NTSB National Transportation Safety Board

General Aviation and the NTSB Most Wanted List

EAA AirVenture

Oshkosh, WI

July 25th, 2016

Earl F. Weener, Ph.D.
Member, NTSB

N6529R - B36TC Bonanza

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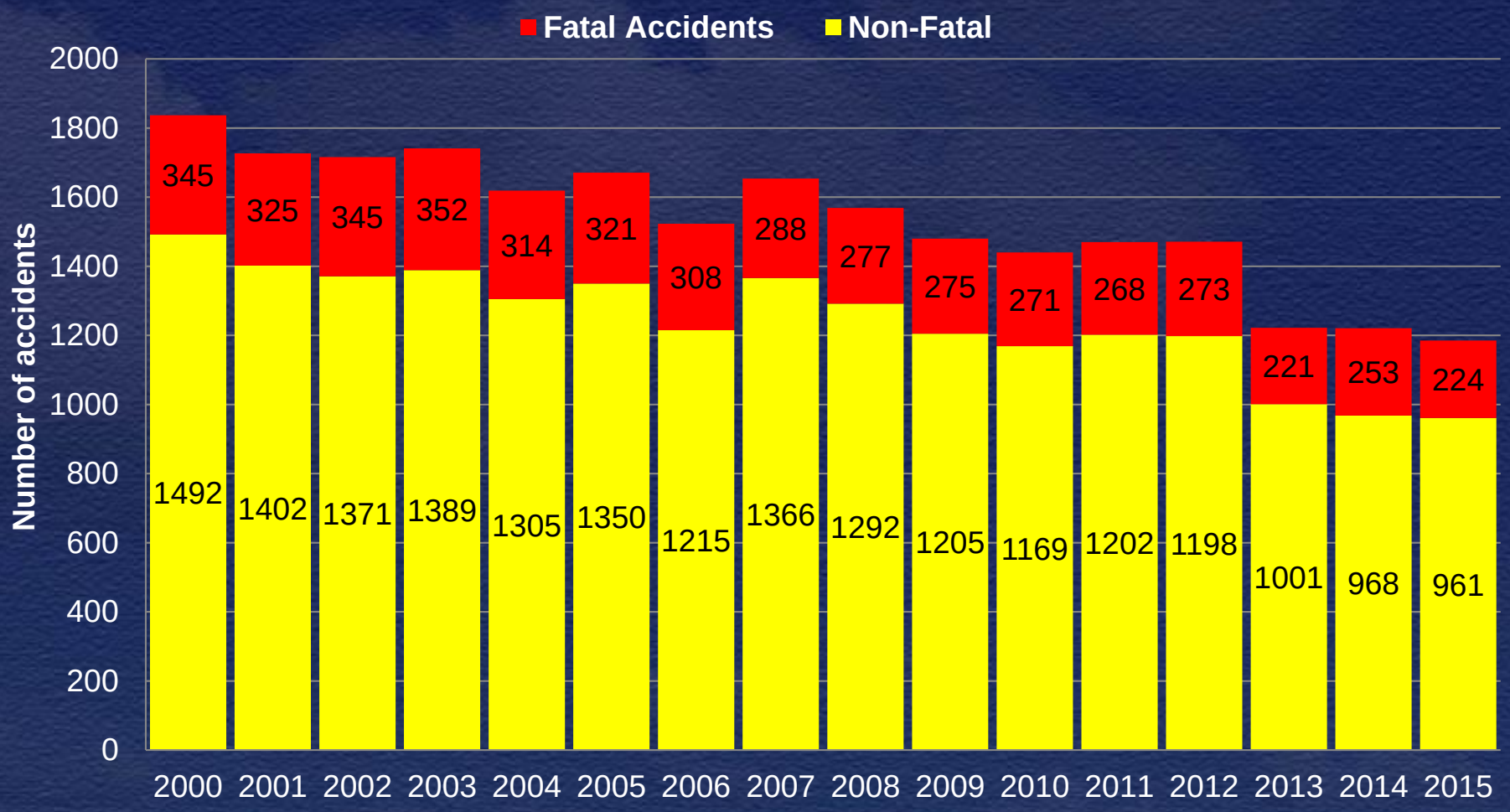
NTSB Mission

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 – 2016
  - Distraction
  - Substance Impairment
  - Medical Fitness for Duty
  - Fatigue
  - Occupant Protection
  - Recorders
  - Loss of Control

All GA Accidents



*2015 Preliminary numbers

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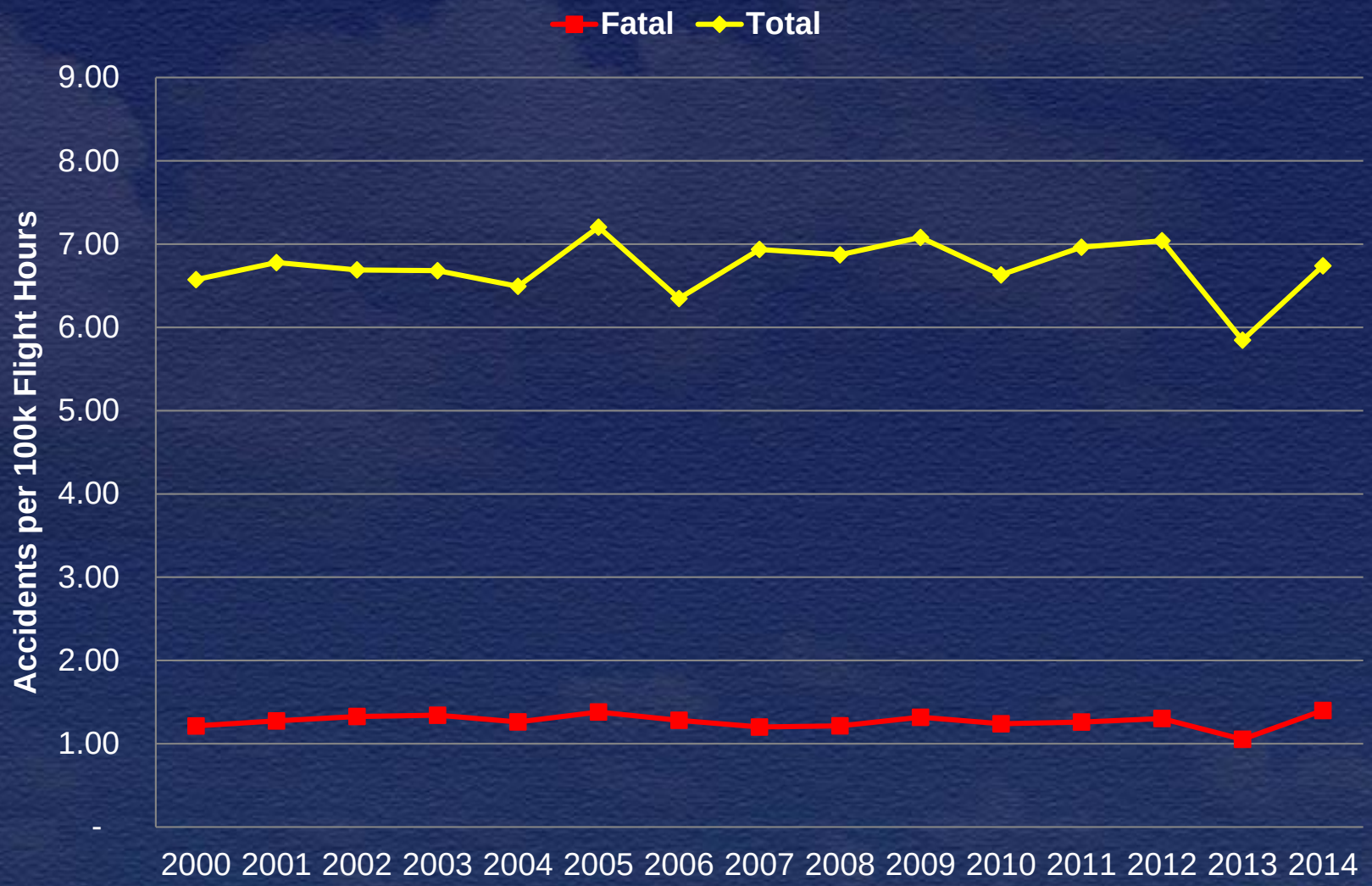
GA Accident-involved Fatalities

