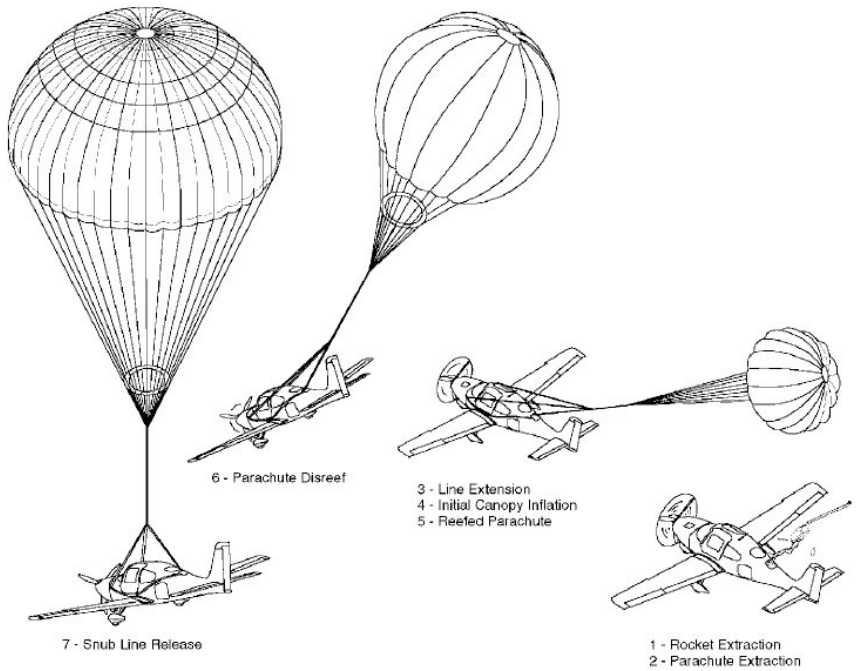
Cirrus Airframe Parachute System
CAPS Works!

Rick Beach
Safety Liaison & CPPP Chair

How CAPS Works



CAPS Does Work!

- **21 saves with 44 survivors!**
- **25 CAPS activations total**
- **2 CAPS activations failed to deploy:**
  - ➢over speed (1 fatal)
  - ➢anomalous rocket trajectory (2 serious)
- **3 CAPS pulls with fatalities:**
  - ➢over speed (1 fatal)
  - ➢spin recovery at 528 feet (1 fatal, 3 serious)
  - ➢very low altitude stall recovery (2 fatal)

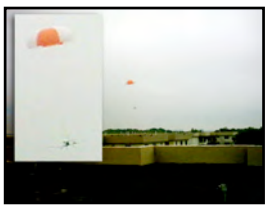
21 CAPS Saves, 44 Lives

Oct 2002, SR22 Lionel Morrison, Lewisville, Texas

Sept 2004, SR22, Bill Graham+1, Peters, California

Apr 2004, SR20, Albert Kolk+3, Alberta, Canada

June 2005, SR22 Ilan Reich, Hudson River, New York



Apr 2004, SR22, Jeff Ippoliti, Fort Lauderdale, Florida

Jan 2006, SR22 Kerwin Day+2, Childersburg, Alabama

21 CAPS Saves, 44 Lives

Feb 2006, SR22
Scott Doom+1,
Wagner,
South Dakota

Apr 2007, SR22
Jim Turpen,
Luna, New Mexico

Aug 2006, SR22
Bob Edesses+3,
Indianapolis,
Indiana

Aug 2007, SR22
Tom Jackson+1,
Siassconset,
Massachusetts

Sept 2006, SR22,
Omar Valdes+3,
Jamaica

Oct 2008, SR22
Hugo
Puigdefábregas
+2,
San Sebastian,
Spain

21 CAPS Saves, 44 Lives

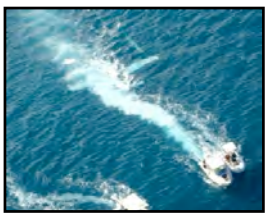
Nov 2008, SR22
Claudio Pugliese+3
Italy

Mar 2009, SR22,
Verle Wiita,
Gaithersburg,
Maryland

Dec 2008, SR22
Gary Noon,
Belgium

June 2009, SR22
Tom Granville,
Elkin,
North Carolina

Dec 2008, SR20,
Russell Redmond
Louisiana



Dec 2009, SR22
Steve Maltby,
Hamilton
Island,
Australia

21 CAPS Saves, 44 Lives

May 2010, SRV
Jarle Finsveen+3
Sirdal, Norway

July 2010, SRV
???,
United Kingdom

Aug 2010, SR22,
Charles Reynolds
Idabel, OK

CAPS Works!

- **No fatalities when activated within design envelope**
  - Airspeed below V_{pd} 133 knots
  - Altitude above 920’ AGL in a descent, 400’ AGL when level
- **No post-impact fires**

How Fast?

- 133 KIAS: V_{pd}
- 168 KIAS (approx): Haverstraw, NY
  - Last radar track = 190 kt GS in dive
- 187 knots: BRS drop test
- 270 knots: Norden overspeed fail

How Low?

