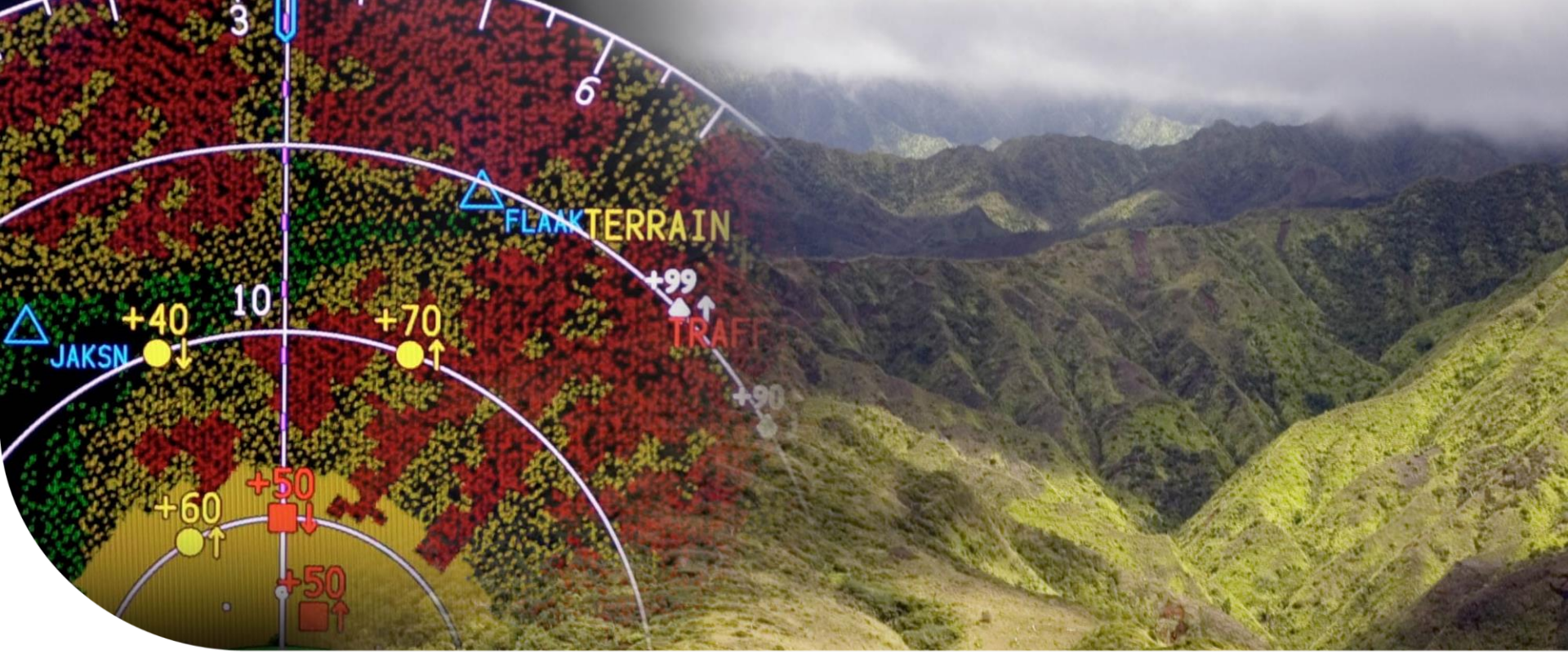


CFIT EVENTS
HOW WE CAN REDUCE THE RISK

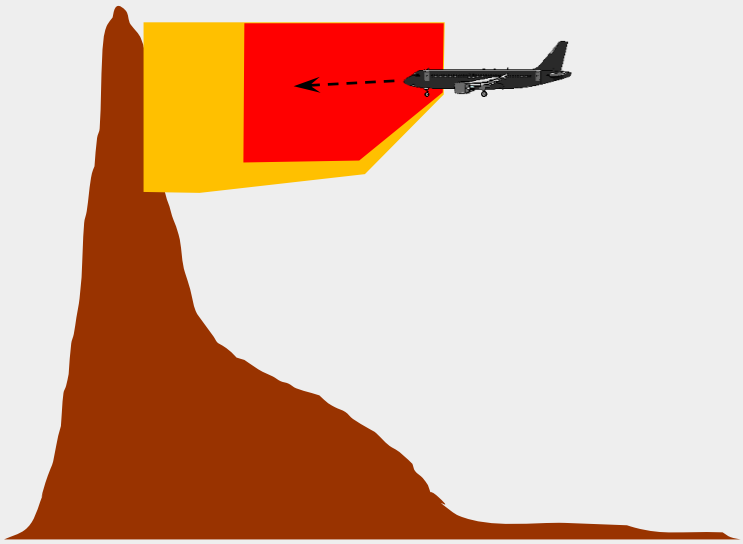
Yasuo Ishihara
Technical Fellow
Honeywell

March 5 - 7, 2019

5th annual Singapore Aviation Safety Seminar (SASS)

