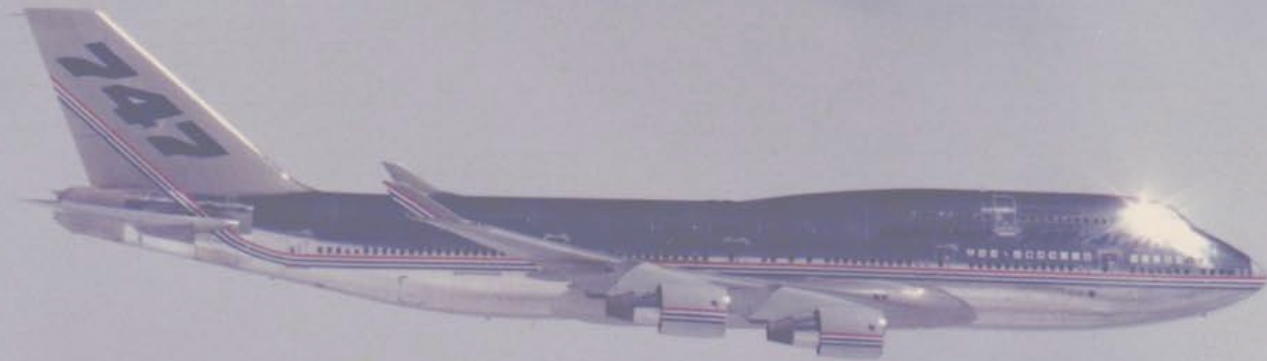


Fundamentals Of Aviation Safety For The Traveler



Brian Bixler

Introduction

- **About Me:**
 - **29 years spent as an Aviation/ Aerospace Professional at Boeing, NASA, TASC, and Icarus Interstellar**
 - **Private Pilot**
 - **Systems Engineer on NextGen, Safety Analyses of Same (TASC), Spacecraft/ Vehicle Safety (Icarus Interstellar), ATOS Lead and Systems Safety for NextGen (NASA)**
 - **25 years at Boeing- Flight Crew Operations, Airplane/ Aviation Safety, Flight Test/ Certification, Flight Test Operations, Manufacturing Engineering**

