Some General Aviation Safety Issues:
What Accident Investigators Are Seeing
Outline

– **NTSB 101**

– **Loss of Control**
  • Taken from slides presented at 2015 Sun & Fun by Paul Cox, Senior Air Safety Investigator, Eastern Region

– **Runway Accidents**
  • Taken from slides prepared by Dan Bartlett, ATC Transportation Safety Specialist

– **See and Be Seen**
  • Taken from NTSB Safety Alert, “See and Be Seen: Your Life Depends on It,” Issued May 2015

– Last but not Least: Shoulder Harnesses?
What the NTSB Does

- Independent federal agency, investigate transportation accidents, all modes
- Determine probable cause(s) and make recommendations to prevent recurrences
- Do not determine blame or liability

- Independence
  - Political: Conclusions and recommendations based upon facts and evidence rather than politics
  - Functional: Impartial and unbiased because no “dog in the fight”
Purpose

- Single focus is *SAFETY*

- Primary product: Safety recommendations issued to any entity that has authority to address the problem

- Response to recommendations: > 80% acceptable

June 6, 2015 AOPA Fly-In
General Aviation Investigations

- Statute requires investigation of all aviation accidents
  - Lesser requirements for other modes
- About 1,500 GA accidents per year
- Most investigated, with FAA help, by about 50 regional investigators
- Upward trend in accidents involving personal (non-business) flying
NTSB Advocacy Tools

- Accident reports, recommendations
- Testimony in Congress
- Convening conferences and forums
- Most Wanted List, issued annually
  - Specific to GA: Loss of Control
  - Also relevant to GA: Distraction, impairment, medical fitness, and procedural compliance
- Safety Alerts
- Participating in conferences
Appellate Function

- FAA license suspension/revocation proceedings are heard first by administrative law judge

- Appeals heard by the full Board

- Changes from Pilot’s Bill of Rights II?
Loss of Control Accidents

- Largest single cause (>40%) of GA accident fatalities
- General Aviation Joint Steering Committee (GAJSC) formed a Loss of Control Work Group
- On NTSB 2015 Most Wanted List
- Not defined in FARs, AIM, Pilot Handbook of Aeronautical Knowledge
- But we know it when we see it
LOC Accidents: Phase of Flight

LOC by Flight Phase

- Approach: 333 incidents (165 non-fatal, 268 fatal)
- Maneuvering: 331 incidents (237 non-fatal, 94 fatal)
- Initial Climb: 275 incidents (126 non-fatal, 149 fatal)
- Takeoff: 200 incidents (41 non-fatal, 159 fatal)
- Landing: 185 incidents (13 non-fatal, 172 fatal)
- Enroute: 103 incidents (91 non-fatal, 12 fatal)
- Emergency Descent: 26 incidents (16 non-fatal, 10 fatal)
- Unknown/Not Reported: 8 incidents (12 non-fatal, 0 fatal)

2008-2014
LOC Accidents: Time of Day, Weather

**All FW LOC Light Condition**
- DUSK/DAWN: 2%
- NIGHT: 7%
- DAYL: 91%

**Fatal FW LOC Light Condition**
- DUSK/DAWN: 3%
- NIGHT: 13%
- DAYL: 84%

**All FW LOC Weather**
- IMC: 9%
- VMC: 91%

**Fatal FW LOC Weather**
- IMC: 18%
- VMC: 82%

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June 6, 2015
AOPA Fly-In

NTSB
LOC Accidents Near an Airport

Airport LOC Phases of Flight

- Takeoff: 41 (All LOC Accidents), 196 (Fatal LOC Accidents)
- Initial Climb: 127 (All LOC Accidents), 276 (Fatal LOC Accidents)
- Approach: 31 (All LOC Accidents), 1 (Fatal LOC Accidents)
- Approach-Circling (IFR): 2 (All LOC Accidents), 1 (Fatal LOC Accidents)
- Approach-IFR Final Approach: 17 (All LOC Accidents), 17 (Fatal LOC Accidents)
- Approach-IFR Initial Approach: 12 (All LOC Accidents), 12 (Fatal LOC Accidents)
- Approach-IFR Missed Approach: 16 (All LOC Accidents), 16 (Fatal LOC Accidents)
- Approach-VFR Go-Around: 78 (All LOC Accidents), 78 (Fatal LOC Accidents)
- Approach-VFR Pattern Base: 31 (All LOC Accidents), 31 (Fatal LOC Accidents)
- Approach-VFR Pattern crosswind: 4 (All LOC Accidents), 4 (Fatal LOC Accidents)
- Approach-VFR Pattern Downwind: 22 (All LOC Accidents), 22 (Fatal LOC Accidents)
- Approach-VFR Pattern Final: 15 (All LOC Accidents), 15 (Fatal LOC Accidents)
- Landing: 30 (All LOC Accidents), 30 (Fatal LOC Accidents)
- Landing-Flare/Touchdown: 58 (All LOC Accidents), 58 (Fatal LOC Accidents)

2008-2014
Challenges Near the Airport

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

Base - 23

Downwind - 15

VFR/IFR Approach 55

Missed Approach / Go Around - 44

Final - 30

Crosswind - 4

Takeoff - 41

Initial Climb - 127
What’s Happening in LOC Accidents?