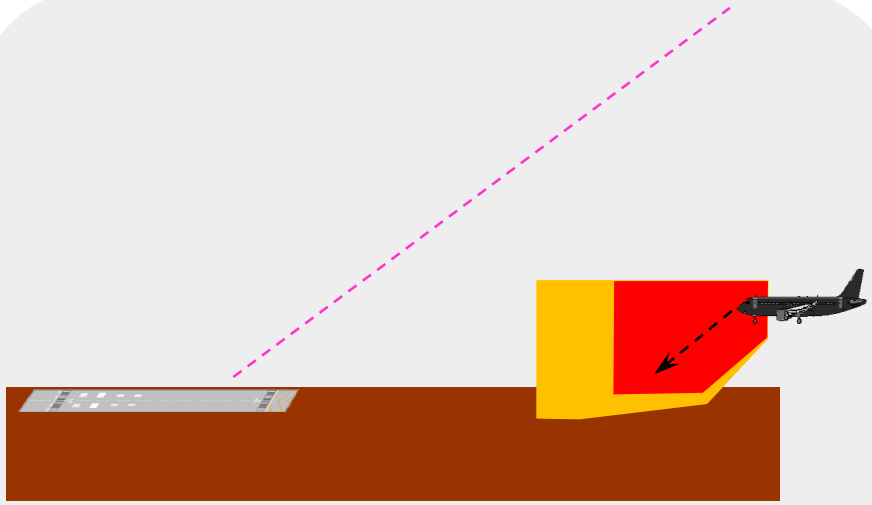
CFIT Scenarios

- CFIT isn’t just about flying into a rising terrain



Flying toward a rising terrain/obstacle

Premature Descent / Undershoot

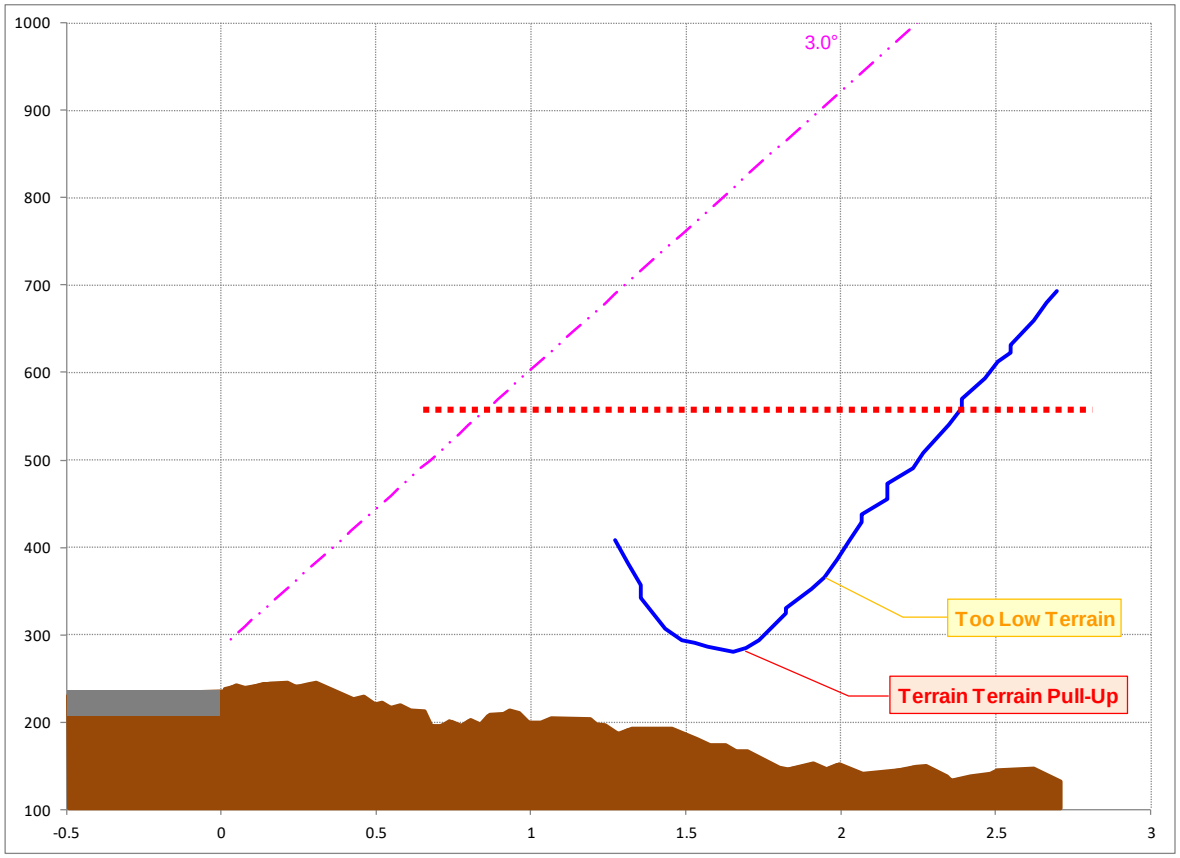


Descending toward terrain/obstacle
(e.g., premature descent or landing short)

