



NTSB National Transportation Safety Board

THE SAFETY BENEFITS OF ADS-B OUT... AND ADS-B IN

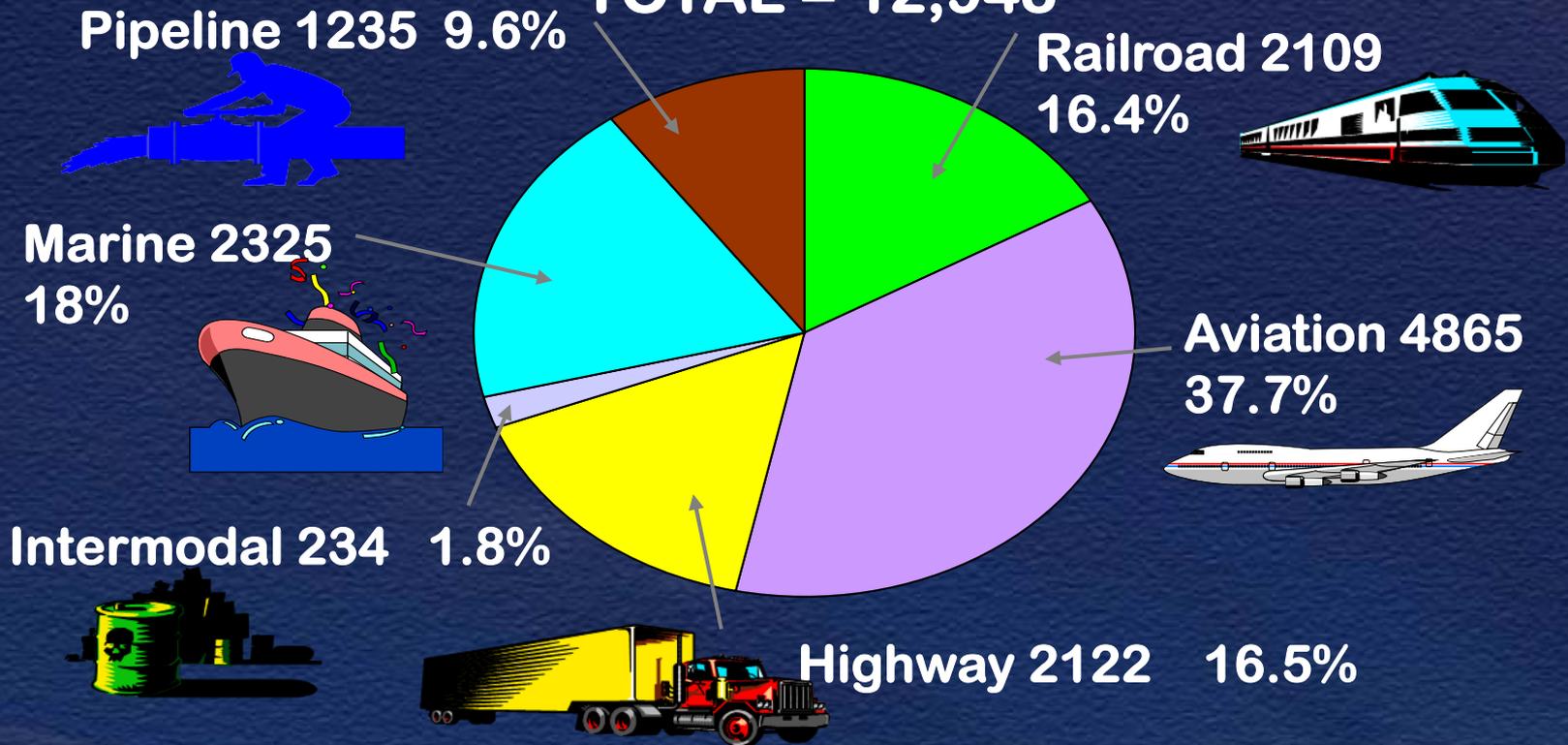
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Member, National Transportation
Safety Board

Aviation Week: ADS-B & NextGen
Alexandria VA March 2009

NTSB Recommendations

Issued Since 1967
TOTAL = 12,948



Most Wanted

- Significant safety recommendations
- Intensive follow-up
- Federal & States
- Issue areas
- Status & classification



The poster is titled "NTSB MOST WANTED LIST Transportation Safety Improvements" and is dated "2009". It features the NTSB logo at the top right and the text "Critical changes needed to reduce transportation accidents and save lives." at the bottom. The main content is organized into three sections: "Actions needed by States", "MARINE", and "National Transportation Safety Board" contact information.