— All aircraft: Typically some type of aerodynamic stall
  • Straight stall
  • Accelerated stall
    ➢ More than 1 g
  • Takeoff/climb stall
    ➢ Back side of the power curve
  • Yaw stall (spin)
  • Skidded turn/cross-controlled stall

— Multi-engine aircraft
  • All of the above plus Vmc roll
Case Study: Kitfox, April 14, 2013

- Probable Cause: Pilot’s failure to maintain adequate airspeed during the turn to final, which resulted in an exceedance of wing critical angle-of-attack and a subsequent aerodynamic stall

- Contributing: Pilot’s combined use of two sedating antihistamines, which resulted in his impairment
Accelerated Stall:
Cirrus SR22, February 29, 2012

– Probable Cause: Pilot’s abrupt maneuver in response to a perceived traffic conflict, which resulted in an accelerated stall and a loss of airplane control at low altitude

– Contributing: Air traffic controller’s incomplete instructions, which resulted in improper sequencing of traffic landing on the same runway
Takeoff/Climb Stall: Cessna 177B, May 5, 2012

– Probable Cause: Pilot pitching the airplane to an excessive nose-up attitude during an aborted landing, which resulted in increased induced drag, diminished airspeed, and an aerodynamic stall/spin

– Contributing: Pilot’s use of a sedating antihistamine, which resulted in impaired mental and motor skills
Vmc Roll: Cessna 441, December 22, 2012

– Probable Cause: Pilot’s failure to maintain minimum control airspeed after a loss of power to the right engine which resulted in an uncontrollable roll into an inadvertent stall/spin

– Contributing: Failure of the right engine for undetermined reasons and the pilot’s subsequent turn toward that inoperative engine while maintaining altitude
Remedies? Mostly Human Factors

- Be honest with yourself about your knowledge of stalls and your ability to anticipate and react to them
- Understand and maintain currency in the equipment and airplanes you fly
- Maximize training opportunities
- Prepare thoroughly for the environments in which you’ll be flying
- Anticipate, manage, and minimize distractions
- Increase your situational awareness, e.g., angle of attack indicator
Runway Accidents: Definitions

– Incursion
  • Previously defined by FAA as hazard created by airplane or vehicle on the runway when it should not have been
  • Now defined as “any occurrence at an aerodrome involving incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing or takeoff aircraft” whether or not a hazard was created
Definitions, con’t

– Excursion
  • Includes takeoff overruns, landing overruns, and departing the runway laterally during takeoff or landing
  • Does not include landing short

– Confusion
  • Includes using other than dedicated or assigned surface for takeoff or landing, e.g., taxiway other than runway, or wrong runway
Runway Accidents, 1995-2010

All Runway Accidents

652

6

11

Fatal Runway Accidents

4
(67% Fatal)

65
(10% Fatal)

6
(55% Fatal)

Note: Of 1429 accidents involving major or substantial damage from 1995-2008, 431 (30%) were runway related.
Runway Accident Fatalities, 1995-2010

Confusions, 136

Incursions, 129

Excursions, 1121
Relative Frequency

– Almost 60 times more excursion accidents than incursion accidents

– Almost 11 times more fatal accidents, and almost 9 times more fatalities, from excursions than incursions

– Confusions represent less than 1% of runway related accidents
Incursion Numbers and Rates

743 Runway Incursions

- OI, 147, 19.8%
- V/PD, 132, 17.8%
- PD, 464, 62.4%

464 Pilot Deviations

- General Aviation, 372, 80%
- Commercial, 55, 12%
- Air Taxi, 20, 4%
- Military, 4, 1%
- Other, 1, 0%
- Foreign, 12, 3%

Source: FAA, 1 Oct 2011 – 30 June 2012
Runway Incursions – Bad News

A and B Runway Incursion Details

All U.S. Towered Airports – A and B RI

FY 2014 Performance Limit
.386 per million operations

DATA ARE PRELIMINARY AND SUBJECT TO CHANGE
DATA CURRENT AS 3/23/2015
What’s Going Wrong?
Sometimes People Simply **FORGET**!