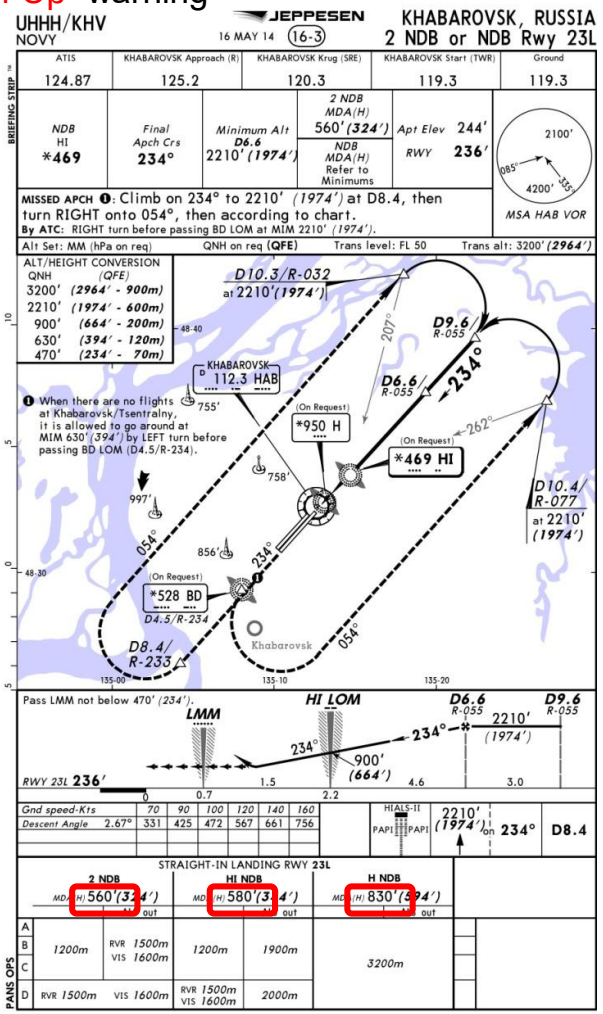
Honeywell

Premature Descent Event

- ILS available for the runway, however, not tuned to the glideslope or localizer during the approach (possibly out of service)
- Descended below MDA (lowest MDA = 560 ft)
- TCF "Too Low Terrain" caution followed by Terrain Awareness "Terrain Pull-Up" warning
- 153 ft minimum terrain clearance at 1.5 nm from the runway