Actions needed by States

HIGHWAY

Improve Child Occupant Protection

- Enact State laws requiring booster seats for young children up to age 8.

Enact Primary Seat Belt Enforcement Laws

- Increase number of people who wear seat belts through stronger enforcement laws that don't restrict officers to observing another offense first.

Reduce Distractions for Young Drivers

- Prohibit use of interactive wireless communications devices by young novice drivers.
- Restrict the number of teen passengers traveling with young novice drivers.
- Enact graduated driver licensing legislation.

Eliminate Hard Core Drinking Driving

- Enact legislation to reduce crashes involving repeat offenders who drink large amounts of alcohol, including:
 - Frequent, statewide sobriety checkpoints.
 - More effective measures (sanctions/treatment) for first time arrests with high blood alcohol concentration and repeat offenders.
 - Zero blood alcohol requirement for those already convicted of driving while intoxicated.
 - Administrative license revocation for refusing to take or failing an evidential test for alcohol.
 - Vehicle sanctions for DWI offenders to separate drinking from driving.
 - Elimination of plea-bargaining DWI offenses and programs that divert offenders and purge offense records.
 - DWI offense records retention for at least 10 years to identify repeat offenders.
 - Special sanction court-based programs such as DWI courts for hard core DWI offenders.

MARINE

Enhance Recreational Boating Safety

- Require mandatory education of boat operators.
- Require use of life jackets by children.

National Transportation Safety Board
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November 2008

NTSB Safety Recommendation

Require, at all airports with scheduled passenger service, a ground movement safety system that will prevent runway incursions.

The system should provide a direct warning capability to flight crews.

In addition, demonstrate through computer simulations or other means that the system will prevent incursions.

A-00-66

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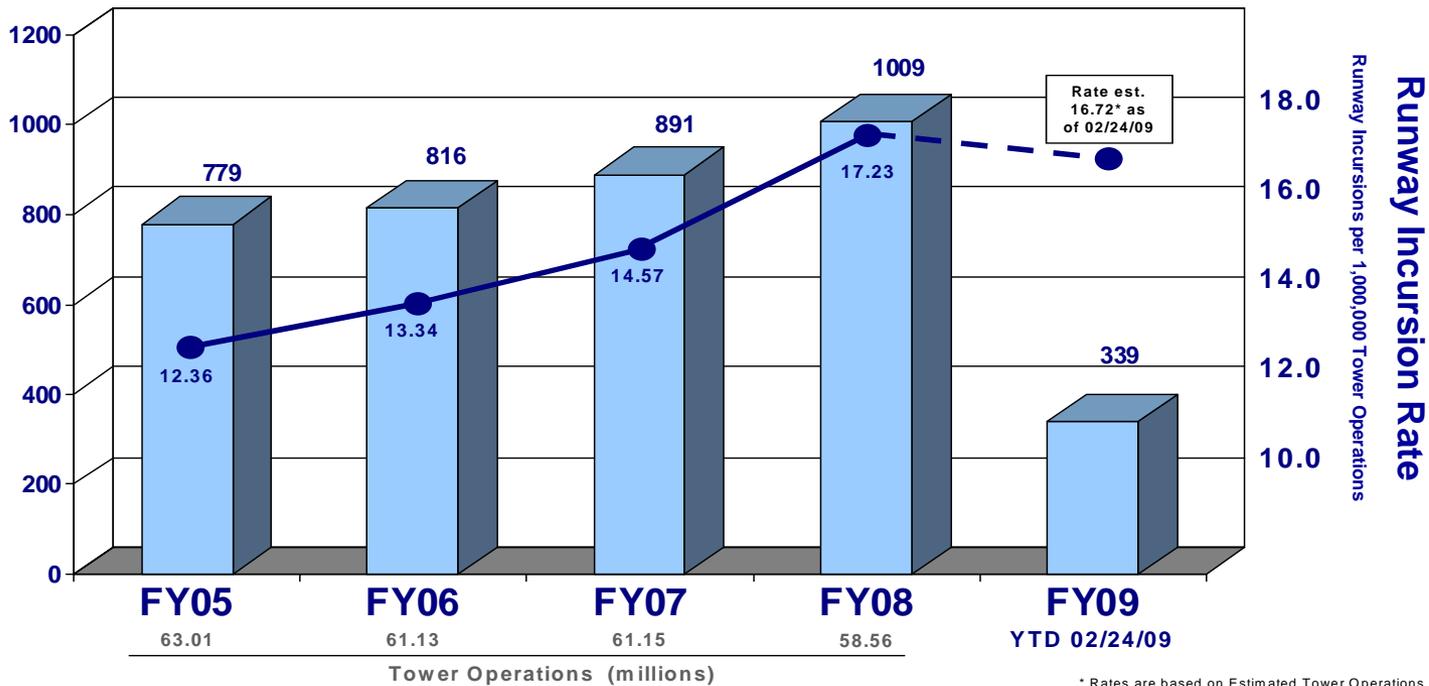
Tenerife, Canary Islands; March 27, 1977