- 200 feet: Deltona, FL in spin (2 fatal)
- <400 feet: Turraco, Italy
- 400 feet: Demonstrated level flight
- 441 feet: Hamilton Island, Australia
- 528 feet: Indianapolis in 3-turn spin (1 fatal)
- 700 feet: Fort Lauderdale, FL climbing
- 920 feet: Demonstrated 1-1/2 spin
- 1600 feet: Haverstraw, NY descending
- 1800 feet: Siassconset, MA disorientation
- Terrain alert: Luna, NM in V_{ne} spiral dive IMC

What Attitude?

- **Spin, severe icing**
  - Childersburg, Alabama
- **Stall/spin**
  - Gaithersburg, Maryland
- **Inverted descent**
  - Peters, California
- **Inverted, 34 KIAS**
  - Luna, New Mexico

Time for a Movie!

- **Luna, NM, April 9, 2007**
- **Avidyne PFD data SR22 N953CD**
- **Look for these things:**
  - Spiral descent in IMC
  - Terrain alert (reported by pilot)
  - Loop, activation at top (inverted, 34 KIAS)
    - Parachute activation found by accelerations
  - Full power under canopy

What Decision?

- **Icing Plan C**
  - Belgium
- **COPA discussion**
  - Gaithersburg, Maryland
- **Thought I was higher**
  - Hamilton Island, Australia
- **IMC departure with crazy instruments**
  - Fort Lauderdale, Florida

Planes That Flew Again

- **N1223S (CAPS #1)**
  - Cirrus Design repair project;
    later Park Falls, WI fatal accident
- **C-GEMC (CAPS #2)**
  - Extracted by helicopter, repaired
- **N931CD (CAPS #4)**
  - Bill Graham sold to friend, still flying

CAPS Landings

- Fields: frozen, soft
- Shrubs: low trees
- Tall trees: orchard, forests
- Mountain slope, inhospitable terrain
- Power lines, communication tower*
- Residential neighborhood
- Water: river*, pond**, canal, ocean**

