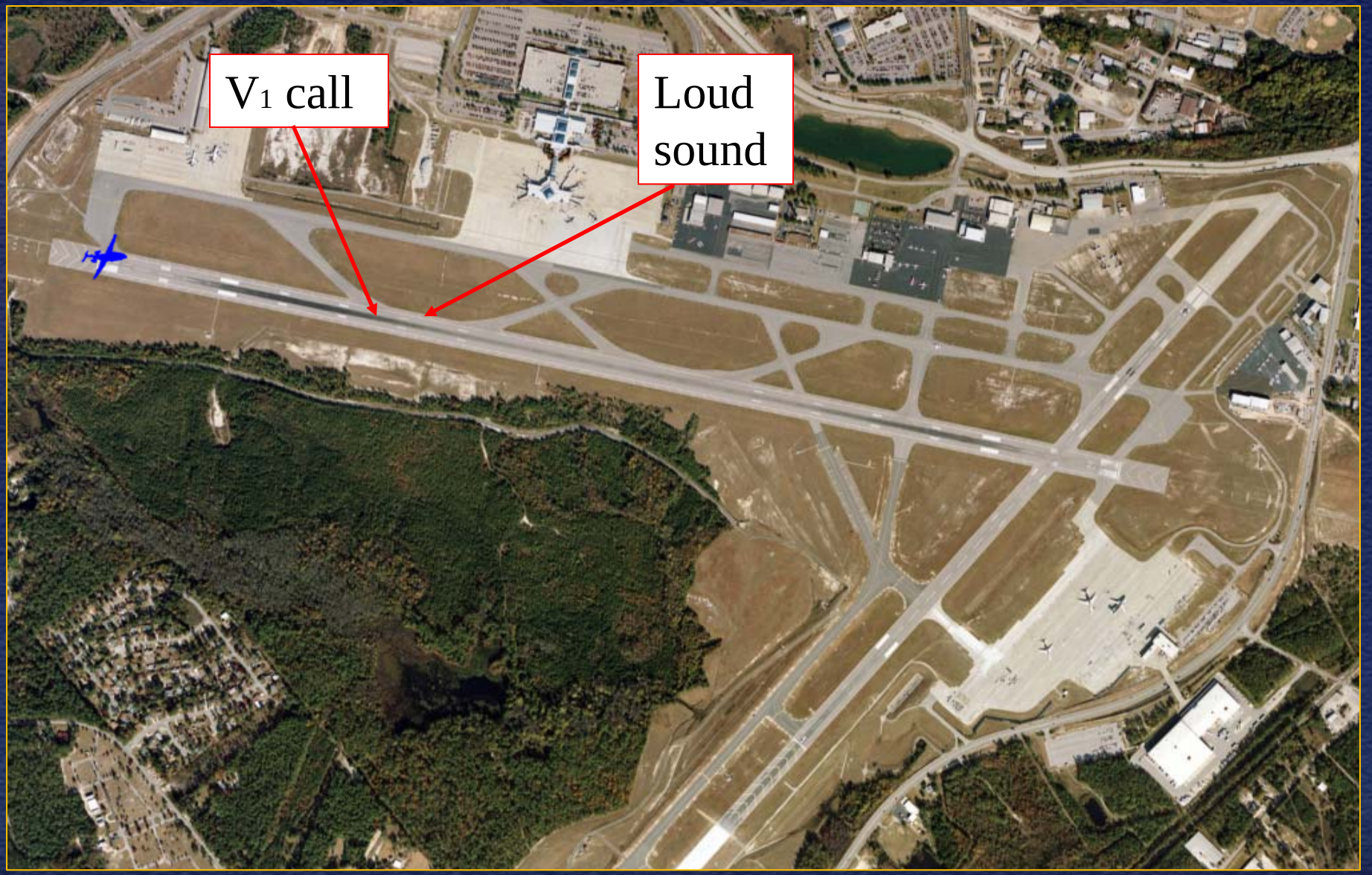