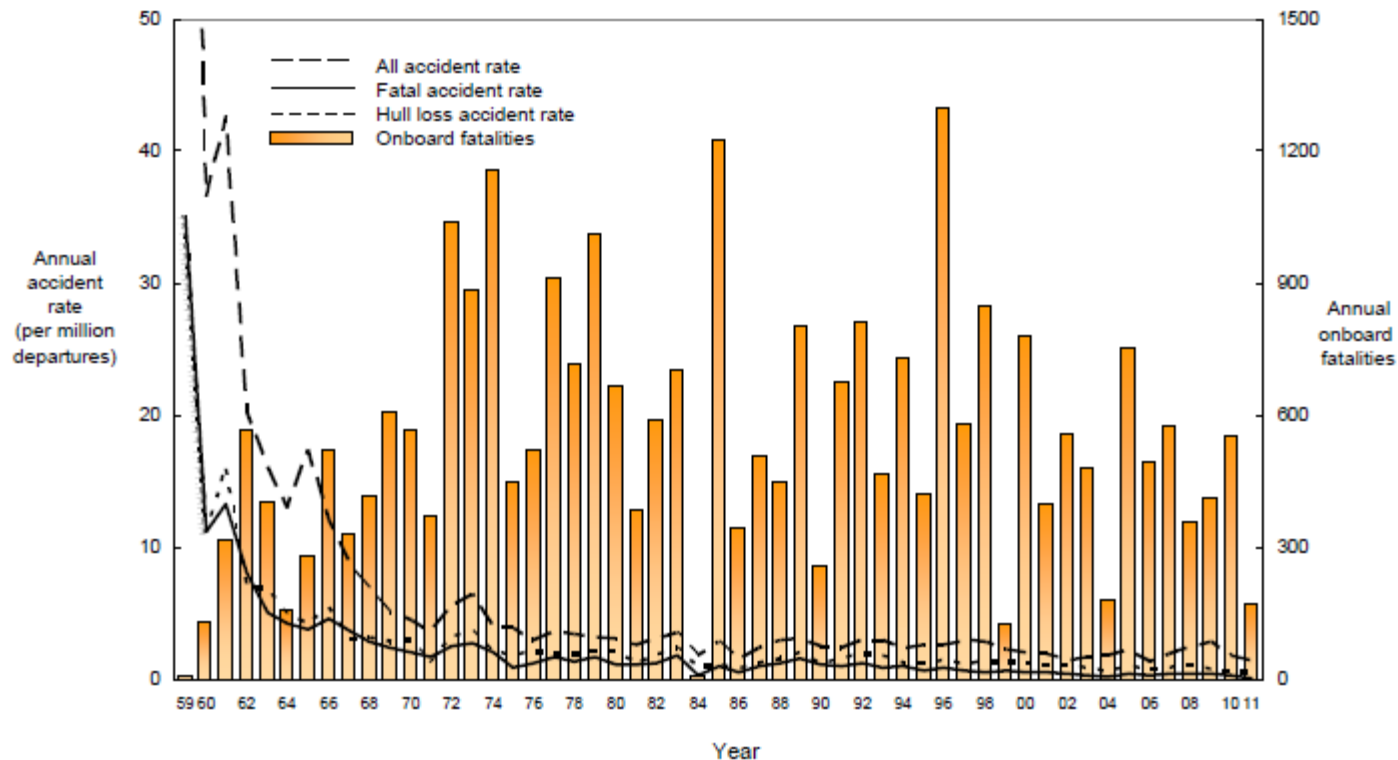
Today's Topics

- **Flying Commercially Is The Safest Thing You'll Do**
- **Pay Attention To The Safety Briefing**
- **Basic Safety Tips**
- **High Level Overview On How Airplanes Are Built, Tested and Certified**
- **Emergency Evacuation- How To Do It Safely**
- **Accident Reviews- Manchester Fire & USAir Birdstrike/Ditching**
- **Pre-Flight Safety Briefing Review**
- **Questions?**

Flying Commercially Is The Safest Thing You'll Do


Accident Rates and Onboard Fatalities by Year

Worldwide Commercial Jet Fleet – 1959 Through 2011




Pay Attention To The Safety Briefing

**SECURITE A BORD
SAFETY ON BOARD**
Région Île de France



DC 10-30



PREMIER SECOURS



SAFETY





Photo: Air France (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)

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PREMIER SECOURS



SAFETY



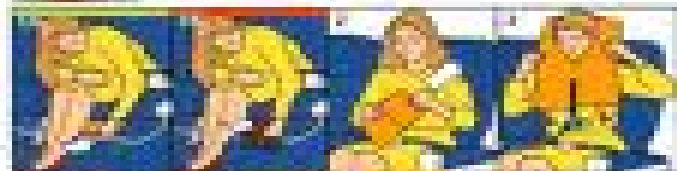
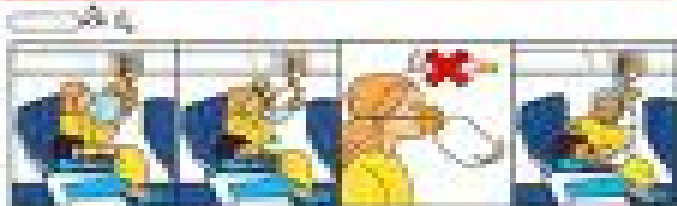
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Pay Attention!

24b

737-600/700

Safety On Board

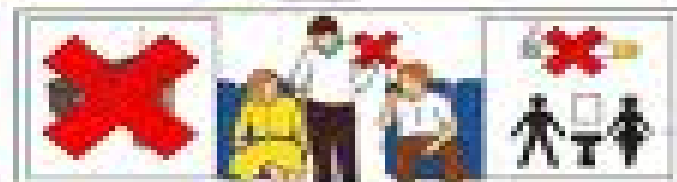


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737-600/700

24b

Safety On Board



Basic Safety Tips

- **PAY ATTENTION TO THE SAFETY BRIEF!**
- **Take note of your surroundings**
- **Don't drink alcohol- 8K ft cabin doubles the effect**
- **Wear cotton and/ or leather, or similar non-flammable clothing. Jeans, cotton shirt, leather jacket, sneakers= perfect. No flip flops or shorts. No polyester or similar**
- **Wear flat shoes, or sneakers- no high heels**
- **Have a handkerchief on you**

High Level Overview On How Airplanes Are Built, Tested and Certified

- <http://www.astech-engineering.com/systems/avionics/aircraft/faatcprocess.html>
 1. **Familiarization Meeting**--this is a meeting to establish partnership with the applicant. It is an opportunity to develop mutual understanding of the type certification process as it applies to the applicant's design. It's highly recommended as a beginning point in the process.
 2. **Formal Application**--applicant's formal application for a TC includes (Ref.Order 8110.4A, par. 7):
 - Cover Letter
 - Form 8110-2
 - Three-View Drawing

