General Aviation Safety, How Are We Doing?

Sun-n-Fun
April 25, 2015

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Member, NTSB
N6529R - B36TC Bonanza
The NTSB is an independent US federal agency charged with determining the probable cause(s) of transportation accidents, making recommendations to prevent their recurrence, conducting special studies and investigations, and coordinating resources to assist victims and their families after an accident.
Topics

• General Aviation Accident Trends
• Most Wanted List – 2015
  – Distractions
  – Substance Impairment
  – Fitness for Duty
  – Loss of Control
  – Procedural Compliance
• NTSB Mission
• NTSB Investigations
All GA Accidents

Number of accidents

<table>
<thead>
<tr>
<th>Year</th>
<th>Non-Fatal</th>
<th>Fatal Accidents</th>
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<tbody>
<tr>
<td>2000</td>
<td>1492</td>
<td>345</td>
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<tr>
<td>2001</td>
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<td>2002</td>
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<td>2007</td>
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<td>2008</td>
<td>1292</td>
<td>277</td>
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<tr>
<td>2009</td>
<td>1205</td>
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<td>2012</td>
<td>1198</td>
<td>273</td>
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<tr>
<td>2013</td>
<td>1001</td>
<td>221</td>
</tr>
</tbody>
</table>
GA Accident-involved Fatalities

Total Fatalities

Accident Statistics - 2013

• 1,298 Total Accidents (Down from 1,537 in 2012)
  • 236 Fatal Accidents
    • 429 Fatalities

• 1,224 General Aviation Accidents
  • 222 Fatal Accident
    • 390 Fatalities

• 51 Part 135 Accidents
  • 12 Fatal Accidents
    • 30 Fatalities
Preliminary Accident Statistics - 2014

- 1,264 Total accidents (down from 1298)
  - 258 Fatal accidents (up from 236)
- 1,202 General Aviation Accidents (down from 1224)
  - 250 Fatal Accidents (up from 222)
    - 405 Fatalities (up from 380)
- 38 Part 135 Accidents (down from 51)
  - 8 Fatal Accidents (down from 12)
    - 20 Fatalities (down from 30)
- 33 Accidents Business/Corporate
The 2011 GA Survey is currently not available. FAA is actively engaged in re-calibration efforts and expect to have validated 2011 data published at a later date.
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Defining Fatal Accident Events
All Part 91 GA 2008-2012

- Loss of Control in Flight
- System/Component Failure – Powerplant
- Controlled Flight into Terrain
- Collision with Terrain/Object (non-CFIT)
- VFR Encounter with IMC
- System/Component Failure – Non-Powerplant
Why GA on the Most Wanted List?

- NTSB investigates approximately 1500 GA accidents per year over the last decade
- Overall GA accident rate flat
  - Has improved little over the last decade
  - Airline accident rate decreased more than 80%
- Personal flying accident rate
  - Increased 20% over last 10 years
  - Fatal rate increased 25% over that period

- **GA safety needs attention**
NTSB 2015 Most Wanted List

- Disconnect from Deadly Distractions
- End Substance Impairment in Transportation
- Enhance Public Helicopter Safety
- Implement Positive Train Control in 2015
- Improve Rail Tank Car Safety
- Make Mass Transit Safer
- Prevent Loss of Control in Flight in General Aviation
- Require Medical Fitness for Duty
- Strengthen Commercial Trucking Safety
- Strengthen Procedural Compliance
2015 MWL - Distractions

- Disconnect from Deadly Distractions
  - A factor in all modes of transportation

- Aviation emphasis
  - Sterile Cockpit
  - Appropriate use of PEDs
  - Manage distractions
• *End Substance Impairment in Transportation*
  – A factor in all modes
• Fatally injured pilots - potentially impairing drugs
  – 11% average 1990 - 1997
  – 23% average 2008 - 2012
Toxicology Findings by Category, 1990-2012

Percent of Study Pilots with Positive Findings

- Potentially Impairing Drugs
- Potentially Impairing Condition
- Controlled Substances
- Illicit Drugs