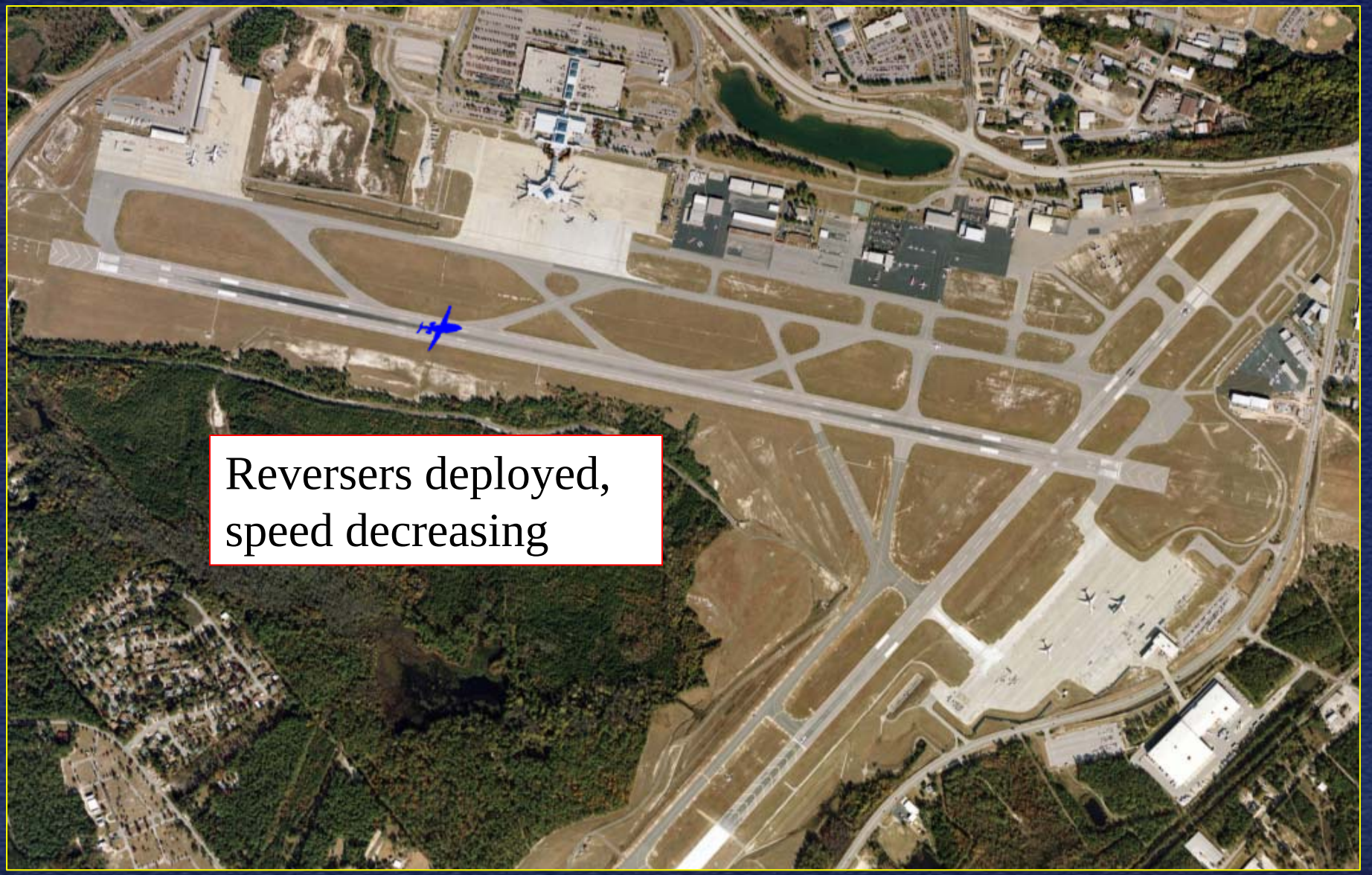