- World's deadliest aviation accident
- PanAm747 & KLM747
- Runway collision
- 583 passengers & crew killed

FAA Runway Incursion Data

All Categories of Runway Incursions



* Rates are based on Estimated Tower Operations



Fatal Runway Incursion Accidents in United States 1990-2008

- 1990 Atlanta GA: B727/Beech A100
- 1990 Detroit MI: DC9/B727
- 1991 Los Angeles CA: B737/SW-4 Metroliner
- 1994 St. Louis MO: MD82/Cessna 441
- 1996 Quincy IL: Beech 1900C/Beech A90
- 2000 Sarasota FL: Cessna 172/Cessna 152
- 2005 Chicago IL (Midway): B737
- 2006 Lexington KY: CRJ 100

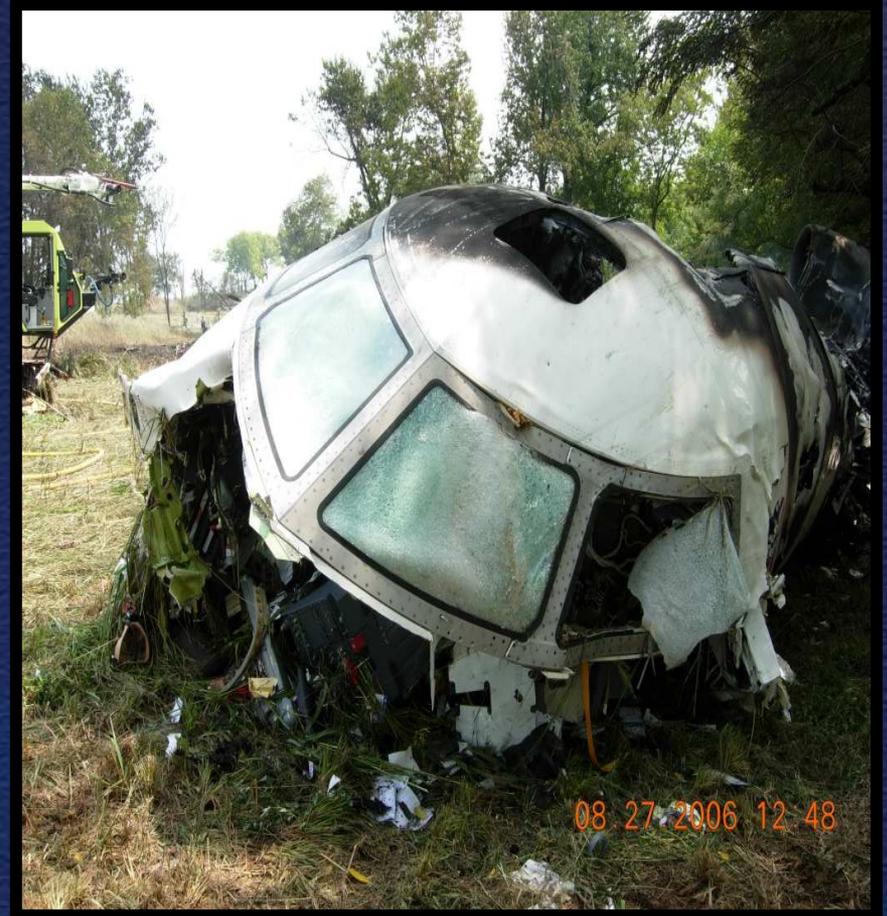
113 Fatalities, including 1 ground fatality