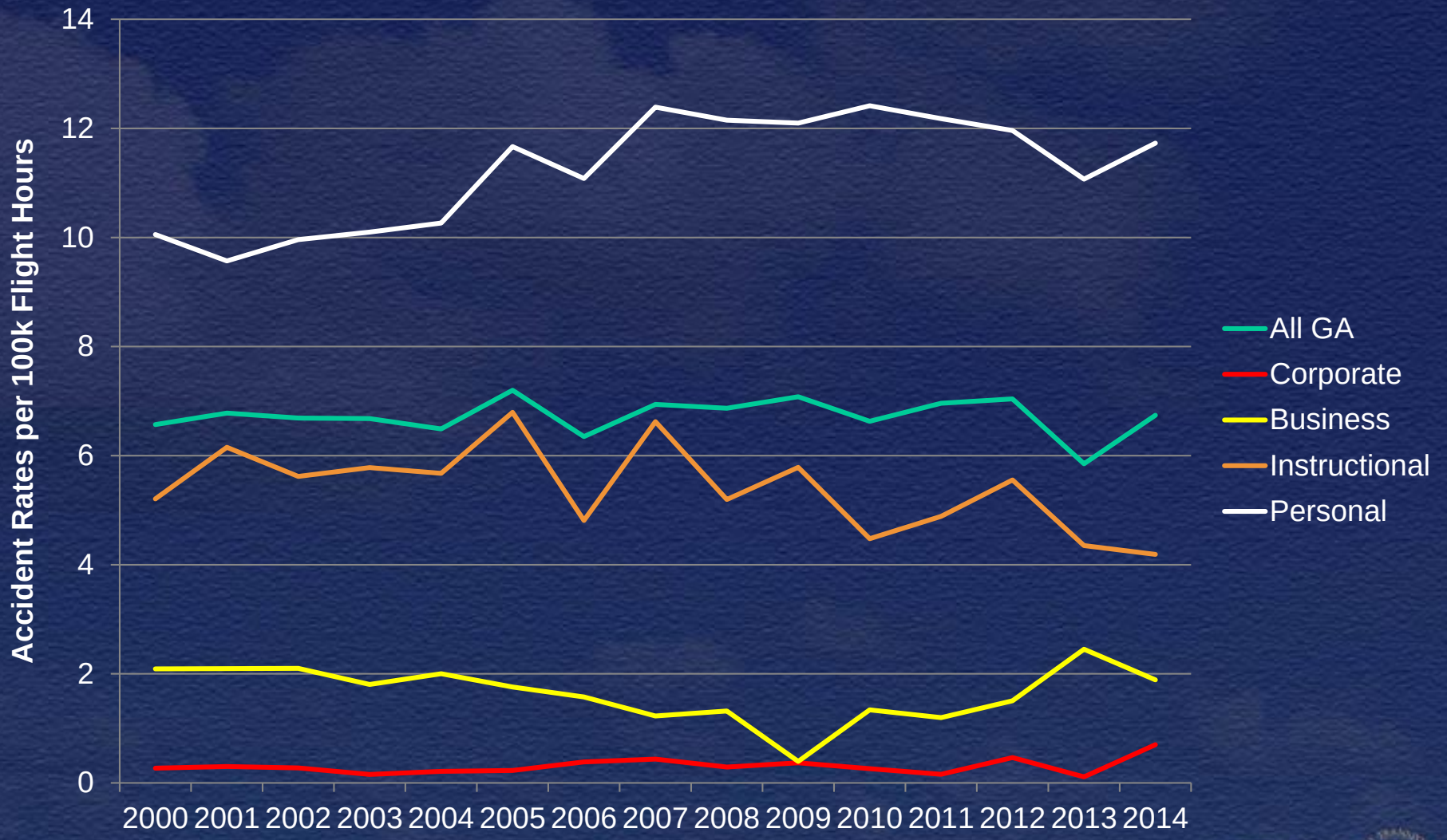
*2015 Preliminary numbers

GA Accident Rates



*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.

Accident Rates per 100k Flight Hours



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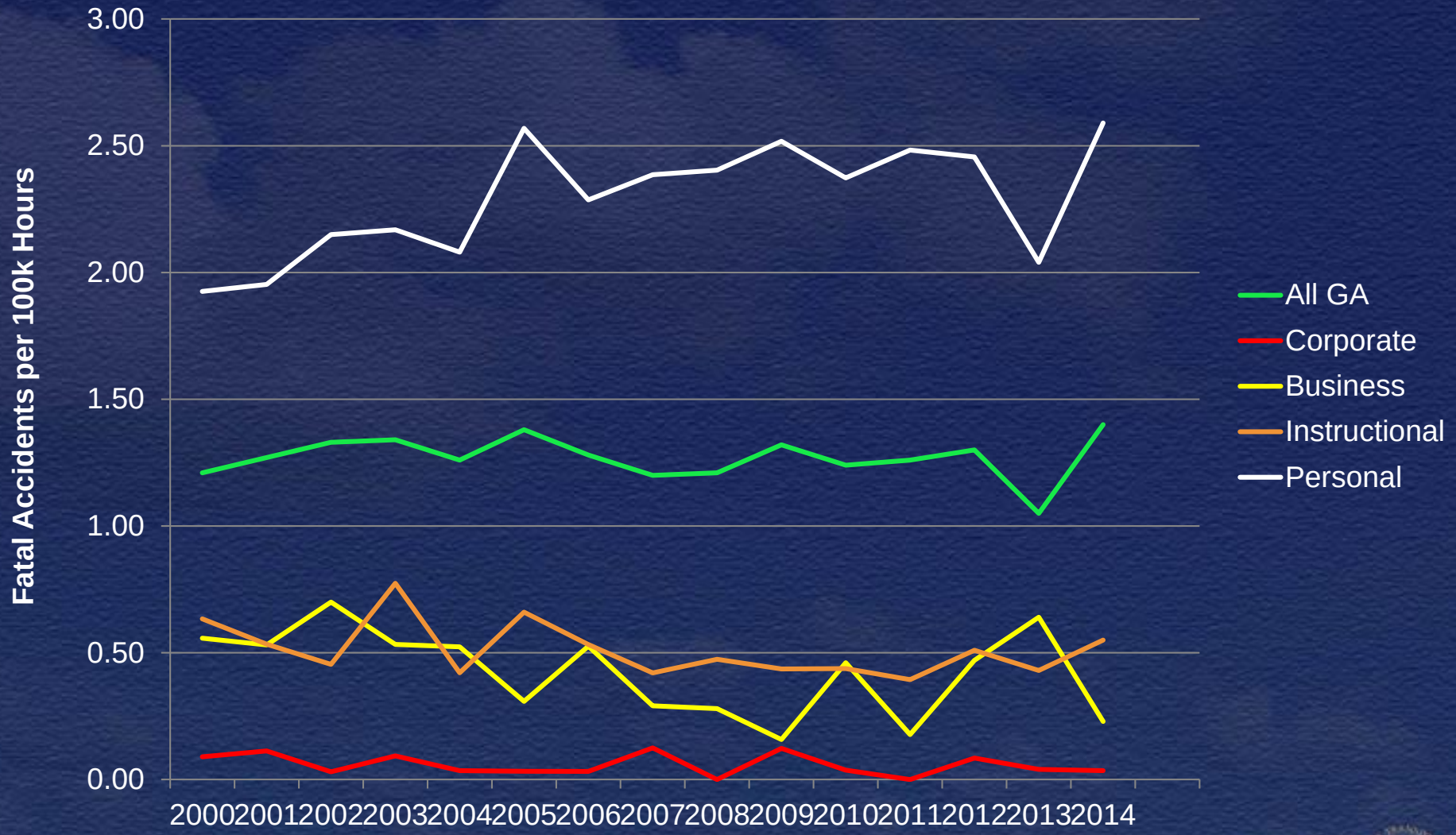
Fatal Accident Rates per 100k Flight Hours



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Defining Events – Part 91 Ops