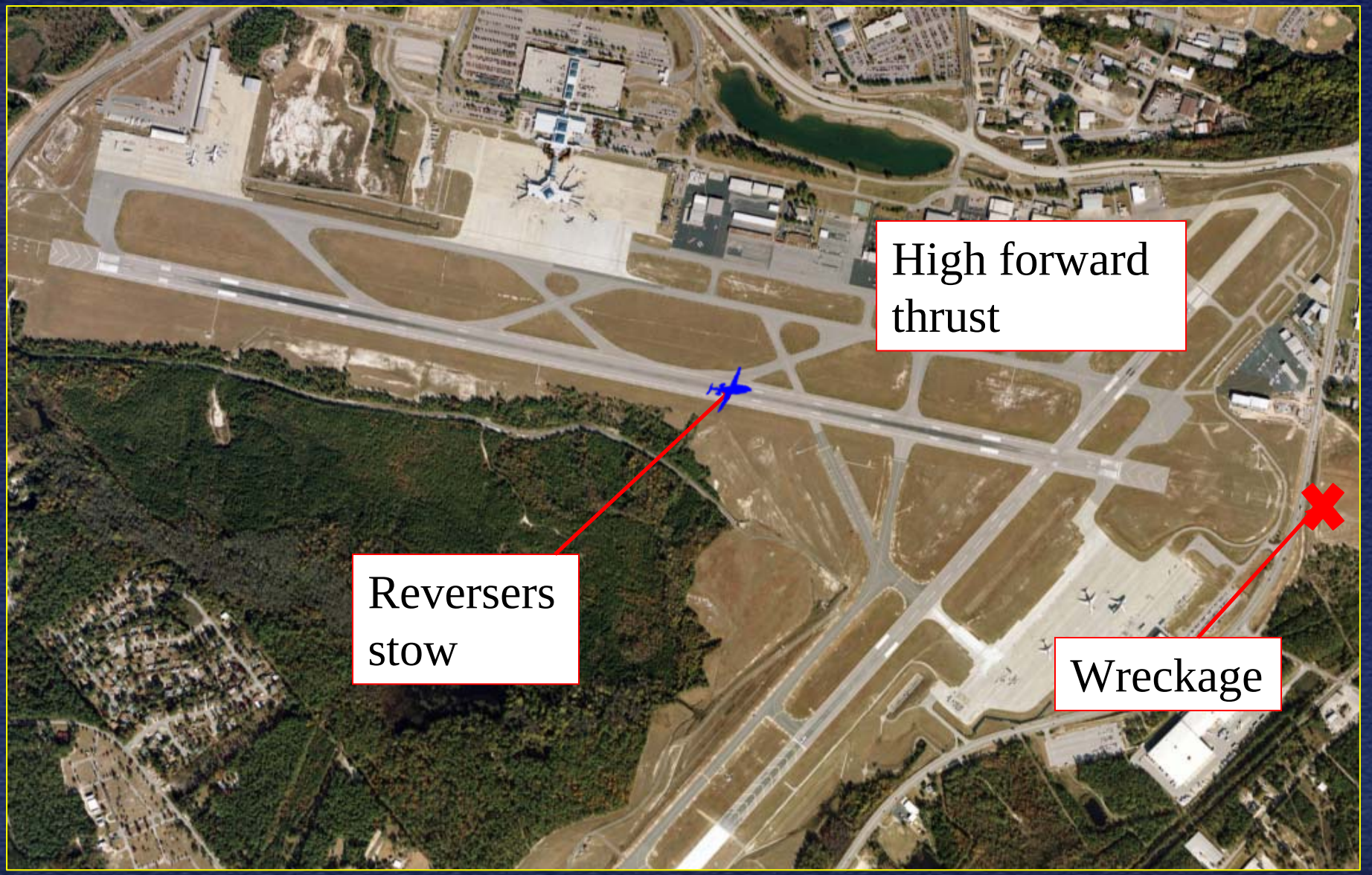
Simplified Event Overview