The information in the application is used by the ACO to develop the Certification Program Notification to the accountable Directorate.
 3. **Preliminary Type Certification Board**--At this initial formal meeting, the project team collects data about the technical aspects of the project and the applicant's proposed certification basis and identified other information to start developing the Certification Program Plan (Ref.Order 8110.4A, par. 9). It also identifies special attention items (Ref.Order 8110.4A, par. 10d).

High Level Overview On How Airplanes Are Built, Tested and Certified

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- Certification Program Plan (CPP)--a key document, the Certification Plan addresses (Ref.Order 8100.5, App. 2):
 - The proposed FAA certification basis
 - The FAA certification basis, including noise and emission requirements
 - Issue papers
 - Special conditions, exemptions, and equivalent level of safety findings
 - Means of compliance
 - Compliance checklists and schedules
 - Use of delegations/designees

5

- Technical Meetings--Held throughout the project, technical meetings, e.g., specialist and interim TC meetings, cover a variety of subjects. Team members may:
 - Approve test plans and reports
 - Review engineering compliance findings
 - Close out issue papers
 - Review conformity inspections
 - Review minutes of board meetings
 - Revise the Certification Program Plan
 - Issue New FAA policy guidance
 - Review airworthiness limitations
 - Review Instructions for Continued Airworthiness

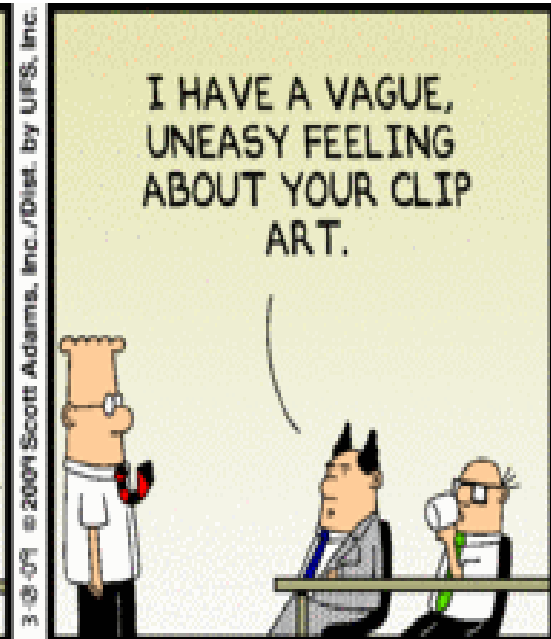
High Level Overview On How Airplanes Are Built, Tested and Certified

6. **Pre-Flight Type Certification (TC) Board**--discussions at the pre-flight TC board center on the applicant's flight test program, including conformity inspections and engineering compliance determinations.
7. **Type Inspection Authorization (TIA)**--Prepared on FAA Form 8110-1, the TIA authorizes conformity and airworthiness inspections and flight tests to meet certification requirements. The TIA is issued when examination of technical data required to TC is completed or has reached a point where it appears that the product will meet pertinent regulations (Ref.Order 8110.4, par. 16).
8. **Conformity Inspections and Certification Flight Tests**--Conformity inspections ensure that product conforms with the design proposed for type certification. Flight tests are conducted in accordance with the requirements of the TIA.