Most Common Drugs

- Sedating antihistamines
  - Most common category

- Diphenhydramine
  - Most common individual drug
  - Most common potentially impairing drug
  - Use INCREASING
### Drug Facts

**Active ingredient (in each capsule)**
- Diphenhydramine HCl 25 mg

**Purpose**
- Antihistamine

### Uses
- temporarily relieves these symptoms due to hay fever or other upper respiratory allergies:
  - runny nose
  - sneezing
  - itchy, watery eyes
  - itching of the nose or throat
- temporarily relieves these symptoms due to the common cold:
  - runny nose
  - sneezing

### Warnings
*Do not use* with any other product containing diphenhydramine, even one used on skin.

**Ask a doctor before use if you have**
- a breathing problem such as emphysema or chronic bronchitis
- glaucoma
- trouble urinating due to an enlarged prostate gland

**Ask a doctor or pharmacist before use if you are taking sedatives or tranquilizers** when using this product:
- marked drowsiness may occur
- avoid alcoholic drinks
- alcohol, sedatives, and tranquillizers may increase drowsiness
- be careful when driving a motor vehicle or operating machinery
- excitability may occur, especially in children

If pregnant or breast-feeding, ask a health professional before use.

**Keep out of reach of children.** In case of overdose, get medical help or contact a Poison Control Center right away. (1-800-222-1222)

### Directions
- take every 4 to 6 hours
- do not take more than 6 doses in 24 hours

<table>
<thead>
<tr>
<th>Adults and children</th>
<th>1 to 2 capsules</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 years and over</td>
<td></td>
</tr>
<tr>
<td>children 6 to under 12 years</td>
<td>1 capsule</td>
</tr>
<tr>
<td>children under 6 years</td>
<td>do not use this product in children under 6 years of age</td>
</tr>
</tbody>
</table>

### Other information
- store at 59° to 77°F in a dry place. Protect from heat, humidity, and light.
- do not use if carton is open or blister unit is broken
- see side panel for lot number and expiration date
Toxicology Findings by Certificate, 2005-2012

Percent of Study Pilots with Positive Findings by Category

- ATP (n = 272)
- Commercial (n = 610)
- Private (n = 955)
- Sport (n = 30)

- Potentially Impairing Drugs
- Potentially Impairing Condition
- Controlled Substances
- Illicit

Highest Airman Certificate Held
Toxicology Findings by Medical, 2005-2012

Percent of Study Pilots with Positive Findings by Category

FAA Medical Within Duration of Third Class
- Potentially Impairing Drugs
- Controlled Substances

Expired / No Medical
- Potentially Impairing Drugs
- Potentially Impairing Condition
- Illicit

(n = 1,676)  (n = 260)
Medical Resources for Pilots

• FAA Publications
  – *Medications and Flying*
  – *Guide for Aviation Medical Examiners*

• Aircraft Owners and Pilots Association (AOPA)
  – Member resources
Medical Resources for Pilots

• General Aviation Joint Steering Committee (GAJSC)
  – 2013 Letter to pilots
  – 2014 Initiatives
    • Drug database
    • Training course
2015 MWL – Fitness for Duty

- **Require Medical Fitness for Duty**
  - A factor in all modes
- **Airman Medical** – fitness at exam time
- **Pilots must self-assess fitness**
  - Need for appropriate flight preparations
- **Focus on medical conditions**
  - Example – Obstructive Sleep Apnea
- **Enhance medical knowledge**
2015 MWL – Procedural Compliance

- **Strengthen Procedural Compliance**
  - More than a dozen related commercial aircraft accidents in last ten years
  - Equally applicable to corporate and business operations
    - Implement well developed procedures
    - Train to the procedures
    - Emphasize and reinforce operations to the procedures
2015 MWL – Loss of Control

• *Prevent Loss of Control in Flight in General Aviation*

• More than 40% GA accidents were LOC during 2001 – 2011

• Most deadly flight phases
  – Approach to landing
  – Maneuvering
  – Climb
Business Flying, 2008-2013