Simplified Event Overview



Simplified Event Overview



Links in Accident Chain

Tire Under-inflation and Failure

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Tire Under-inflation and Failure

- Loud noises and swerving associated with tire failures

First to burst at 137+ knots

Last to burst

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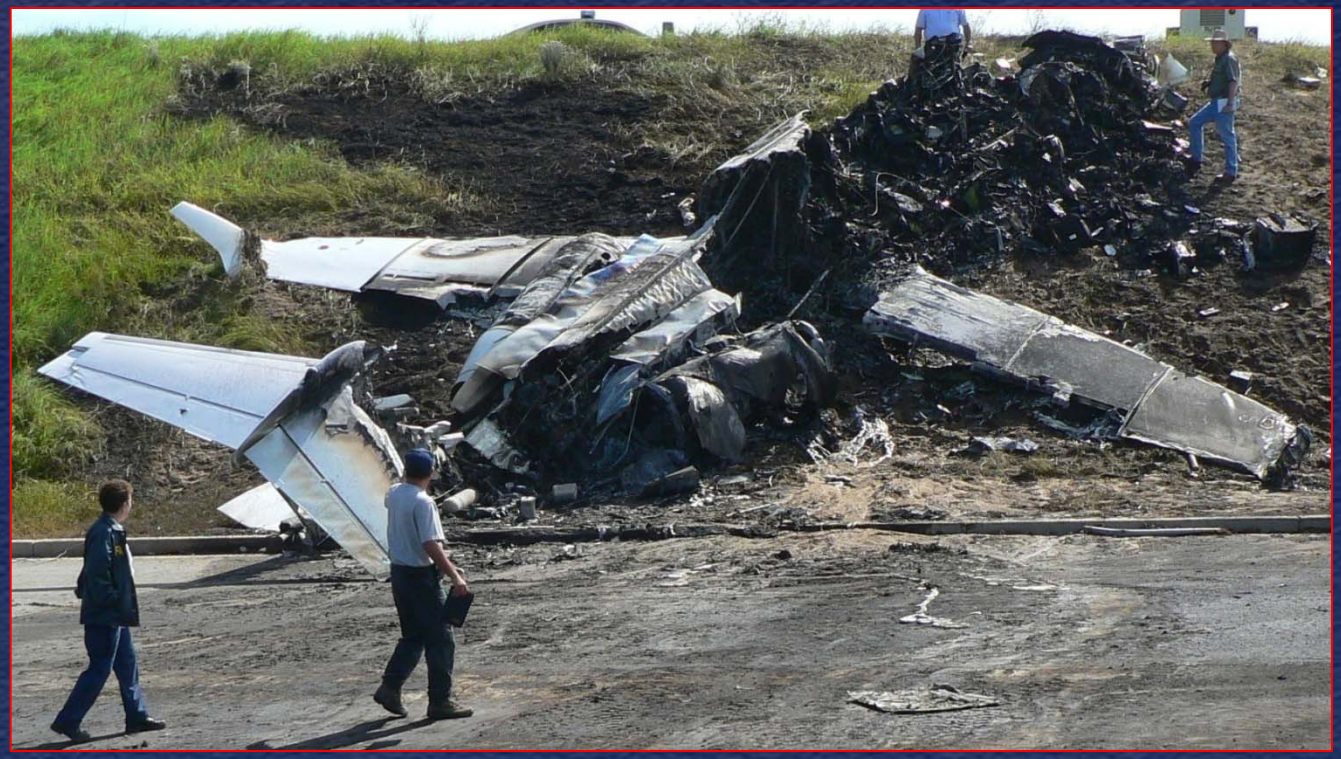
Damage and Brake Loss

- Tire fragments struck airplane
- Brakes lost early in sequence



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Tire Construction and Heat

- Heavy loads, high speed, high pressure
- Pressure loss about 2% per day (Learjet 60)
- Low pressure increases flex
- Flex creates heat

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Loss of Inflation Pressure

- **Full inflation: 219 psi**

- At 2% inflation loss per day for this tire:

- **After 8 days: 185 psi (requires replacement)**
  - Low inflation not visually detectable
- **After 3 weeks: 140 psi (accident airplane)**

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Links in Accident Chain

Rejected Take Off
Past V1

Accident

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Rejected Take Off Past V1

- Rumbling noise associated with tire failure was heard 2 seconds past V1
- First Officer immediately stated “Go, Go, Go.”
- Captain hesitated, retarded thrust levers, then advanced them, finally pulling them to idle

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Guidance on RTOs

- "Takeoff Safety Training Aid:"
  - Tire failures difficult to identify
  - Pilots cautioned: Do not reject at high speed for tire failure
- NTSB "Special Investigation Report:"
  - High-speed RTOs for tires common
- Typically no training for tire failures