Business	Instruction	Personal
1. Loss of Control	1. Loss of Control	1. Loss of Control
2. CFIT	2. Midair	2. Powerplant Fail
3. Fuel	3. Powerplant Fail	3. CFIT
4. Component Fail	4. CFIT	4. Other
5. Powerplant Fail	5. Other	5. Component Fail

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 13% over last 10 years
  - Greater than 15% increase in fatals over that period

- ***GA safety needs attention***

NTSB 2016 Most Wanted List

- Disconnect from Deadly Distractions
- End Substance Impairment in Transportation
- Expand Use of Recorders to Enhance Transportation Safety
- Improve Rail Transit Safety Oversight
- Prevent Loss of Control in Flight in General Aviation
- Promote Availability of Collision Avoidance Technologies in Highway Vehicles
- Promote the Completion of Rail Safety Initiatives
- Reduce Fatigue-Related Accidents
- Require Medical Fitness for Duty
- Strengthen Occupant Protection

Gray Summit, MO – bus/vehicle/truck crash

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Distraction

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Distraction

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Distraction

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2016 MWL - Distractions

- ***Disconnect from Deadly Distractions***
  - A factor in all modes of transportation
- Aviation emphasis
  - Sterile Cockpit
  - Appropriate use of PEDs
  - Manage distractions

Impairment

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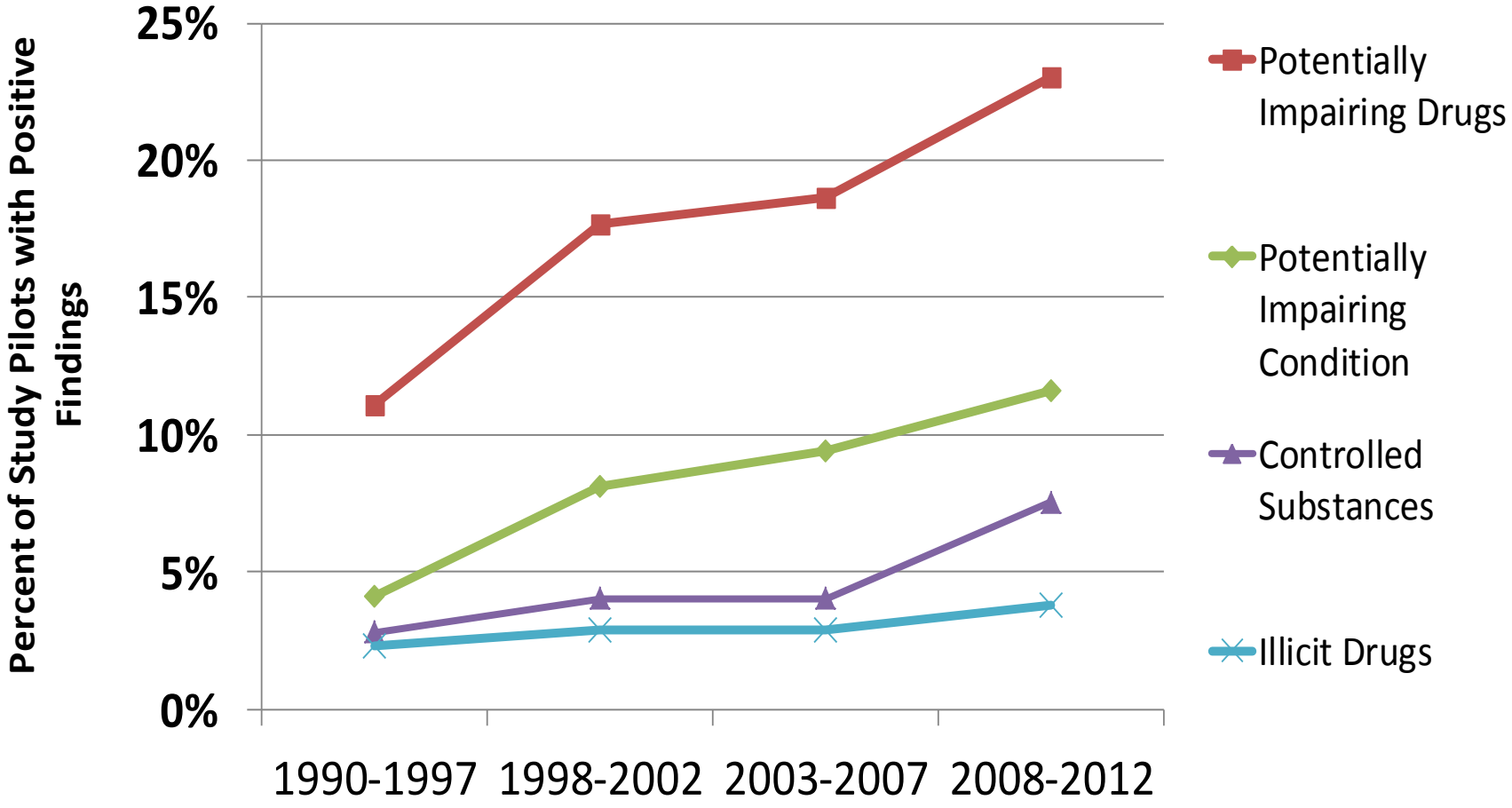
2016 MWL - Impairment

- ***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



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) — **Purpose**

Diphenhydramine HCl 25 mg ..... 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 ... taking sedatives or tranquilizers

When using this product

- marked drowsiness may occur
- avoid alcoholic drinks
- alcohol, sedatives, and tranquilizers 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

adults and children 12 years and over	1 to 2 capsules
children 6 to under 12 years	1 capsule
children under 6 years	do not use this product in children under 6 years of age

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

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Medical Resources for Pilots

- General Aviation Joint Steering Committee (GAJSC)
  - 2013 Letter to pilots
  - 2014 Initiatives
    - Drug database
    - Training course

Medical Resources for Pilots

- FAA Publications
  - *Medications and Flying*
  - *Guide for Aviation Medical Examiners*
- Aircraft Owners and Pilots Association (AOPA)
  - Member resources

Medical Fitness for Duty

Fitness for Duty

2016 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

Fatigue

2016 MWL - Fatigue

- ***Reduce Fatigue - Related Accidents***
  - A factor in all modes
  - 182 Major investigations (2001 – 2012)
    - 20% involved fatigue
  - Need
    - Research, education, training
    - Technologies
    - Hours of service, on/off duty policies
    - Medical treatment of sleep disorders

BE A36 – 2 fatalities/2 survivors

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2016 MWL – Occupant Protection

- ***Strengthen Occupant Protection***
  - A factor in all modes
  - Numerous investigations showed potential for reduced injuries & fatalities
  - Need
    - Increased use of existing restraint systems
    - Designs that enhance survival space
    - Enhance ease of evacuation
    - Shoulder harnesses for GA aircraft

Recorders

FLIGHT
RECORDER
DO NOT OPEN
Honeywell
FLIGHT
RECORDER
DO NOT OPEN
VOYAGE DATA RECORDER
DO NOT OPEN
REPORT TO AUTHORITIES
FURUNO ELECTRIC CO., LTD.
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Recorders

- Expand use of recorders to enhance transportation safety
  - A factor in all modes
  - Critical in accident investigation
  - Install crash resistant image recorders in smaller turbine powered aircraft
  - Install flight recorders in transport category and HEMS aircraft