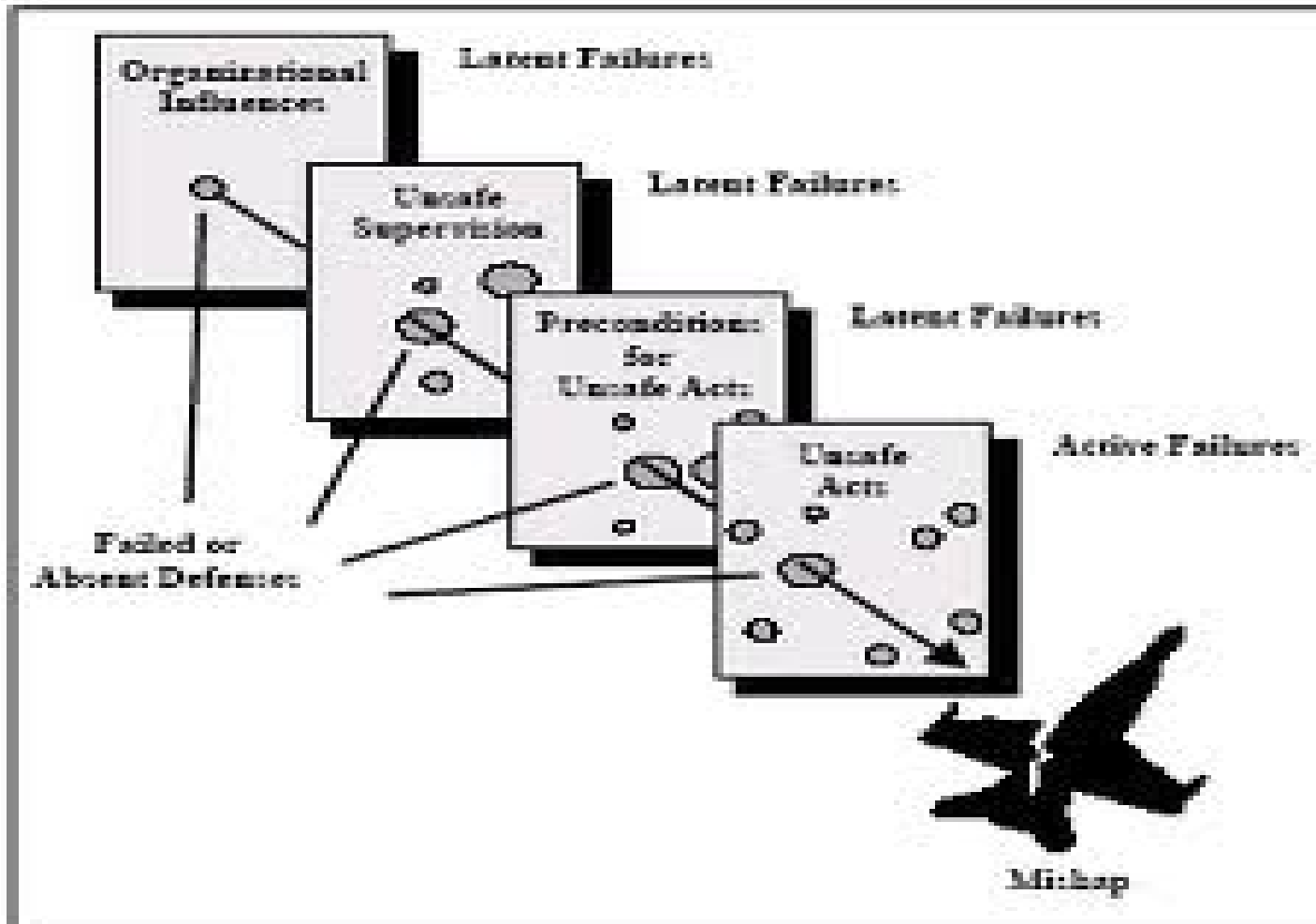
High Level Overview On How Airplanes Are Built, Tested and Certified

9. **Aircraft Evaluation Group (AEG) Determinations**--The AEG works with certification engineers and FAA flight test pilots to evaluate the operational and maintenance aspects of certificated products through such activities as (Ref.Order 8110.4A, par. 17):
 - Flight Standardization Board (FSB)
 - > Pilot type rating
 - > Pilot training checking, currency requirements
 - > Operational acceptability
 - Flight Operations Evaluation Board (FOEB)
 - > Master minimum Equipment List (MMEL)
 - Maintenance Review Board (MRB)
 - > Maintenance Instructions for Continued Airworthiness
 10. **Final Type Certification Board**--When the applicant has met all certification requirements, the ACO schedules the final formal TC board. The board wraps up any outstanding items and decides on the issuance of the TC (Ref.Order 8110.4, par. 10g).
 1. **Type Certificate (TC)**--The certifying ACO issues the TC (FAA Form 8110-9) when the applicant completes demonstration of compliance with the certification basis. The TC data sheet is part of the TC and documents conditions and limitations to meet FAR requirements (Ref.Order 8110.4, par. 22, 23).
 1. **Post Certification Activities**--This includes the Type Inspection Report (TIR), Certification Summary Report (CSR), and
 2. **Post Certification Evaluation**.
 - The TIR is a record of the inspections and test authorized by the TIA to show compliance with the FAR. It is completed within 90 days of issuance of the unique technical requirements and lessons learned (Ref.Order 8110.4, par. 19).
 - Post Certification closeout activities complete the TC project and provide the foundation for our continued airworthiness monitoring activities such as ADs, service bulletins, revisions to type design, malfunction/ defect reports, and Certificate Management for the remainder of the aircraft's life cycle.
-

How Did We Get Here?