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Links in Accident Chain

Tire Debris Damaged Air/Ground Sensor

Accident

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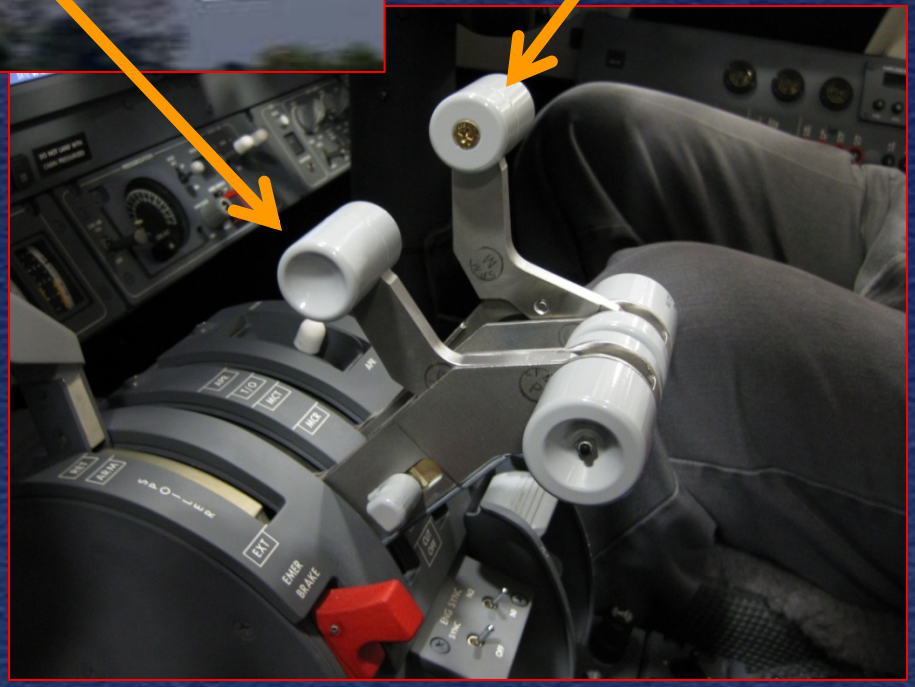

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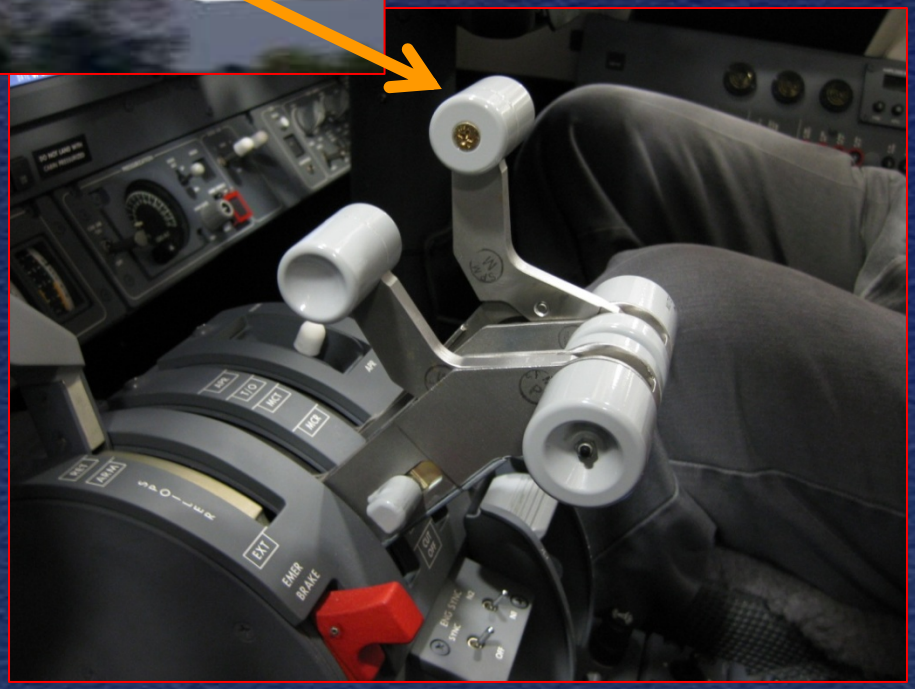
Deadly Combination

Thrust Reversers Stowed, High Thrust



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The investigation resulted in…

- 26 Findings
- 20 Recommendations

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Findings regarding Tire Maintenance

- The accident airplane's insufficient tire pressure was due to Global Exec Aviation's inadequate maintenance.