Loss of Control

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Loss of Control

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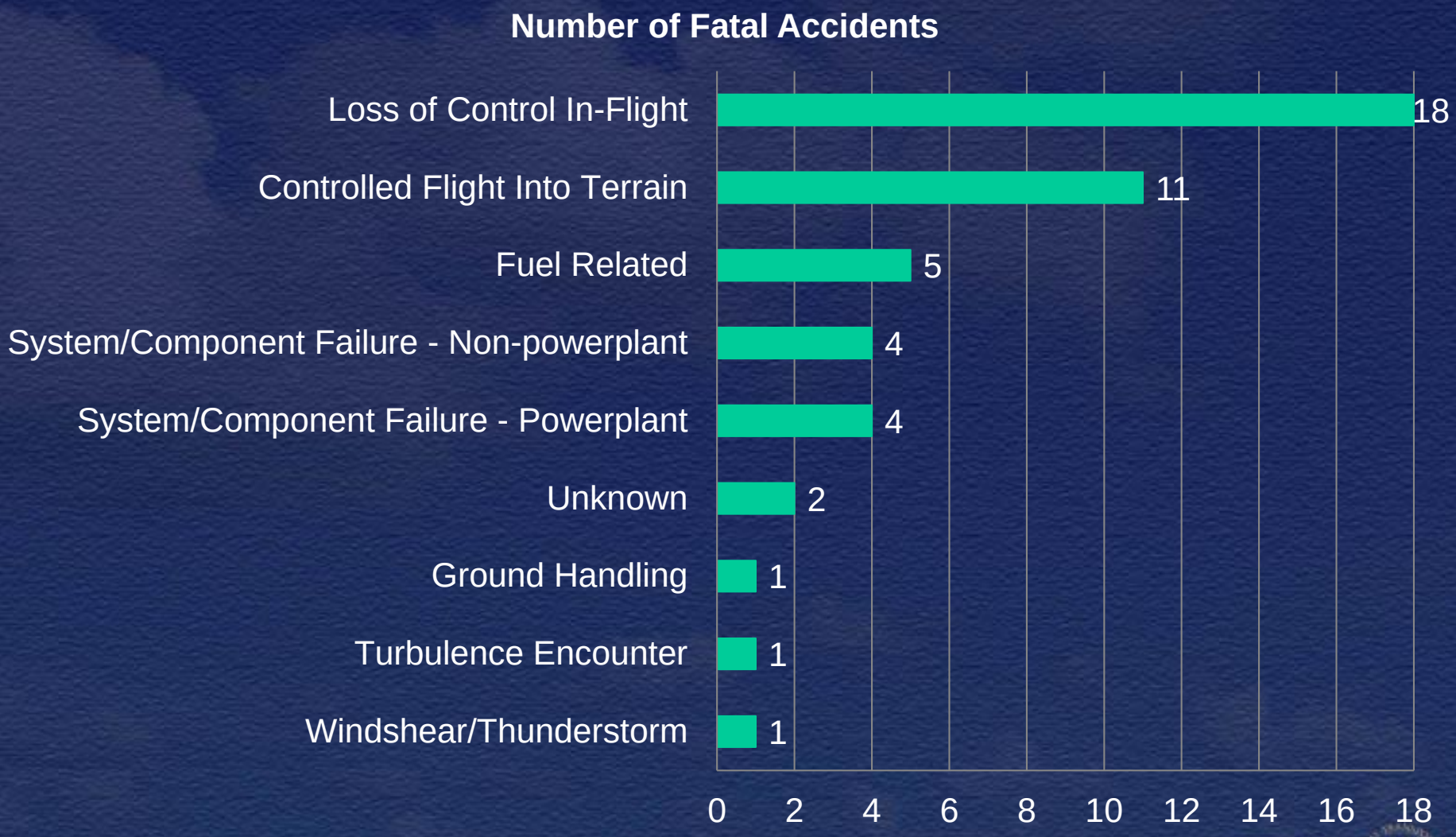
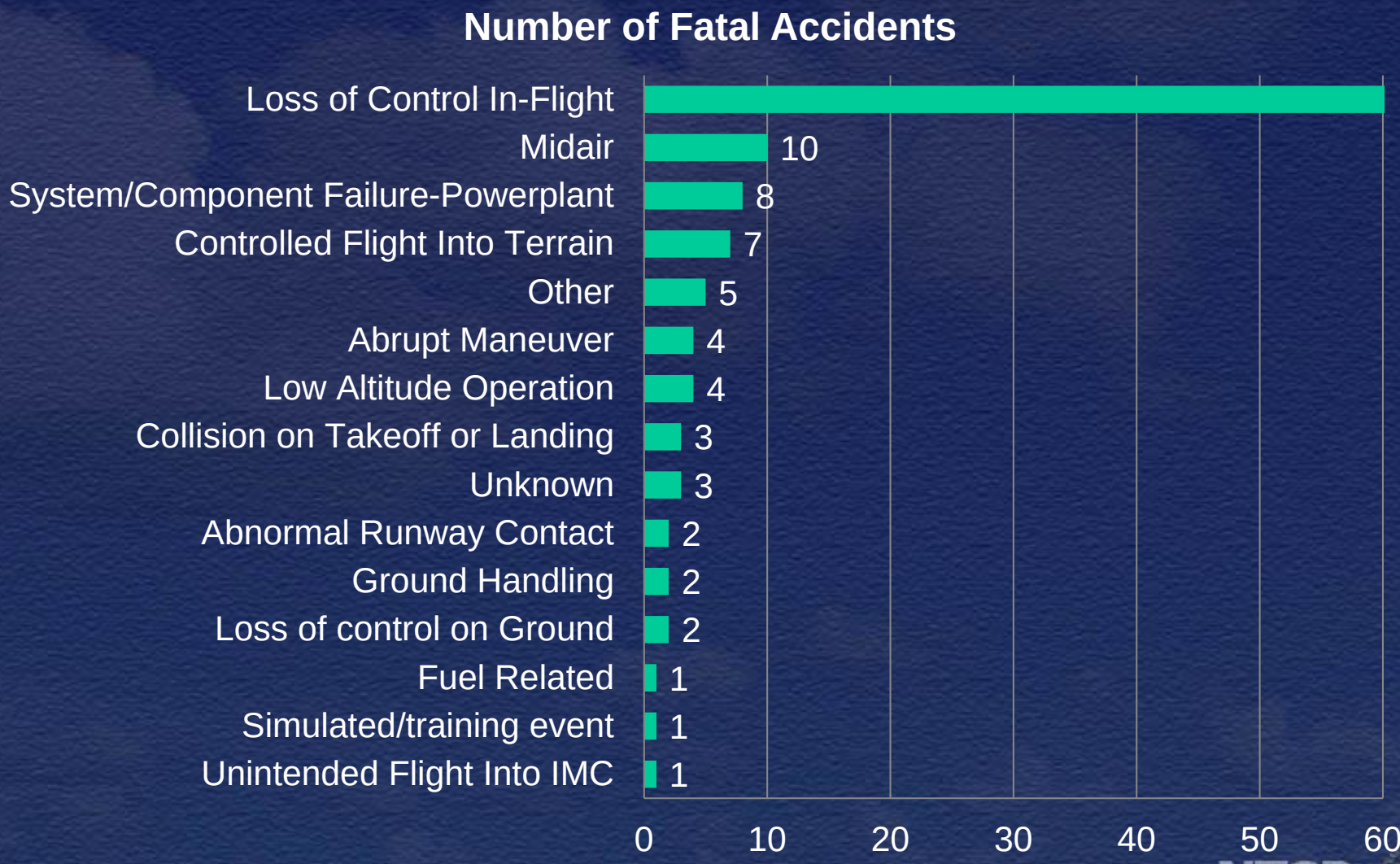
2016 MWL – Loss of Control

- ***Prevent Loss of Control in Flight in General Aviation***
- More than 40% fatal GA accidents were LOC during 2004 – 2014
- Most deadly flight phases
  - Approach to landing
  - Maneuvering
  - Climb