Probable Approach Flown

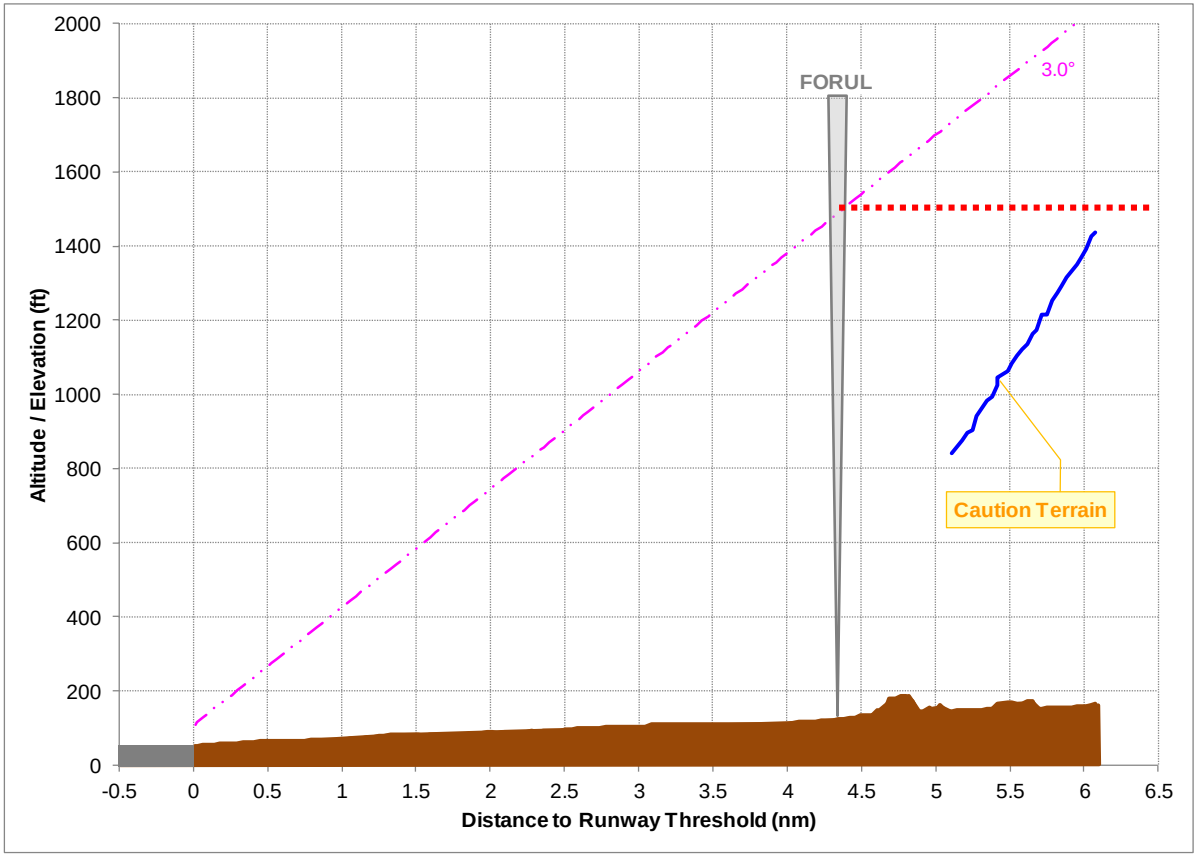


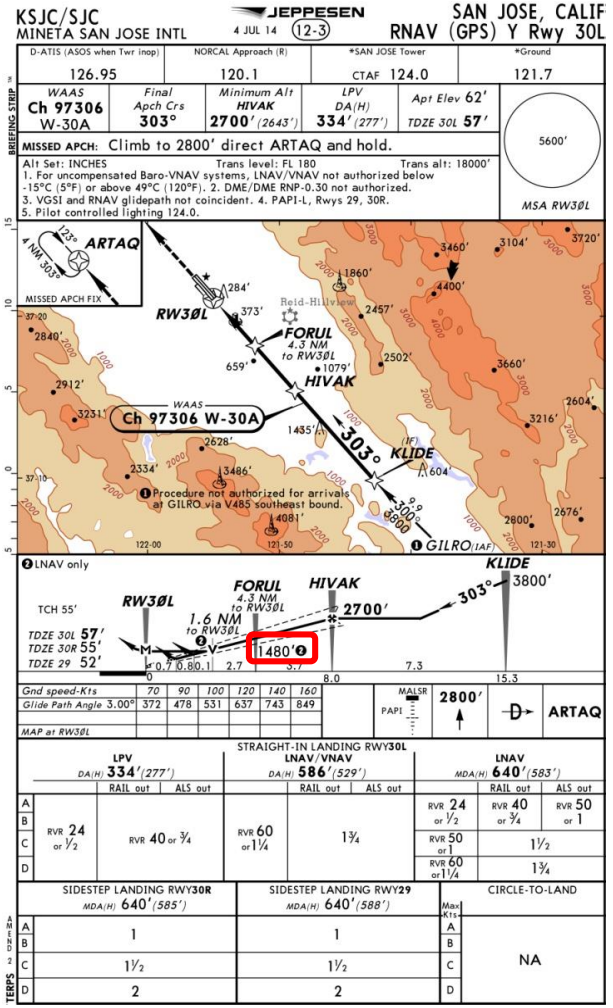
Note) The date of occurrence or the actual approach procedure flown is not known.

Honeywell

Premature Descent Event

- Attempted to capture 3° VNAV path from above inside of the final approach fix
- Higher than normal descent rate (in excess of -1,300 fpm)
- Descended below 3° approach path or the segment minimum safe altitude (1480 ft)
- Terrain Awareness "Caution Terrain" caution

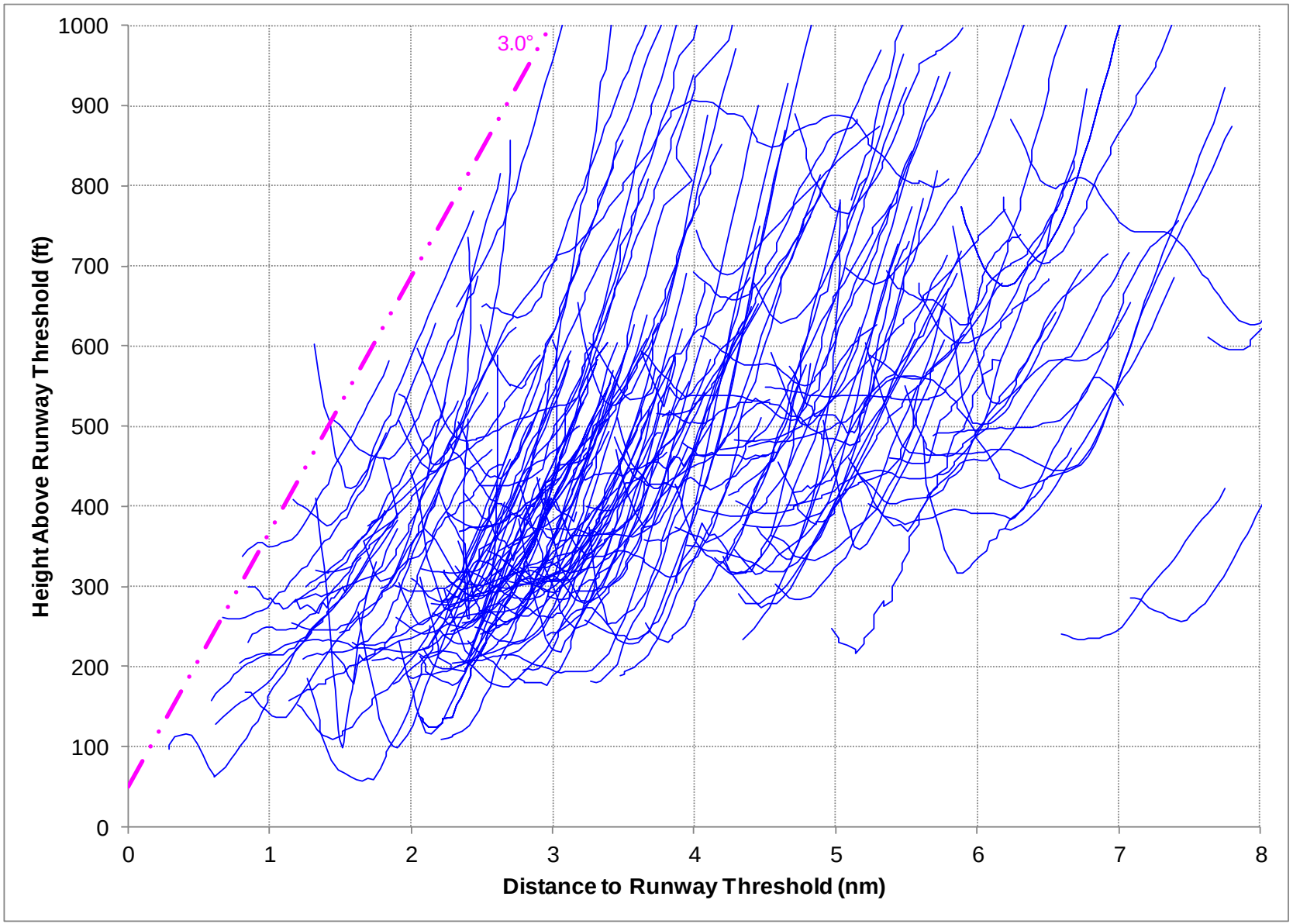




Note) The date of occurrence or the actual approach procedure flown is not known.