- Some operators are not sufficiently aware of the appropriate tire pressure check intervals for the airplanes in their fleets and are operating their airplanes with tires inflated below the aircraft maintenance manual replacement specifications.

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Findings

- The accident pilots would have been better prepared to recognize the tire failure and to continue the takeoff if they had received realistic training in a flight simulator on the recognition of and proper response to tire failures occurring during takeoff.

- The captain's passenger safety briefing contributed to the survival of two passengers.

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Probable Cause

- "… the operator's inadequate maintenance of the airplane's tires, which resulted in multiple tire failures during takeoff roll due to severe underinflation, and the captain's execution of a rejected takeoff after V1, which was inconsistent with her training and standard operating procedures."

Continued…

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Contributing to the accident

1. deficiencies in Learjet's design of and the FAA certification of the Learjet 60's thrust reverser system, which permitted the failure of critical systems in the wheel well area to result in uncommanded forward thrust …;
2. the inadequacy of Learjet's safety analysis and the FAA's review of it, which failed to detect and correct the thrust reverser and wheel well design deficiencies after a 2001 uncommanded forward thrust accident;
3. inadequate industry training standards for flight crews in tire failure scenarios; and
4. the flight crew's poor crew resource management.

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Recommendations

- Require that all Part 121, 135, and 91 subpart K operators perform tire pressure checks at a frequency that will ensure that the tires remain properly inflated.
- Require tire pressure monitoring systems for all transport-category airplanes.

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Recommendation

- Define and codify minimum simulator model fidelity requirements for tire failure scenarios that provide realistic sound and motion cueing.
- Once developed, require training in high speed tire failures.

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Colgan Air flight 3407

Clarence Center, NY

February 12, 2009

Background

- February 12, 2009
- 10:17 pm Eastern Standard Time
- Colgan Air, Inc.
  - Operated as Continental Connection
- Bombardier DHC-8-400
- On approach to Buffalo, New York
- 50 fatalities
  - 2 pilots
  - 2 flight attendants
  - 45 passengers
  - 1 resident killed

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History of flight

- Crew engaged in almost continuous conversation throughout flight
  - Conversation mostly extraneous to flight operations
- Conversation preempted timely performance of flight-related duties
  - Approach briefing, descent checklist, approach checklist

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History of flight

- Approximately 3 miles from outer marker:
  - power was reduced to slow for approach
  - gear extended
  - props to max RPM
- Airspeed decreased 50 kts in 21 seconds

Stall, Upset, Loss of Control

- Stick shaker (stall warning) activated at 131 knots
- Autopilot disconnected
- Captain reacted with “startle and confusion”
- Captain pulled nose to 19 degrees nose up pitch
- Stall, extreme roll
- Stick pusher activated 3 times
  - countered by captain’s actions of pulling
- Loss of control

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Major Areas of Focus

- Airspeed Selection
- Cockpit Discipline
- Crew Reaction to Stall Warning and Stall

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NTSB Finding

- The captain's failure to effectively manage the flight
  - enabled conversation that delayed checklist completion and conflicted with sterile cockpit procedures, and
  - created an environment that impeded timely error detection.

NTSB Report

"Because of their conversation, the flight crewmembers squandered time and their attention, which were limited resources that should have been used for attending to operational tasks, monitoring, maintaining situational awareness, managing possible threats, and preventing potential errors."

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Probable Cause

- The captain's inappropriate response to the activation of the stick shaker, which led to an aerodynamic stall from which the airplane did not recover.

Contributing to the accident:

1) the flight crew's failure to monitor airspeed in relation to the rising position of the low-speed cue
2) the flight crew's failure to adhere to sterile cockpit procedures
3) the captain's failure to effectively manage the flight
4) Colgan Air's inadequate procedures for airspeed selection and management during approaches in icing conditions.

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25 recommendations to FAA

- Strategies to prevent flight crew monitoring failures
- Fatigue
- Remedial training
- Pilot records
- Stall training
- Airspeed selection procedures
- FAA oversight
- Pilot professionalism

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NTSB Forum on Professionalism

Ensuring Excellence in Pilot and Air Traffic Controller Performance

May 18 – 20, 2010

NTSB Conference Center, Washington, DC.

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