Number of Fatal Accidents

- Loss of Control In-Flight: 18
- Controlled Flight Into Terrain: 9
- Fuel Related: 3
- System/Component Failure - Non-powerplant: 3
- System/Component Failure - Powerplant: 3
- Unknown: 3
- Ground Handling: 1
- Other: 1
- Turbulence Encounter: 1
- Windshear/Thunderstorm: 1
### Instructional Flying, 2008-2013

#### Number of Fatal Accidents

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of Control In-Flight</td>
<td>59</td>
</tr>
<tr>
<td>Midair</td>
<td>9</td>
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<tr>
<td>Controlled Flight Into Terrain</td>
<td>8</td>
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<tr>
<td>System/Component Failure - Powerplant</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
</tr>
<tr>
<td>Abnormal Runway Contact</td>
<td>3</td>
</tr>
<tr>
<td>Low Altitude Operation</td>
<td>3</td>
</tr>
<tr>
<td>Abrupt Maneuver</td>
<td>2</td>
</tr>
<tr>
<td>Collision on Takeoff or Landing</td>
<td>2</td>
</tr>
<tr>
<td>Ground Handling</td>
<td>2</td>
</tr>
<tr>
<td>Loss of Control on Ground</td>
<td>2</td>
</tr>
<tr>
<td>Fuel Related</td>
<td>1</td>
</tr>
<tr>
<td>Unintended Flight Into IMC</td>
<td>1</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Number of Fatal Accidents: 60
Personal Flying, 2008-2013

Number of Fatal Accidents

- Loss of Control In-Flight: 521
- System/Component Failure - Powerplant: 120
- Controlled Flight Into Terrain: 102
- Other: 58
- System/Component Failure - Non-Powerplant: 55
- Unintended Flight Into IMC: 49
- Unknown: 47
- Fuel Related: 31
- Low Altitude Operation: 30
- Midair: 22
- Collision on Takeoff or Landing: 16
- Abrupt Maneuver: 15
- Abnormal Runway Contact: 14
- Loss of Control on Ground: 10

Number of Fatal Accidents

0 100 200 300 400 500 600

NTSB
Loss of Control In-Flight, 2008-2013

Number of Fatal Accidents

- Personal Flying: 521
- Instructional Flying: 59
- Business Flying: 18
- Corporate Flying: 8
Fatality by CAST/ICAO Common Taxonomy Team (CICTT) Aviation Occurrence Categories


No fatal accidents were noted in the following principal categories:
- ADRM Air Traffic Management/Communications, Navigation, Surveillance
- ATFM Air Traffic Management/Communications, Navigation, Surveillance
- BIRD Bird
- CABIN Cabin Safety Events
- CTOL Collisions with obstacle(s) during takeoff and landing
- EVAC Evacuation
- EXTL External load related occurrences
- F-POT Fire/Smoke (Post-Impact)
- FUEL Fuel Related
- GCOL Ground Collision
- ICE Ice
- LALT Low Altitude Operations
- LOC-G Loss of Control – Ground
- RIA Runway Incursion – Air
- RH VP Runway Incursion – Vehicle, Aircraft or Person
- SCF NP System/Component Failure or Malfunction (Non-Powerplant)
- SEC Security Related
- TURB Turbulence Encounter
- WILD Wildlife

- ARC Abnormal Runway Contact
- CFIT Controlled Flight Into or Toward Terrain
- F-NI Fire/Smoke (Non-Impact)
- LOC-I Loss of Control -- In Flight
- MAC Midair Near or Midair Collision
- OTHR Other
- RAMP Ground Handling
- RE Runway Excursion (Takeoff or Landing)
- SCF-PP System/Component Failure or Malfunction (Powerplant)
- UNK Unknown or Undetermined
- WSTRW Windshear/Thundersnow

Note: Principal categories as assigned by CAST.