Honeywell

Premature Decent Events

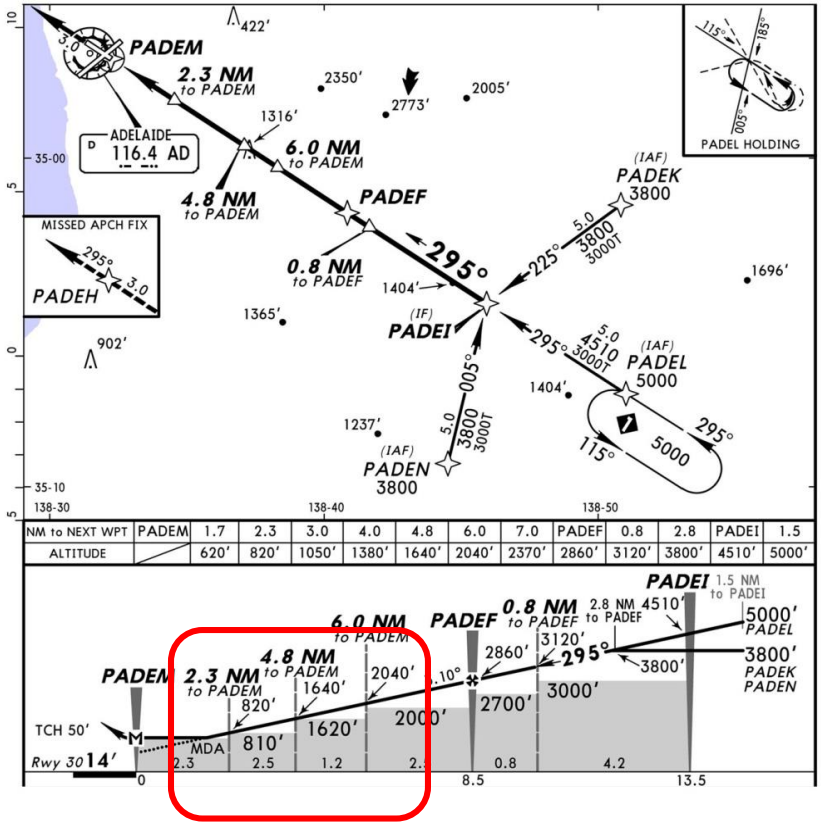


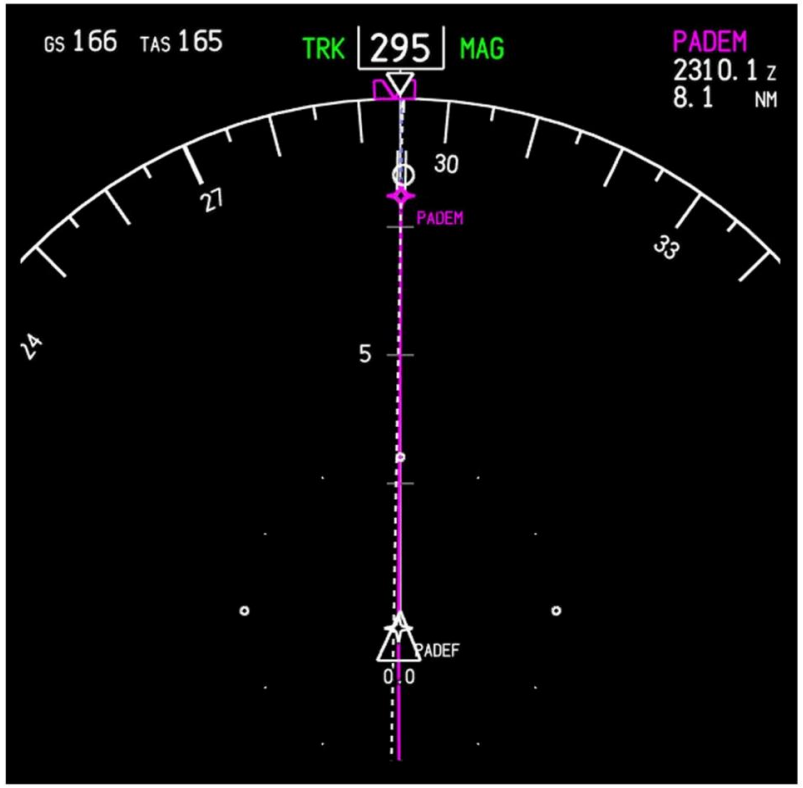
The altitude normalized by the destination runway elevation (0 ft at the runway threshold)