Swiss Cheese Diagram



Design For Threats

- **Approximately 55 known airplane level threats used**
- **Engine rotor burst – which would cause high-energy engine pieces to damage the fuselage, wing and the systems contained within them**
- **Explosion sphere of destruction – which is modeled as a 6 foot sphere to drive systems separation**
- **Rapid decompression - which would lead to structural failure that would have an impact on aircraft systems**
- **Wheel/ tire burst and thrown tread**
- **Bird strike to forward facing structure and system elements behind structure**
- **Primary systems failure (hydraulic, electrical, flight controls, etc.)**

Birdstrike



Birdstrike



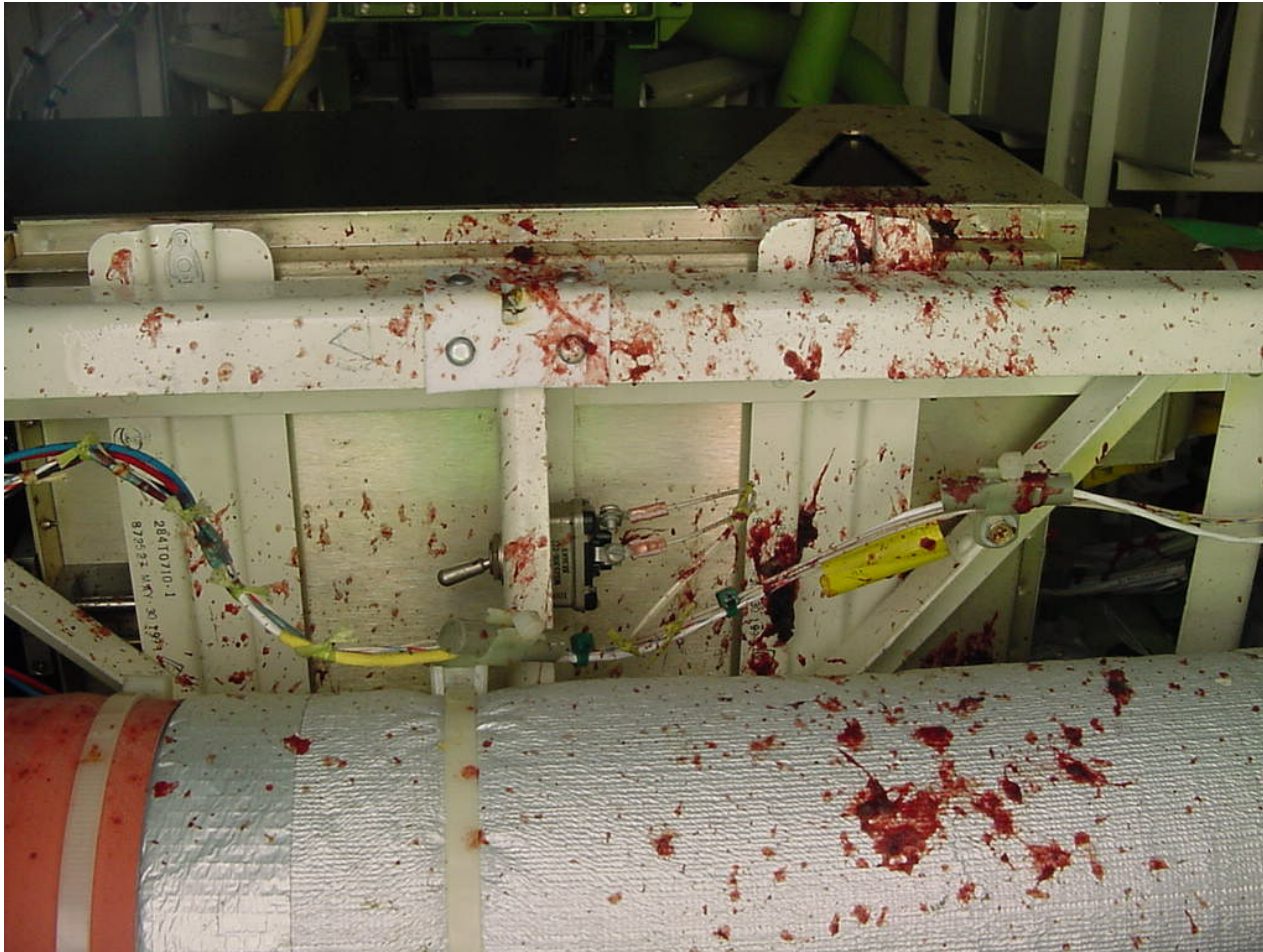
Birdstrike



Birdstrike



Birdstrike



Birdstrike

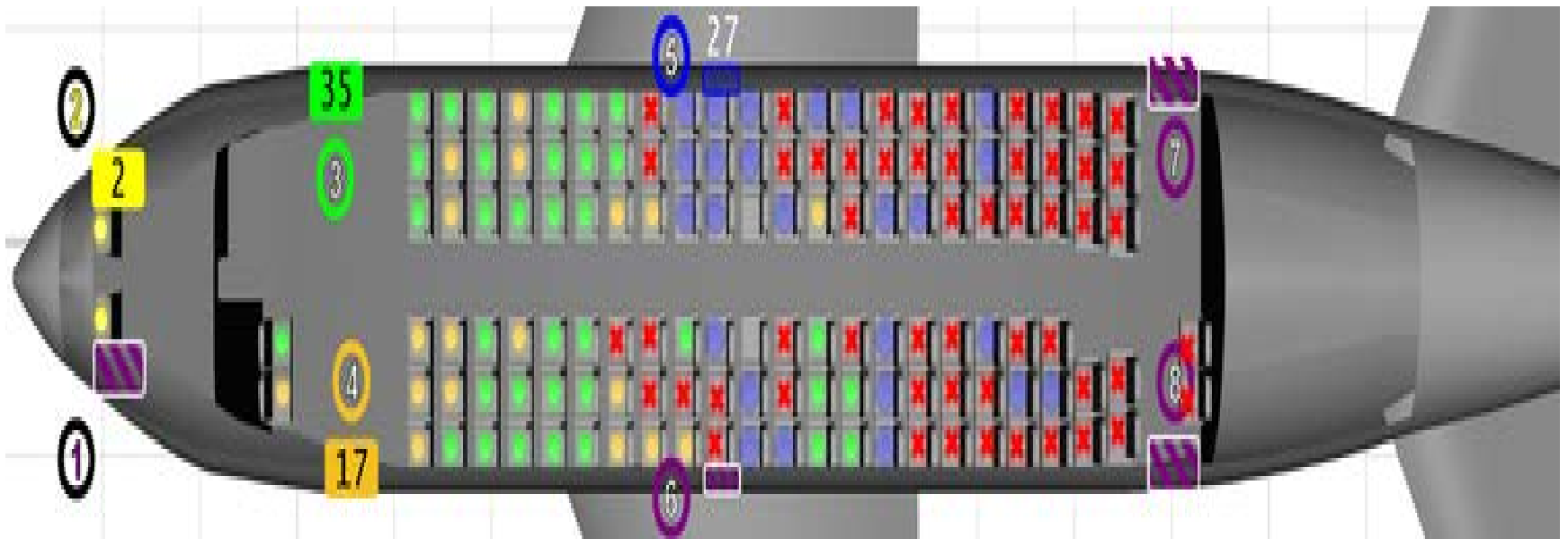




Accident Reviews- British Airtours

- **Flight 28M- August 22, 1985**
- **Combustor failure, leading to chunk hitting fuel access panel, led to fuel spillage and fire**
- **Slow to evacuate due to confusion - many factors**
- **Once evacuation began, it was disorderly due to fire/ fumes/ panic – 55 fatalities**
- **Recommendations were made which included fire resistant seat covers, floor lighting, fire-resistant wall and ceiling panels, more fire extinguishers and clearer evacuation rules, and overwing exit changes**