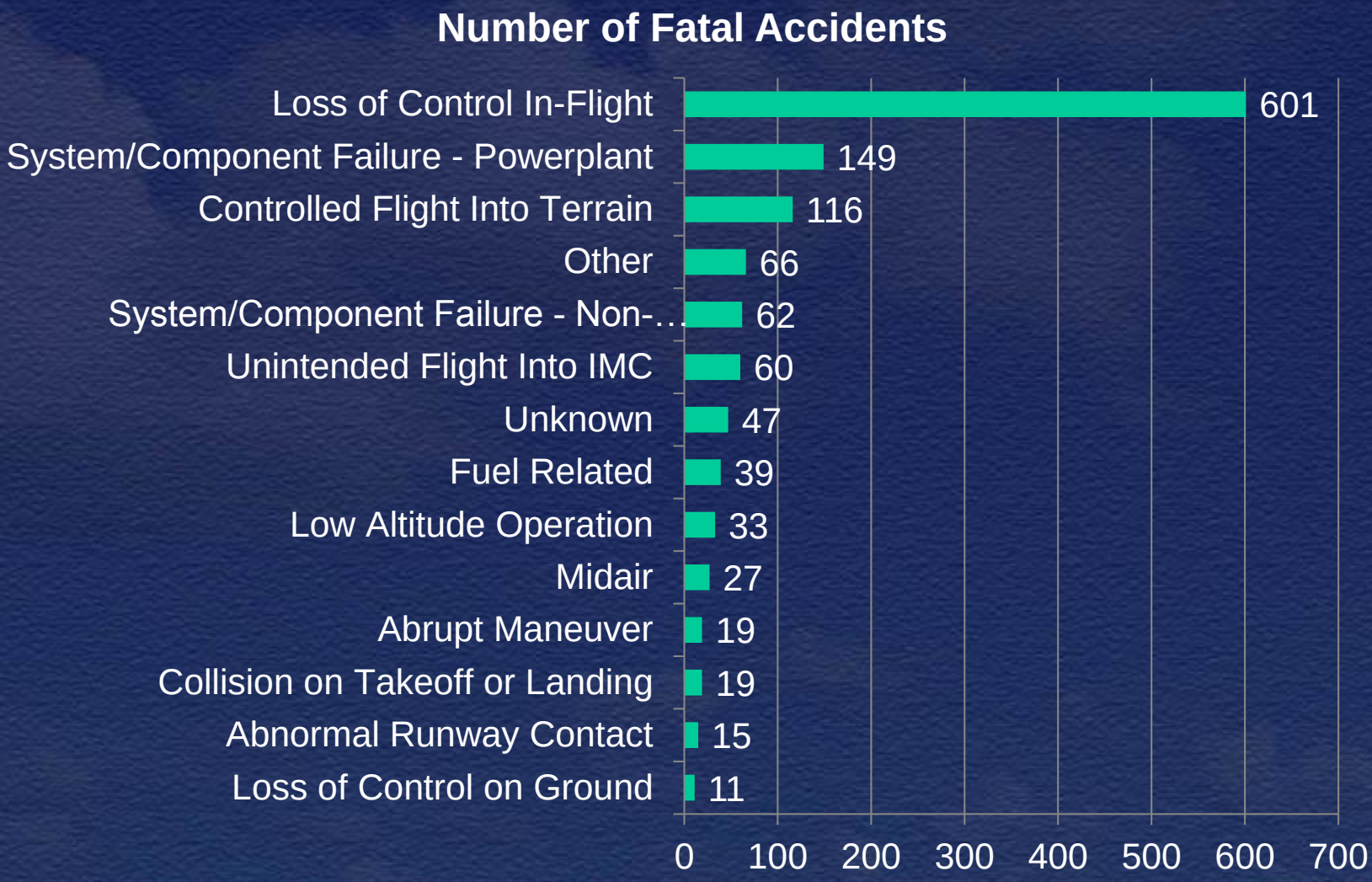
Business Flying, 2008-2014



Instructional Flying, 2008-2014



Personal Flying, 2008-2014



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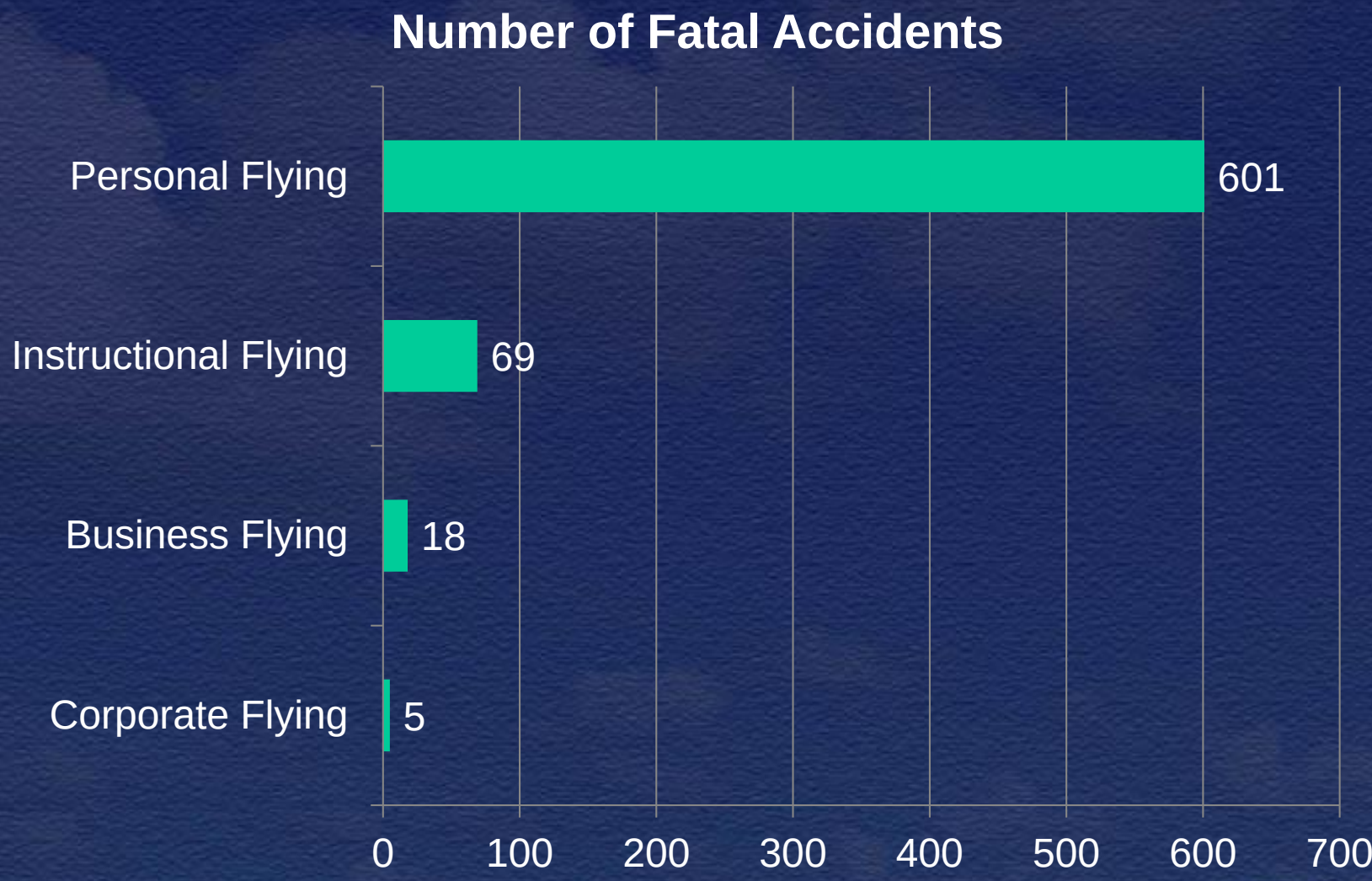
Loss of Control In-Flight, 2008-2014