Honeywell

Some Potential Traps

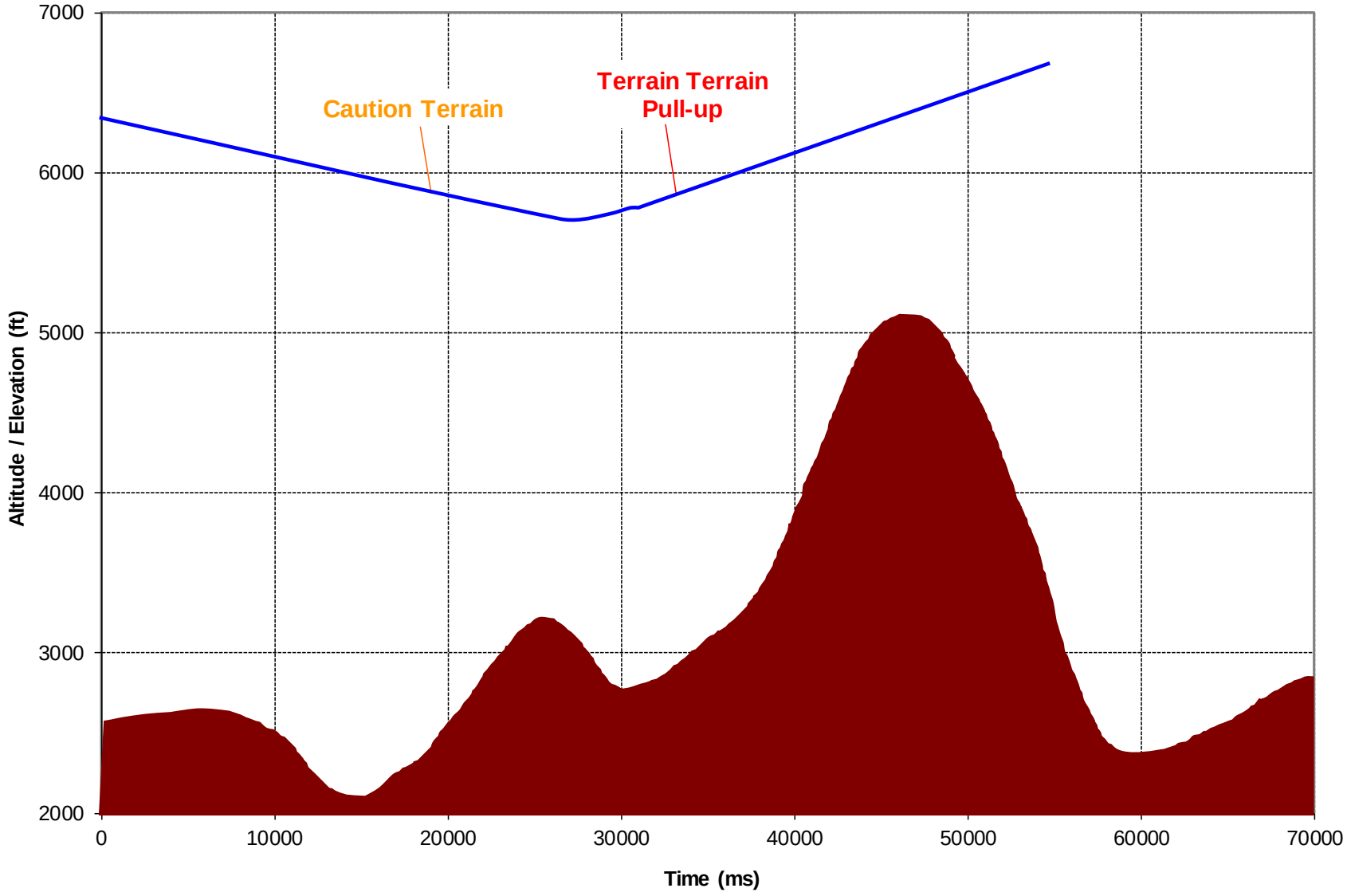
- Capturing approach path from above and inside of the final approach fix
  - **All waypoints shown on an approach plate may not be included in FMS navigation database**
  - **Often intermediate waypoints with altitude restrictions inside of the final approach fix are not in the database**