For a complete description of CICTT Aviation Occurrence Categories, go to: http://www.intaviationstandards.org/
Primary category of accidents

- Personal flying
- Instructional flying
- Business flying
- Corporate flying
- Airline flying
LOC by Flight Phase

- **Approach**: 333 accidents, 165 fatal
- **Maneuvering**: 331 accidents, 237 fatal
- **Initial Climb**: 275 accidents, 126 fatal
- **Takeoff**: 200 accidents, 41 fatal
- **Landing**: 185 accidents, 13 fatal
- **Enroute**: 103 accidents, 91 fatal
- **Emergency Descent**: 91 accidents, 26 fatal
- **Unknown/Not Reported**: 8 accidents, 16 fatal

Legend:
- Green: All LOC Accidents
- Red: Fatal LOC Accidents
Fatal Airport LOC 2008-2014

Fixed-Wing Fatal Loss of Control Airport Accidents 2008-2014

- Takeoff - 41
- Initial Climb - 127
- Missed Approach / Go Around - 44
- VFR/IFR Approach - 55
- Final - 30
- Base - 23
- Downwind - 15
- Crosswind - 4
Loss-of-control Working Group

Safety Enhancements Identified

- AOA – New, Current, Retrofit
- Aeronautical Decision Making
- Stabilized Approach
- Single Pilot CRM
- Medication effects
- Weather Technologies
- Etc…

28 Safety Enhancements
Lower Cost AOA Displays

• Stall occurs at a specific Angle-of-Attack
  – But not necessarily at the same airspeed

First of AOA indicators built to ASTM stds and installed as a minor mod

FAA installation policy changed
Stall Recovery

• Reduce the angle-of-attack below stall AOA (Max CL)
  – Push over to eliminate stall warning
• Level wings
• Adjust thrust
  – Avoid overspeed and high G levels
• Pitch back to level flight
• Don’t try to “Power out of a stall”
NTSB Safety Alerts

- Preventing Aerodynamic Stalls
- Reduced Visual References
- Is Your Aircraft Talking to You
- Risk Management for Pilots
- Risk Management for Mechanics

Available on www.NTSB.gov
NTSB Structure

• The Board
  – Chairman
  – Vice Chairman
  – 3 Members

• Multi Mode
  – Aviation
  – Railroad
  – Highway
  – Marine
  – Pipeline and Hazardous Materials
The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in the other modes of transportation – railroad, highway, marine and pipeline -- and determining the probable cause of the accident.

The NTSB also participates in investigations conducted by other countries when U.S. aviation safety interests are involved.
Lubbock, TX – ATR 42-320 Cargo Aircraft
Gray Summit, MO – bus/vehicle/truck crash
Port Arthur, TX – Eagle Otome Tank Ship
Washington, DC – Washington Metro Transit System
NTSB Responsibilities

• Determines Probable Cause based on investigation
• Issues recommendations aimed at preventing future accidents.
• Conducts safety studies.
• Conducts Forums and Symposia on safety topics.
• Acts as U.S. accredited representative on foreign aviation accident investigations under the provisions of the International Civil Aviation Authority (ICAO) agreements.
• Maintains official civil aviation accident database.
• Evaluates the effectiveness of emergency responses to hazardous materials accidents.
• Provides family assistance following accidents.
• Acts as an administrative appeals court for actions concerning airmen, air carriers and mariners.
Investigation Process

• An NTSB “Go-Team” is dispatched from Washington headquarters to major transportation accidents.

• A full “Go-Team” for a major accident typically includes the following:
  – Board Member
  – Investigative-In-Charge (IIC)
  – Technical specialists
  – Public Affairs/Government Affairs officers
  – Family Affairs Specialists
Arrival On Scene
Arrival On-Scene

- Coordinate with local law enforcement authorities
- Establish our investigative resources at the accident site
- Establish an NTSB Operations Center
- Coordinate with Law Enforcement Command Post
- Confirm security arrangements
- Coordinate biohazard precautions with local authorities
Organization On-Scene

• Conduct an organization meeting
• Managed by the IIC
• Designed to:
  – Coordinate the investigative groups and the overall investigation
  – Identify NTSB participants
  – Establish and organize groups
  – Designate parties and party coordinators if appropriate
  – Specify Rules of Conduct of the NTSB investigation
Briefings

- Provided for both Press and Family (if applicable)
  - Factual information is reported to the media and families at least daily in briefings
  - The NTSB Board Member or IIC are the sole spokespersons for the investigation
Post On-scene

- Additional fact-finding work — including laboratory testing
- Analysis of the factual data
- Development of findings
- Probable Cause
Board Meeting

• The Board Members conduct a public meeting to discuss and approve a final report on the accident. The final report includes conclusions, a statement of probable cause, and recommendations.
Recommendations

• Safety recommendations are a major product of the Safety Board.