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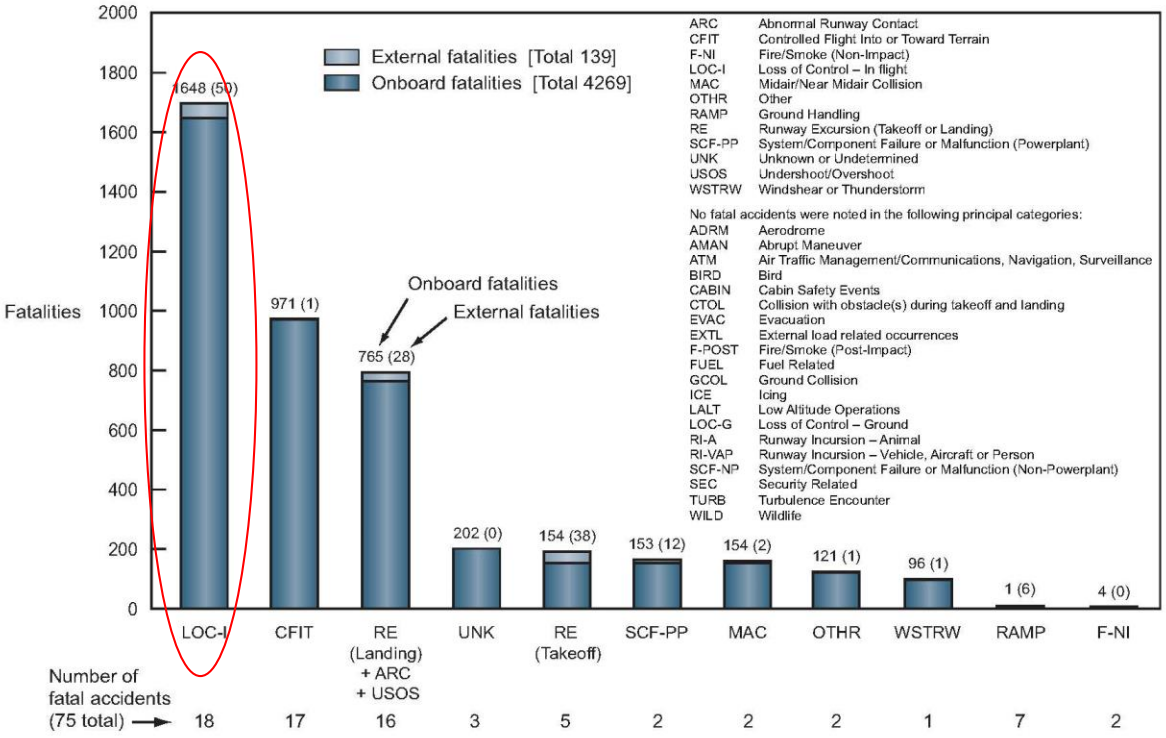
Boeing Annual Statistical Summery

Fatalities by CAST/ICAO Common Taxonomy Team (CICTT) Aviation Occurrence Categories

Fatal Accidents – Worldwide Commercial Jet Fleet – 2003 Through 2012



Note: Principal categories as assigned by CAST.

For a complete description of CICTT Aviation Occurrence Categories, go to: http://www.intlaviationstandards.org/

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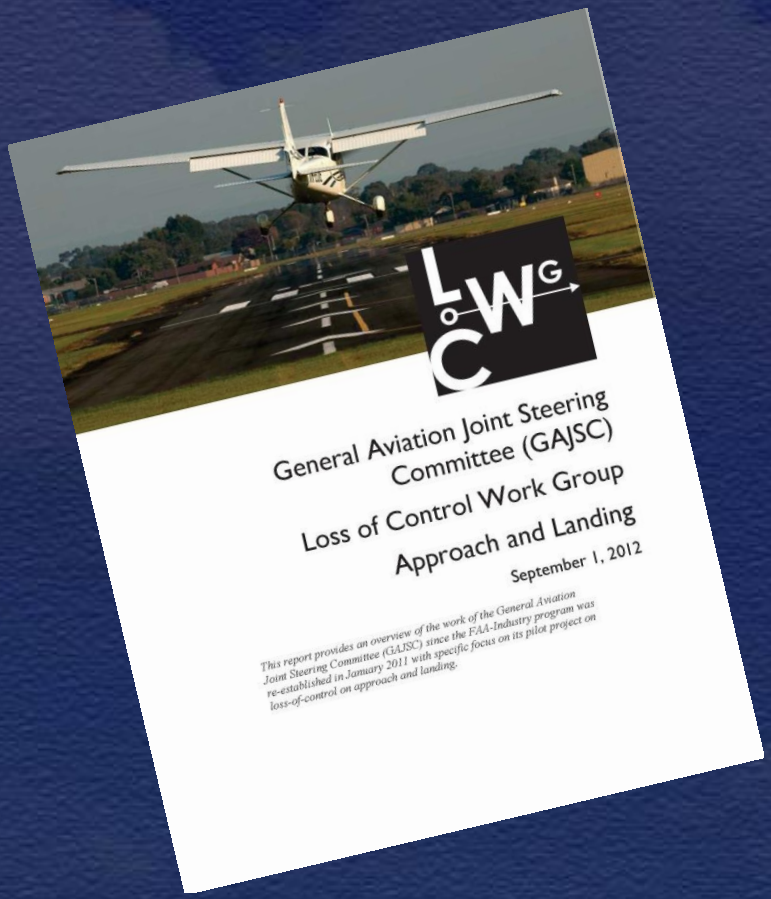
Primary category of accidents

Personal flying	–	LOC
Instructional flying	–	LOC
Business flying	–	LOC
Corporate flying	–	LOC
Airline flying	–	LOC

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

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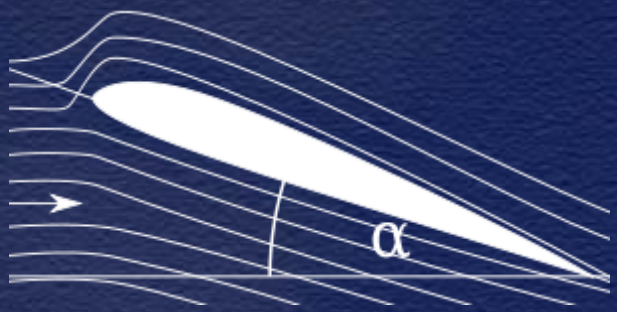
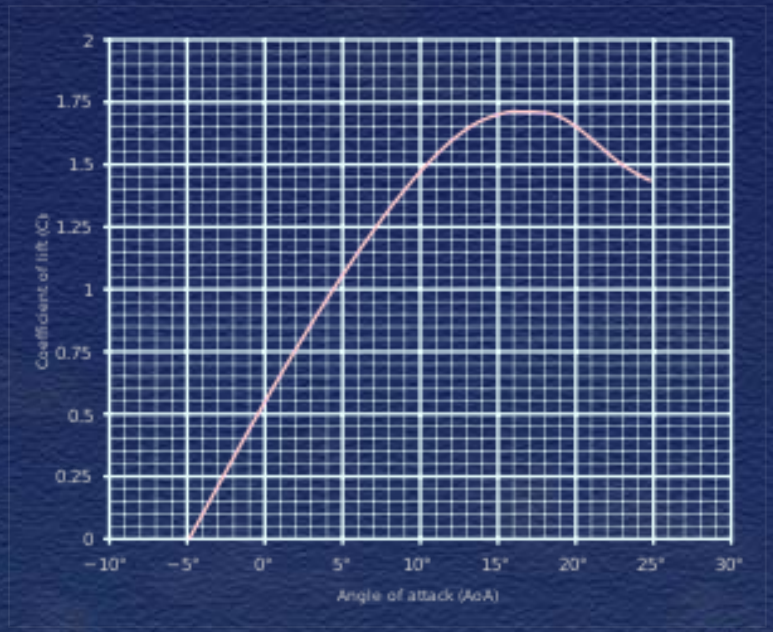
Lower Cost AOA Displays

- 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

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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***"