Honeywell

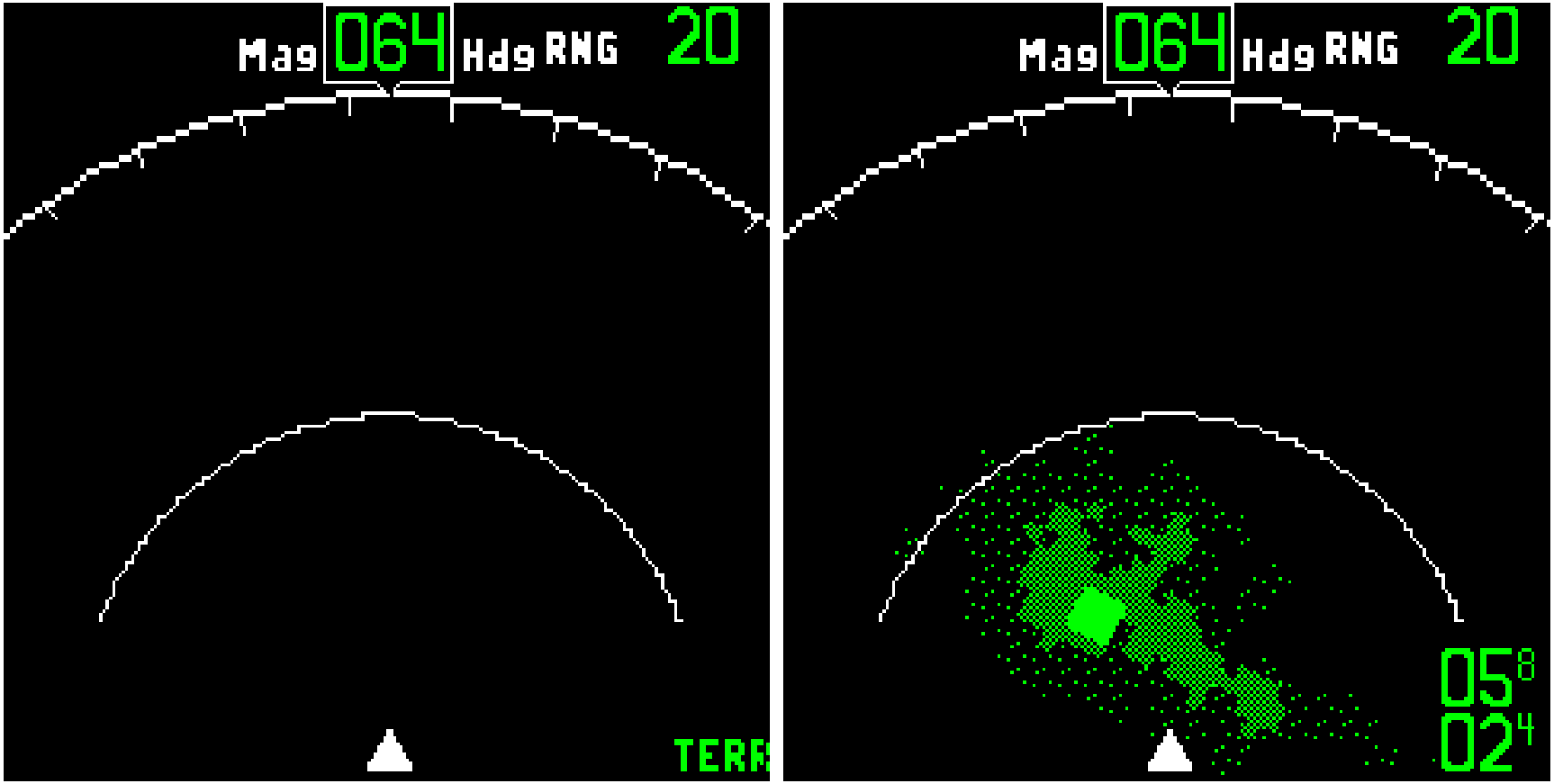
Controlled Flight Toward Terrain Event



Honeywell

Controlled Flight Toward Terrain Event

At 8,000 feet



Standard Display

PEAKS Display

Do you have PEAKS display on your aircraft…?

Honeywell

Some Potential Traps

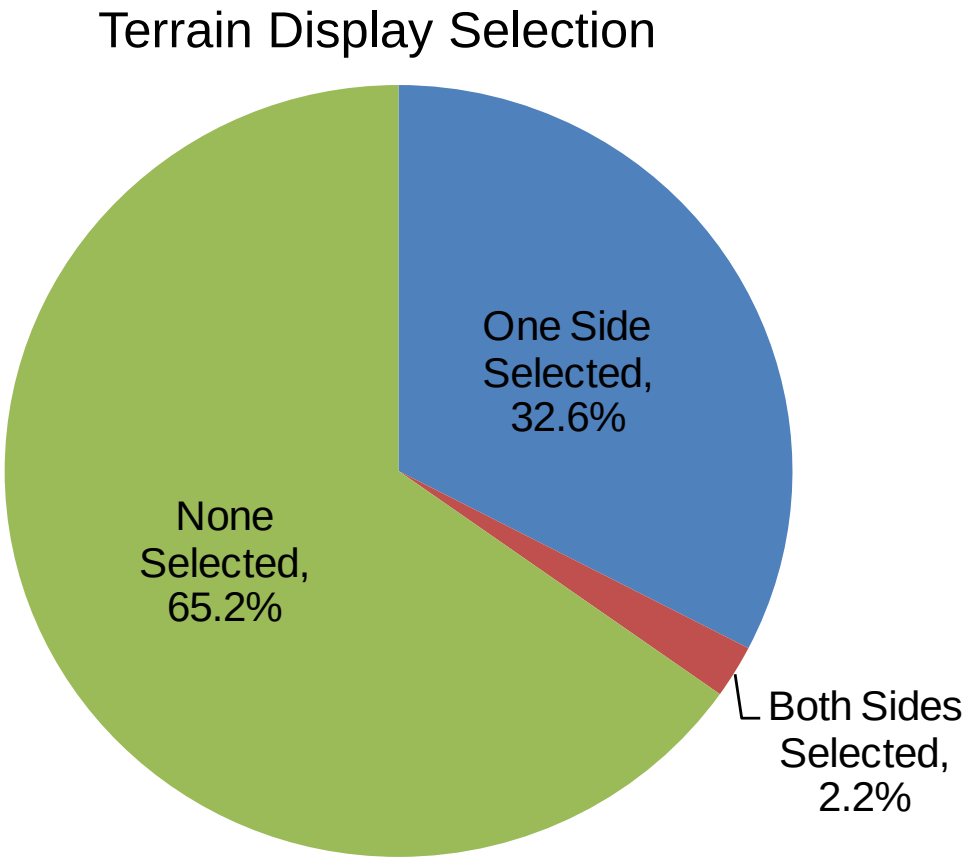
- Night Visual Approach
  - **The flight crew may not realize what is between the aircraft and the runway even when the runway is in sight at night.**
  - **There have been numerous reports on the aircraft descending prematurely almost below a hill top while the airport environment was still in sight.**

Example: Runway 11L at Tucson, Arizona, USA

Honeywell

Terrain Display

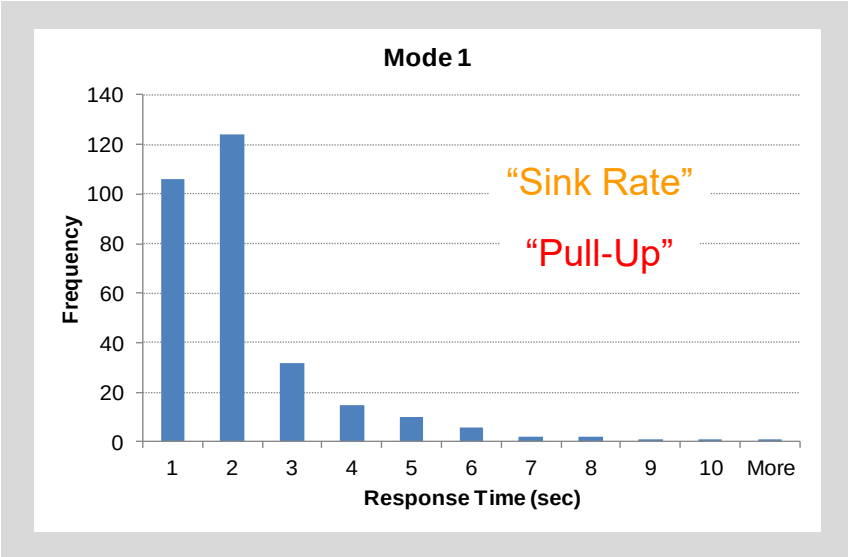
- A terrain display not selected prior to terrain awareness alerts in 65% of the time