Importance Of Evacuation Procedure

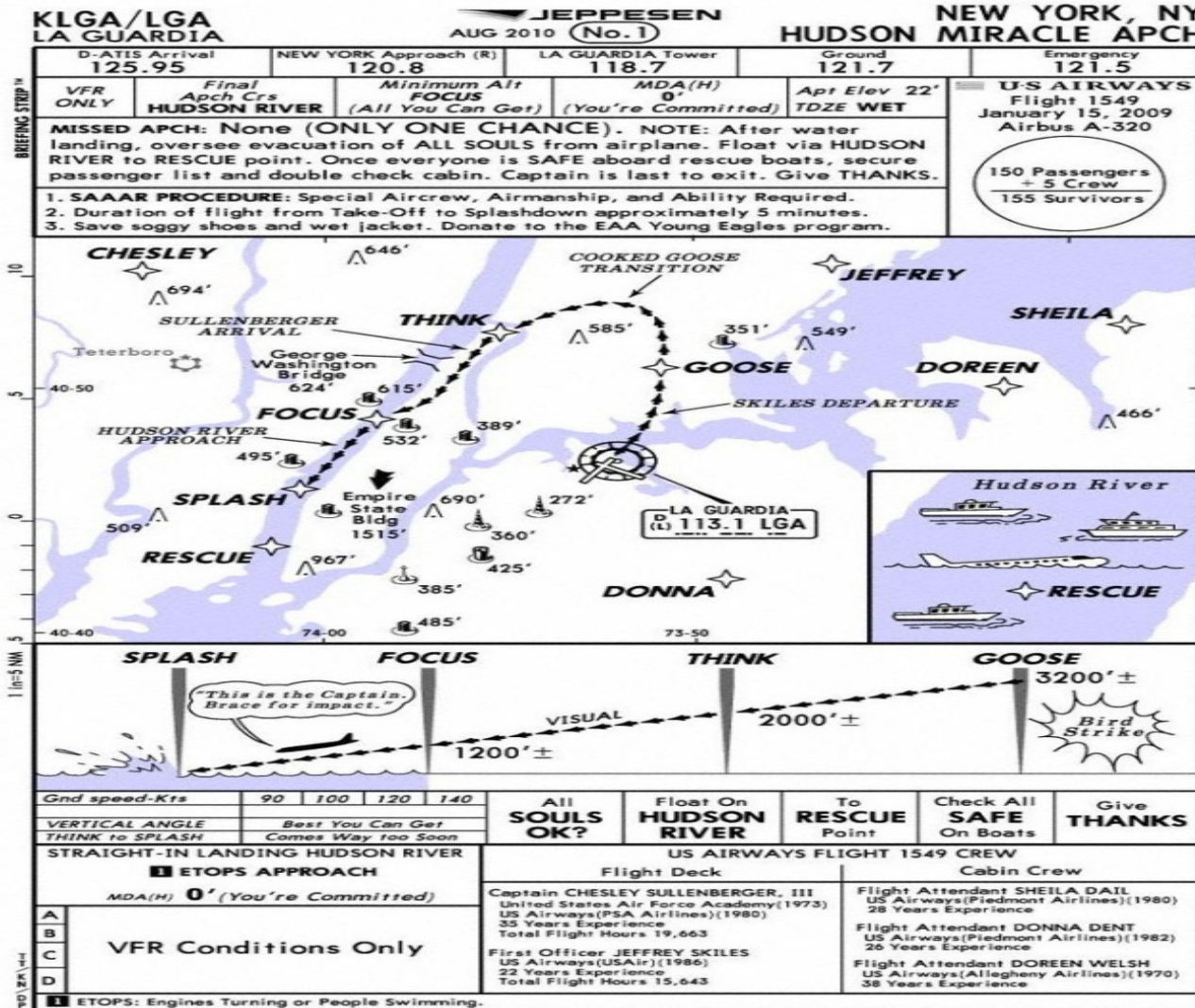




Accident Reviews- USAir Flight 1549

- **January 15, 2009**
- **“Miracle On The Hudson”**
- **Multiple birdstrikes into both engines shortly after takeoff**
- **After splashdown- BIG factor in zero fatalities were crew conduct, orderly evacuation**
- **Boats/ first responders**
- **Professionalism saved the day**

Approach plate



Accident Reviews- USAir Flight 1549



Emergency Evacuation

- http://www.youtube.com/watch?feature=player_detailpage&v=Xlaovi1JWyY

Pre-Flight Safety Briefing Review

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737-600/700

Safety On Board



737-600/700

246

Safety On Board



Enjoy Your Vacation!



Summary

- Flying is the safest thing you'll ever do
- Lots of hard work and professionalism goes into making it that way
- What can YOU do?
- **PAY ATTENTION TO THE SAFETY BRIEF!**

Keep your wits about you, remember the brief, have a plan, and you'll be all right

Q & A

Questions?