Accident ID: ERA12FA385

14 CFR Part 91
Approximately 1235 EDT, June 7, 2012
Injuries: 6 Fatal

In-flight breakup
near Lake Wales, FL

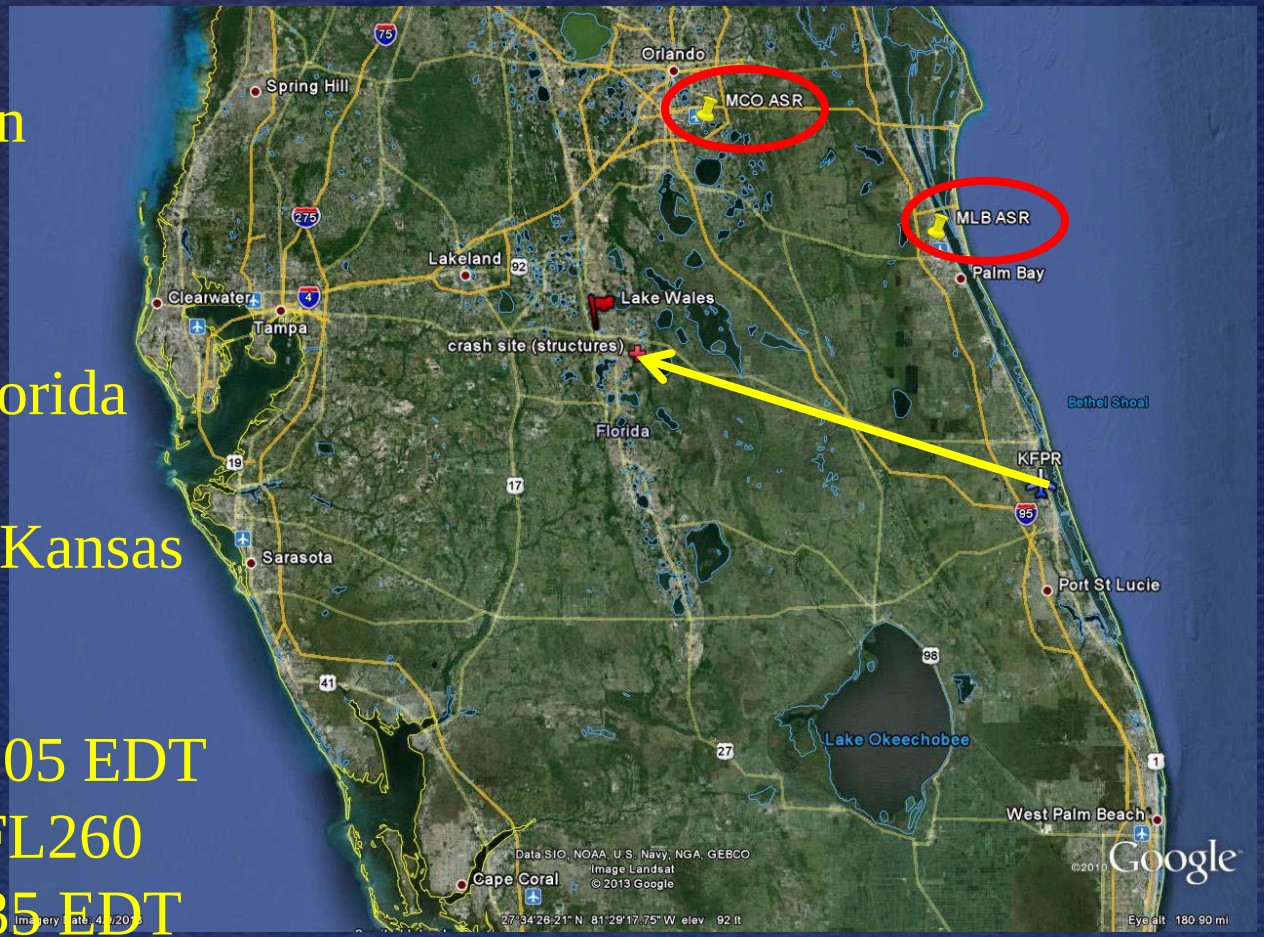
Pilatus PC-12/47, N950KA

History of Flight

IFR Flight Plan

Fort Pierce, Florida
to
Junction City, Kansas

Departure 12:05 EDT
Climbing to FL260
Accident 12:35 EDT



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History of Flight

Pilot advised of moderate to heavy precipitation at 12 to 2 o'clock

Deviations north of course approved

Also approved deviations south of course

Weather – no record of briefing

GEOS-13 visible image showed multiple layers of clouds at time of accident

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History of Flight

Cleared to FL260

On autopilot throughout climb

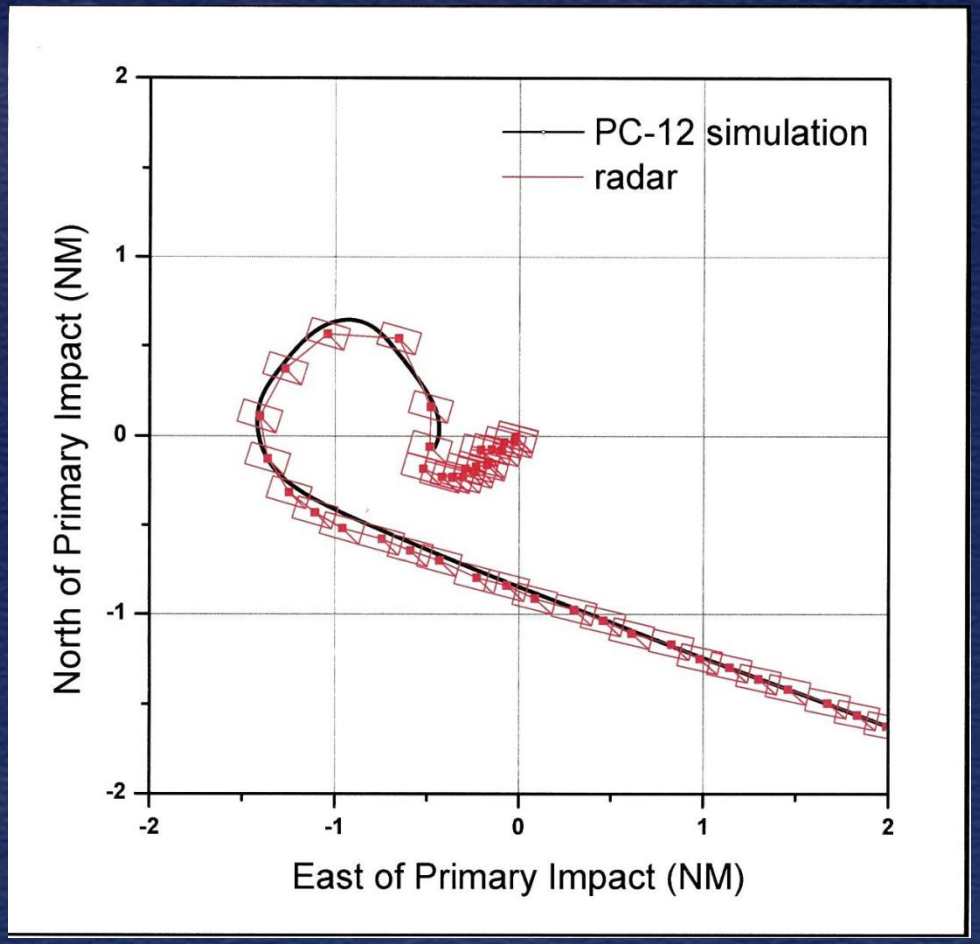
Pirep nearby – light rime FL260

At FL247 activated Ice Mode

At FL251 in IMC right turn on autopilot

Four sec into turn at IAS 109 kt and <25 degree bank – autopilot disconnected

Bank angle increased to more than 75 deg and 338 kt airspeed



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Right Forward Quarter

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Left Rear Quarter

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Left Forward Quarter

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Right Forward Quarter

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Airplane

- Pilatus PC-12/47
  - Type Certificate December 2005
  - Normal category (load factors +3.3/-1.32 g's)
  - S/N 730, manufactured 2006
  - Max T/O weight 10,450 lbs
  - Maneuvering speed 163 KIAS
  - Vmo 236 KIAS (Mmo .48 Mach)
  - Vd 290 Kias

Pilot

- Age 45
- Private Pilot ASEL, Instrument rating
- Approximately 800 hrs total, 30 hrs instruments
- Prior to purchase
  - No actual instrument time logged in previous 7yr and 4 mo
  - 7.5 hrs dual in PA-46-500TP in 2009 (no endorsement)
- Subsequent to purchase
  - Ground, simulator and extra flight sessions
  - IPC, BFR, High Altitude Flight Endorsement
- 14 hrs PIC in accident airplane

Probable Cause

- The failure of the pilot to maintain control of the airplane while climbing to cruise altitude in instrument meteorological conditions (IMC) following disconnect of the autopilot. The reason for the autopilot disconnect could not be determined during postaccident testing. Contributing to the accident was the pilots lack of experience in high-performance, turbo-propeller airplanes and in IMC.