- Nearly half of GA incursions involve entry onto the runway or across the hold short line
  - In nearly half of those, the pilot received a clearance, acknowledged the clearance, and read it back correctly
  - In the remainder, the pilot either received no clearance, or received a clearance to, but not onto, the runway

- Controllers sometimes forget and issue simultaneous (conflicting) clearances
Other Error Sources: Abnormal Operations

– Construction
  • Normal or construction lights may be inoperative
  • Routes may not be well marked
  • Procedures interim, may not be robust

– Other
  • Stuck mike – Causal link in takeoff without clearance
  • Long conversation – Resulted in landing without clearance
  • Mishap at airport – Resulted in incorrect clearance (procedures not robust or well-practiced)
Result: New Paradigm

- Previous Response: Punishment
  - Mostly pilots
  - Sometimes controllers

- The Good News: Runway Safety Council
  - Objective: Identify and fix problems, rather than punish
  - Collaborative activity, including FAA, airlines, labor, AOPA, and others
  - Quarterly meetings to determine root causes, re most recent RI’s, make recommendations
  - Follow up on recommendations
Problems and Solutions: Airport Chart

- Have it
  - Incursions sometimes due to pilots unfamiliar, no chart
  - Get charts online
  - Encourage FBOs to provide charts

- Understand it (especially “Hot Spots”)
  - Incursions due to missed turn while programming FMS
  - Incursions due to failure to clarify confusing clearance
  - Incursions due to unawareness of “gotcha”
  - Wrong runway due to inadequate awareness of geometry
Unawareness of “Gotcha”

Note entry onto runway immediately after right turn out of FBO ramp
Expectation Bias
(Think You Hear What You Expect To Hear)

- Pilot hears clearance incorrectly
  - Pilot told to continue approach
  - Controller in long conversation re other matter
  - Pilot landed without clearance

- No readback
  - Pilot’s readback did not specify which runway
  - Controller did not ask
  - Pilot departed on wrong runway

- Controller hears readback incorrectly
  - Readback re non-existent intersection should have alerted controller to problem
No Readback; Wrong Runway

Note that
- Taxiway A does not go to RW 22R; must turn right onto Taxiway B
- Taxiway A becomes Taxiway A1, but change not obvious
- Taxiway A1 goes to RW 22L
Non-Existent Intersection

Note that Taxiway M does not intersect RW 25L
Lessons Learned

- Many airport safety issues examples involve
  - *At least one error by a pilot, and*
  - *At least one error by a controller*

- The system involves many good people trying to do the right thing, but pilots and controllers must always be alert for errors
  - *their own and others*

- Pilots and controllers:  *Trust but verify*

  - Pilots: Always use the taxi chart; and when in doubt, *ASK!!*
Sample of Results

- Inclusion of chapter re Runway Incursion Avoidance in Pilot’s Handbook of Aeronautical Knowledge

- Progress toward inclusion of runway incursion material in
  • Practical Test Standards
  • Instructor training
  • Part 142 curriculum

- Changes in ATC procedures

- Changes re airport signs and markings
Recently Announced

- FAA Runway Incursion Mitigation (RIM) Program
  - FAA developed a preliminary inventory of airport locations where runway incursions have occurred
  - Identified specific airport areas with risk factors that could contribute to a runway incursion, and identified those risk factors
  - Plan to work with airports to develop strategies to mitigate runway incursions at these locations
Moral of the Story

Identifying problems and fixing them improves safety far more effectively than punishment.
See and Be Seen

- The good news – It’s a very big sky
- The bad news – One midair collision can ruin your whole day!
- Collisions are more likely in high traffic areas, e.g., near airports and ground-based navaids (less now since GPS)
- Can also happen enroute
- Emerging threat – distractions in the cockpit
- NTSB issued Safety Alert, May 2015
Safety Alert Countermeasures

- Vigilant and methodical scanning . . . and not just in high-volume traffic areas
- Divide attention in and out of the cockpit, minimize distractions
- Maximize conspicuity of your aircraft
- Broadcast your intentions clearly
- Increase vigilance in situations that make aircraft spotting more difficult
- Encourage passengers to participate in spotting traffic
- Use on-board traffic advisory systems . . . but only as backup, not as a substitute
Final Note: Shoulder Harnesses?

- Substantially better protection than lap belt alone
- Recommended by NTSB for nearly 40 years
- Required for front seats in newly built aircraft since 1978
- Required for all seats in newly built aircraft since 1986
- Substantial percentage of the fleet older, not equipped
- Many accidents might have been survivable with shoulder harnesses
  - If you don’t have them, consider getting them, and
  - If you do have them, please make sure you use them!
- The choice is yours . . .
Thank You, and Happy Flying!!!

Questions?