* Serious injury or death ** Low altitude activation

CAPS Over Water?
Hudson River, New York

CAPS Over Water?
Hamilton Island, Australia

CAPS Over Trees?
Peters, California

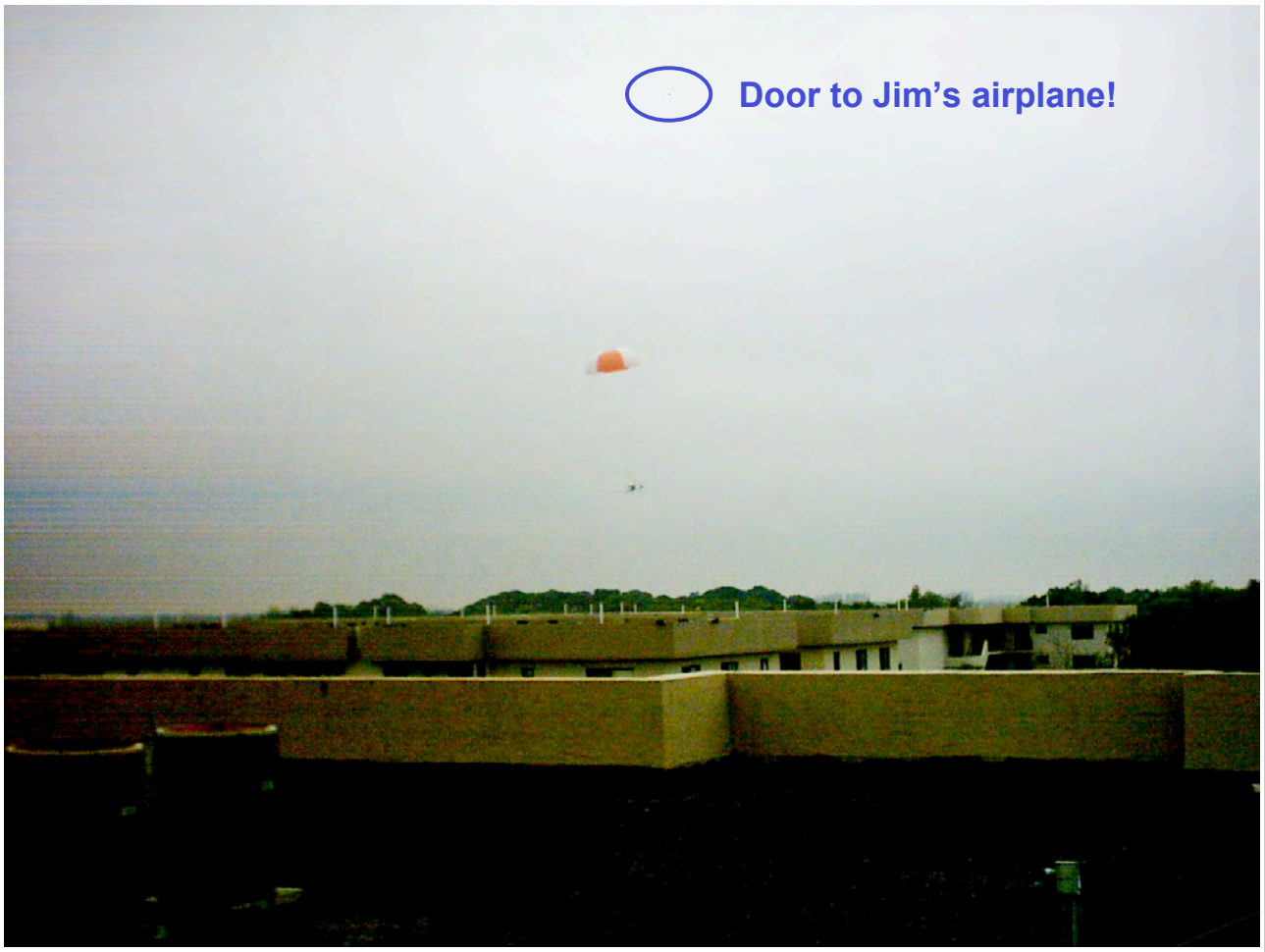
CAPS Over Trees?
Childersburg, Alabama

CAPS Over Obstructions?
Nantucket, Massachusetts

CAPS Over Residential Area? Gaithersburg, Maryland

CAPS Over People? Photos Taken Under Canopy!

- **Rocket noise**
- **Parachute canopy crack!**
- **Descent rate**
  - 35 secs from 1,000’
  - 70 secs from 2,000’
  - 2:20 from 4,000’



CAPS Over People!

- **People in park heard CAPS activation and photographed descent behind trees!**

Parachute risers

CAPS Over Fields!
Wagner, South Dakota

CAPS Over Fields, Finally!
Elkin, North Carolina

Physics 101

- Energy goes up as (Velocity)^2
- Cirrus CAPS descent: 20 knots
- Cirrus stall speed: 60 knots
  - ➢ Impact with 9 times more energy
- Cirrus spin descent speed: 100 knots
  - ➢ Impact with 25 times more energy
- Cirrus high-speed descent: 180 knots
  - ➢ Impact with 81 times more energy!

CAPS Decision Criteria

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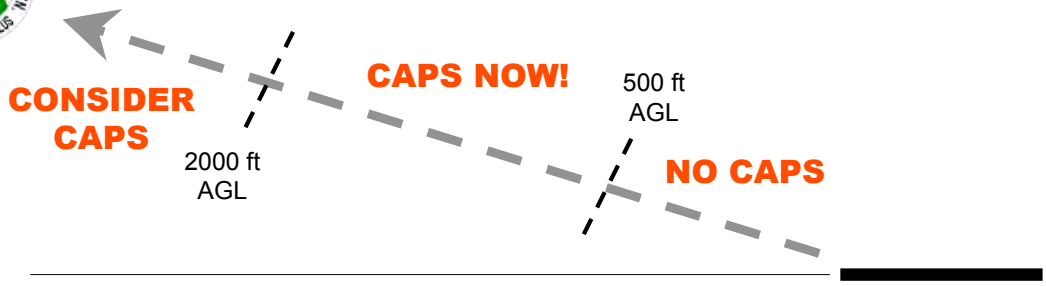
Engine Failure on Departure



- **Below 500 ft AGL -- NO CAPS**
  - 400 ft demonstrated loss of altitude from level flight
  - Reaction to loss of power takes time; time erodes altitude
  - Land straight ahead!
- **Above 500 ft AGL -- CAPS NOW!**
  - No time / altitude to trouble shoot loss of power
  - Reaction to loss of power takes time; time erodes altitude
  - Pull CAPS handle now!
- **Above 2000 ft AGL -- CONSIDER CAPS**
  - Have time / altitude to trouble shoot loss of power
  - Prompt decision on recovery
  - Pull CAPS above 1000 ft AGL if landing not assured!

CAPS Decision Criteria

- **Departure criteria**
  - Below 500' AGL: **NO CAPS**
  - Below **2000' AGL**: **CAPS NOW!**
  - Above **2000' AGL**: **Consider CAPS**
  - Define **your altitude** to consider CAPS
- **Loss of Control: CAPS NOW!**
- **Cruise criteria, engine out, off-airport**
  - Crossing **1500' AGL**, **CAPS NOW!**
- **Water criteria**
  - **CAPS Early** to prepare for egress

Off-Airport?

- **Physics 101**
  - ➢Vertical descent @ 17 knots
  - ➢Horizontal velocity @ wind speed
- **Rolling stop @ Landing speed**
  - ➢Obstructions can disrupt direction
- **Impact stop @ Flying speed**
  - ➢Trees, wires, rocks, ditches, signs, vehicles, buildings

Why Not CAPS?

- **Reckon over half of Cirrus fatal accidents involve decision-point similar to successful CAPS pull!**
  - ➢ High altitude loss of control
  - ➢ VFR into IMC
  - ➢ Loss of engine power
  - ➢ Off-airport landing
- **41 of 66 fatal accidents, 80 fatalities**
  - ➢ 18 high, 23 mid probability of CAPS

Many Pilots Did Not Pull

Photograph 08 - Stowed Handle

From 12000' – No CAPS!