Accident ID: ERA12FA120

14CFR Part 91
1725 EDT, December 22nd, 2012
One fatality - Pilot

IFR - Long Beach, CA to
York Airport, Nashville, PA

Night visual approach
Engine-out Loss of Control

Cessna 441, N48BS

Arrival Flight Path

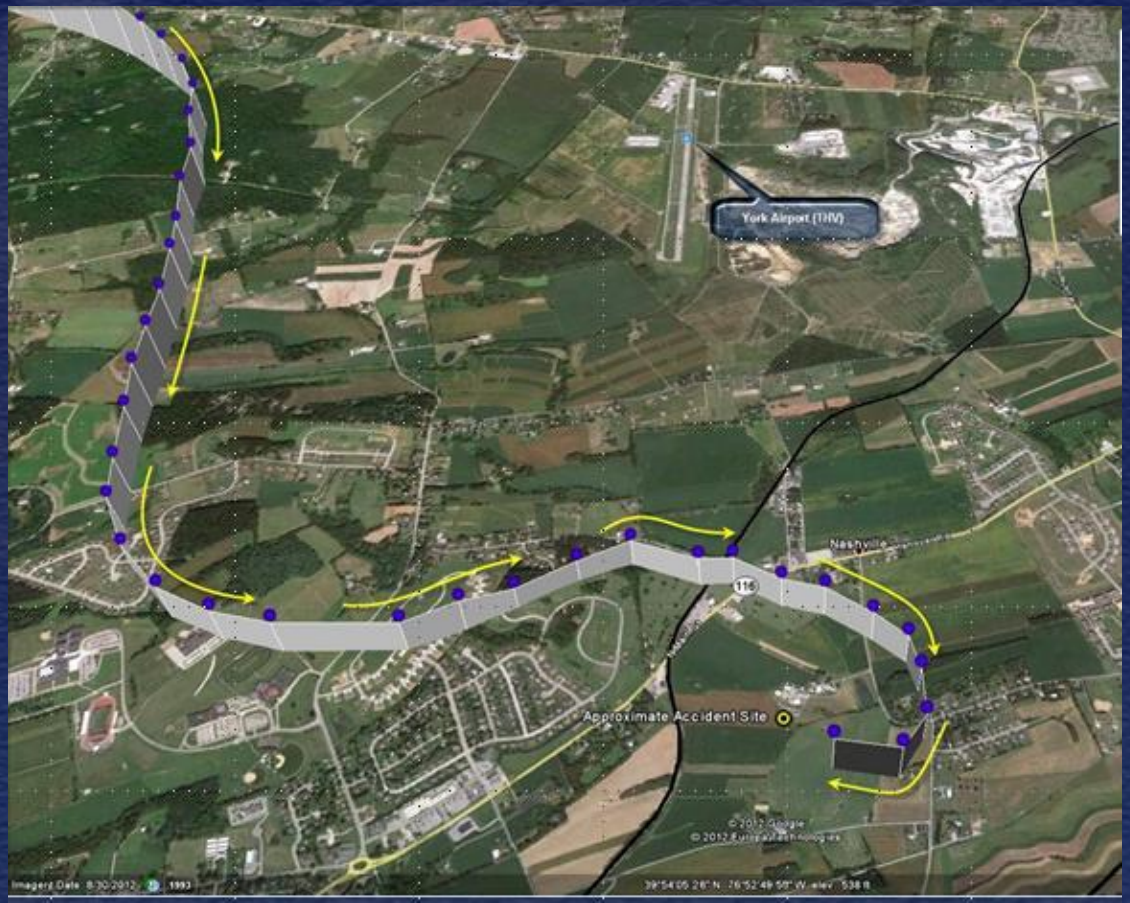
Left downwind

Lost right engine on base leg

Started turn to final

Crossed extended runway centerline

Turned to right



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Right Engine Loss of Thrust

Pilot called "base to final"

Turn continued into right engine

Witness – bank increased through vertical to inverted
Impacting in near vertical descent

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Radar Plot Position and Altitude

Radar plotting -

112 Kt downwind

102 Kt beginning base

75 Kt in right turn

Maintained 1,100 to 1,200 ft alt

Witness – “awfully slow”, “snap rolling nose down, tail up”

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Frontal View

Right Side View

Aft Section View

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Left Side View

Pilot

- Age 38
- Commercial License, SEL, MEL, Instruments
- Approximately 1400 hrs Total Time
  - 950 hrs multi-engine
  - Approximately 500 hrs make and model
- Medical – 3rd Class, November 7, 2011
- No medical or toxicological anomalies noted
- Fatality due to “blunt impact”

Airplane

- Cessna 441, Conquest II
- Honeywell TPE 331, 635 HP TP
- Approximately 5900 Hrs total time
- 514 Hrs since engine overhaul
- Right engine loss-of-power
  - Unknown cause
  - Fuel not an issue

Loss of Thrust – Single Engine

- Minimum Control Speed (Vmca) 91 KIAS
- Normal Procedures: Before Landing
  - 13. Wing Flaps – LAND below 180 knots
  - 14. Approach Speed – 99 KIAS at 9360 pounds
- Emergency Procedures (Amplified Procedures)
  - Engine Failure in Flight (Speed Below Vmca)

  (Memory Items)
  - 1. Power Lever – RETARD as required to stop turn
  - 2. Aileron and Rudder – AS REQUIRED toward operative engine to maintain straight-ahead flight
  - Pitch Attitude – LOWER NOSE to accelerate above 91 knots

Probable Cause

- The 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 inverted stall/spin. Contributing to the accident was the failure of the airplane's right engine for reasons that could not be determined because no preexisting mechanical anomalies were found, and the pilot's subsequent turn toward that inoperative engine while maintaining altitude.

NTSB LOC Forum – Oct 14, 2015

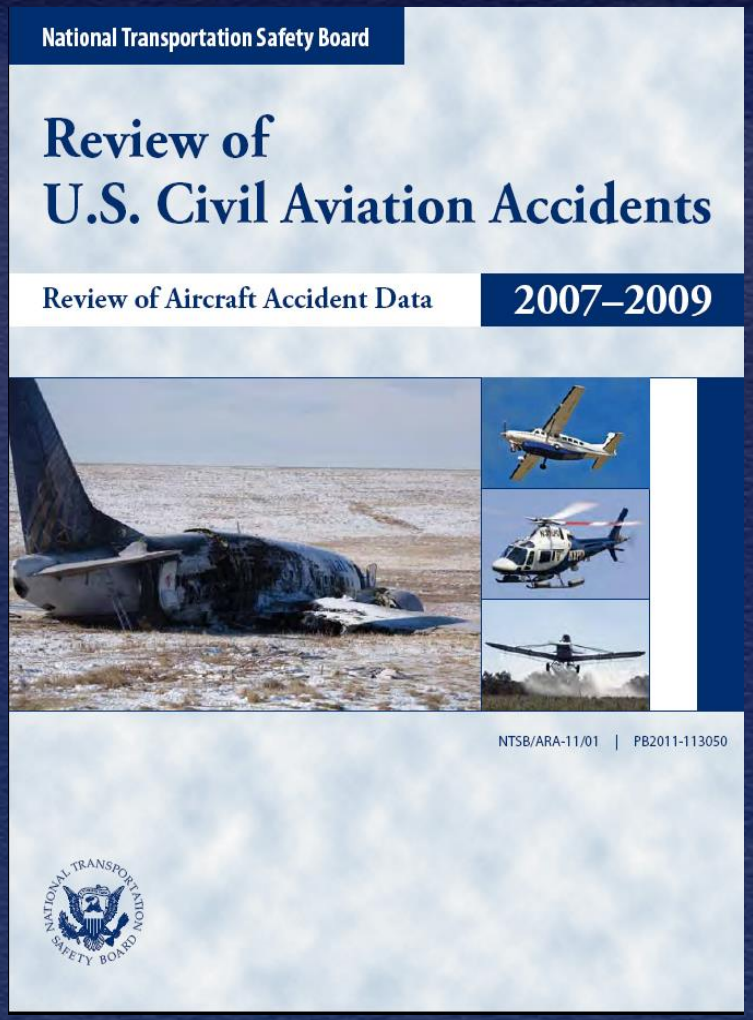
Humans and Hardware: Preventing General Aviation Inflight Loss of Control

- Search “NTSB Loss of Control Forum” and look for Capitol Connection web site.
- Also on YouTube.
- Forum Docket contains 38 documents

Alfred Sheinwold

"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

http://www.ntsb.gov/doclib/reports/2011/ARA1101.pdf

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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."

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Fatal Airport LOC 2008-2014

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