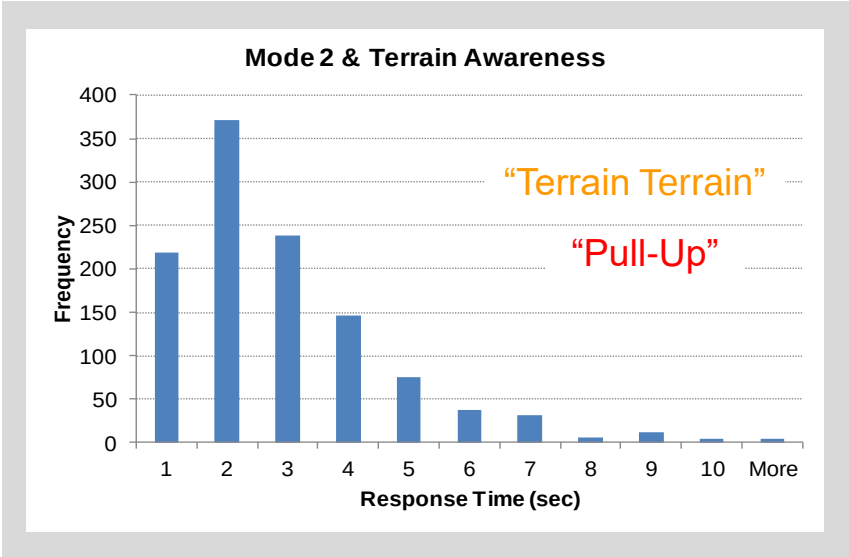


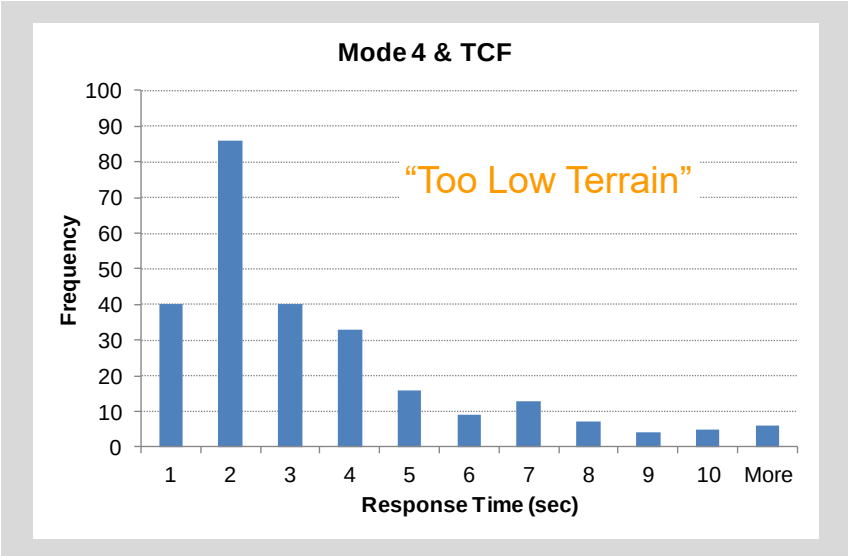
Honeywell

Pilot's Response Time to EGPWS Alert

- Response time was measured using change in pitch or vertical speed
  - Actual pilot's response (control inputs) occurred sooner







Honeywell

Escape Maneuvers

During night or in IMC, apply the procedures below immediately.
Do not delay reaction for diagnosis.

Warning

1. Immediately position throttles for maximum rated thrust. Apply maximum available power as determined by energy needed. The pilot not flying (if applicable) should set power and ensure that TO/GA power and modes are set.
2. If engaged, disengage the autopilot and smoothly but aggressively increase pitch toward “stick shaker” to obtain maximum climb performance.
3. Continue climbing until the warning is eliminated and safe flight is assured.
4. Advise ATC of situation

Caution

1. Take immediate corrective action as necessary to recover safe terrain clearance.
   - Refer to your pilot’s guide and/or AFM(S) for recommended procedures for each EGPWS caution alert
2. Advise ATC of situation as necessary

Honeywell

Recommendations

- *Keeping EGPWS Current*
  - Update the EGPWS to the latest version to enable functions such as:
    - Geometric Altitude
    - PEAKS display
    - Enhanced GPWS Modes
  - By procedural practice and process, update the EGPWS Terrain/Obstacle/Runway database to the latest available
    - Database is released typically every 58 days
  - If your operating runway is not in the EGPWS database, notify Honeywell with details in order to add the runway in the next database release.
- *Aircraft Position Source*
  - *GPS should be used for the position source to EGPWS*
    - It may require configuration setting change to enable GPS as a new position source

Honeywell

Recommendations

- *Training*
  - Use the events in this presentation to illustrate to the pilot that many CFIT ‘Traps’ exist out in the real world of flying.
  - Use some of these events to help illustrate to the pilot, the usefulness of EGPWS, but also its limitations.

- *Operational Procedures*
  - As a SOP, one cockpit display should display terrain during all phase of flight, and the other on weather, if significant weather exists.
  - During night or in IMC, apply the CFIT recovery procedures immediately. Do not delay reaction for diagnosis.

Honeywell

Thank you!