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Lexington KY; August 27, 2006

- Deadliest U.S. runway incursion accident
- Comair flight 5191
- Blue Grass Airport
- Wrong runway takeoff
- 49 passengers & crew killed



Runway Incursion Investigations

- Denver CO, 1/5/07, SW4/A319 50 feet
- San Francisco CA, 5/26/07, EMB170/EMB-B 150 feet
- Teterboro NJ, 6/17/07, P180/CSR22 Near intxn collision
- New York NY, 7/5/07, CRJ100/B737 650 feet
- Fort Lauderdale FL, 7/11/07, A320/B757 230 feet
- Teterboro NJ, 8/13/07, LJ45/CL60 1200 feet
- Los Angeles CA, 8/16/07, B737/A320 37 feet
- Washington DC, 9/12/07, LR35 Closed runway
- Memphis TN, 10/11/07, C525 Departed taxiway
- Baltimore MD, 12/2/07, CRJ100/A320 300 feet
- Teterboro NJ, 12/27/07, G5/H25 4000 feet



Runway Incursion Investigations

- Teterboro NJ, 6/25/08, LR45 Closed runway
- St. Augustine FL, 6/30/08, PA28 Wrong runway
- Seattle WA, 7/2/08, B737/A330 400 feet
- New York NY, 7/5/08, B737/B767 200 feet
- Teterboro NJ, 7/9/08, C172/DF200 1200 feet
- Chicago IL, 7/21/08, ERJ145/LJ60 325+ feet
- Reading PA, 8/3/08, C550 Ground collision landing
- Reading PA, 8/27/08, C172 Closed runway
- Fresno CA, 8/28/08, PA46/CRJ 50-100 feet
- Allentown PA, 9/19/08, CL600/C172 10 feet

1302 passengers/crew in 21 runway events

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Denver CO; January 5, 2007



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San Francisco CA; May 26, 2007



Fort Lauderdale FL; July 11, 2007



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Runway Incursion Between United A320 and Delta Airlines B757

Fort Lauderdale-Hollywood Airport
Fort Lauderdale, Florida
July 11, 2007
OPS07IA006

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What Can Be Done?

Technology:

- A system to give immediate warnings of probable collisions and incursions directly to flight crews in the cockpit

Electronic Flight Bag



The Future is Here



ACSS[®]
An L-3 Communications
& Thales Company

SafeRoute
ADS-B Solutions

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NTSB On-the-Record

House Aviation Subcommittee (February 2008)

NTSB comments on FAA ADS-B NPRM (March 2008)



- FAA NPRM
 - Aircraft surveillance by 2013
 - ADS-B *Out* avionics required by 2020
 - ADS-B *In* avionics voluntary
- **NTSB supports ADS-B – but both ADS-B *Out* and ADS-B *In* are needed for full safety benefit**

ADS-B In



Weather



Traffic



Terrain

Report Card (Nov 2008)

Safety Improvements Wanted

Give immediate warnings of probable collision/incursions directly to cockpit flight crews. **A-00-66**

Require specific air traffic control clearance for each runway crossing. **A-00-67**

Install cockpit moving map displays or automatic systems to alert pilots of attempted takeoffs from taxiways or wrong runways. **A-07-45**

Require landing distance assessment with an adequate safety margin. **A-07-57**



Red: Unacceptable response

Progress....

- October 2008
 - FAA funds 7 air carriers with EFBs and aural alerting systems to increase situational awareness @ 21 test airports
- November 2008
 - FAA announces nationwide deployment of ADS-B (starting w/11 FL ground stations; 794 nationwide by 2013)
- January 2009
 - Runway incursions down **slightly**
 - 226 in first quarter 2008
 - 224 in first quarter 2009
 - FAA/US Airways/ACSS partnership @ PHL
 - 20 US Airways A330s w/ADS-B **In & Out signal** avionics



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