• Each Safety Recommendation:
  – Describes the action the board recommends.
  – States the safety need to be satisfied.
  – Designates the party or person expected to take action.
NTSB Office of Aviation Safety

All Civil Aviation Accidents
- Fatal
- Non-Fatal
- Midair
- Public-Use

Foreign Accidents of US Carriers

Foreign Accidents of US Manufacture or Design

Injury or Death of US Citizens
Nationwide NTSB Staffing

- Just over 400 Employees (All modes)
- 140 Employees (Aviation)
- 4 Regional Aviation Offices
- 50 Regional Aviation Investigators
- 6 (AS-10) Majors Investigators
The Office of Aviation Safety is composed of about 100 investigators. About half of the positions are located in the headquarters office and the other half divided among the regional offices.
NTSB Headquarters
L'Enfant Plaza

**Laboratories**
- CVR & FDR
- Materials (Met Lab)

**NTSB Management**
- Board Members
- Senior Staff
- Go-Team

**NTSB ROC**
- 24 / 7 Coverage
24 hr Accident Notification

WWW.NTSB.GOV

NTSB Response Operations Center

844-373-9922
“Data Collection” Accident Investigation

- Known circumstances
- No fatalities
- Pilot interview
- Investigator will not travel
- No mechanical issues
- No Preliminary Report
“Limited” Accident Investigation

- No fatalities
- Pilot interview
- Investigator may not travel to the scene
- Mechanical issues
“Field” Accident Investigation

- Fatalities (Crew/Pax)
- Investigator will travel to scene
- Transportation Disaster Assistance (TDA) if required
“Field Major” Investigation

- Multiple Fatalities
- Strong Public / Media Interest
- NTSB “Go Team” with a NTSB Board Member
- Transportation Disaster Assistance (TDA)
“Major” Investigation

- Large 121 Carriers
- Full “Go Team” with NTSB Board Member
- Transportation Disaster Assistance (TDA)
The Party Process

The Safety Board investigates more than 1,500 aviation accidents and incidents a year and about 500 rail, highway, marine and pipeline accidents. With only about 400 employees, the NTSB accomplishes this task by leveraging its resources and designating parties to its investigations.
Typically, parties include:

- FAA
- Air Carrier / Operator
- Airframe manufacturer
- Engine manufacturer
Absolutely no news media, company media relations, attorneys, consultants, or insurance personnel are permitted to participate in any phase of the investigation, including meetings.
What happens now?
What to expect

First Hour:
- Operator management contact
- Who, what, when, and where?
- State Troopers, U.S. Air Force (RCC), Coast Guard, Park Service

Second Hour:
- Travel itinerary
- FAA investigator responding
- Airframe / Engine Air Safety Dept.
- Offer party status
Regional Investigative Team
Regional Investigative Team

- NTSB Investigator
  Investigator-In-Charge (IIC)
Regional Investigative Team

- **NTSB Investigator**
  Investigator-In-Charge (IIC)

- **FAA Investigator**
  Not the operator's POI or PMI
Regional Investigative Team

- NTSB Investigator
  Investigator-In-Charge (IIC)

- FAA Investigator

- Airframe Investigator
Regional Investigative Team

- NTSB Investigator
  Investigator-In-Charge (IIC)

- FAA Investigator

- Airframe Investigator

- Engine Investigator
Party Member Expectations

- **Undivided Attention**
  On scene – 3 days
  Component testing - Travel
  Interviews

- **Operational Experience**
  Chief Pilot, Director of Safety
  Insight into corporate culture

- **Team Player**
  Able to work in groups, as a team member
“Learn all you can from the mistakes of others. You won’t have time to make them all yourself”
Accident Investigations

• NTSB accident files are on-line
• Many recent accident Dockets are on-line
  – Factual reports,
  – Interviews
  – Photographs
• www.ntsb.gov

Douglas Adams

“Human beings, who are almost unique in having ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so.”