



# National Transportation Safety Board

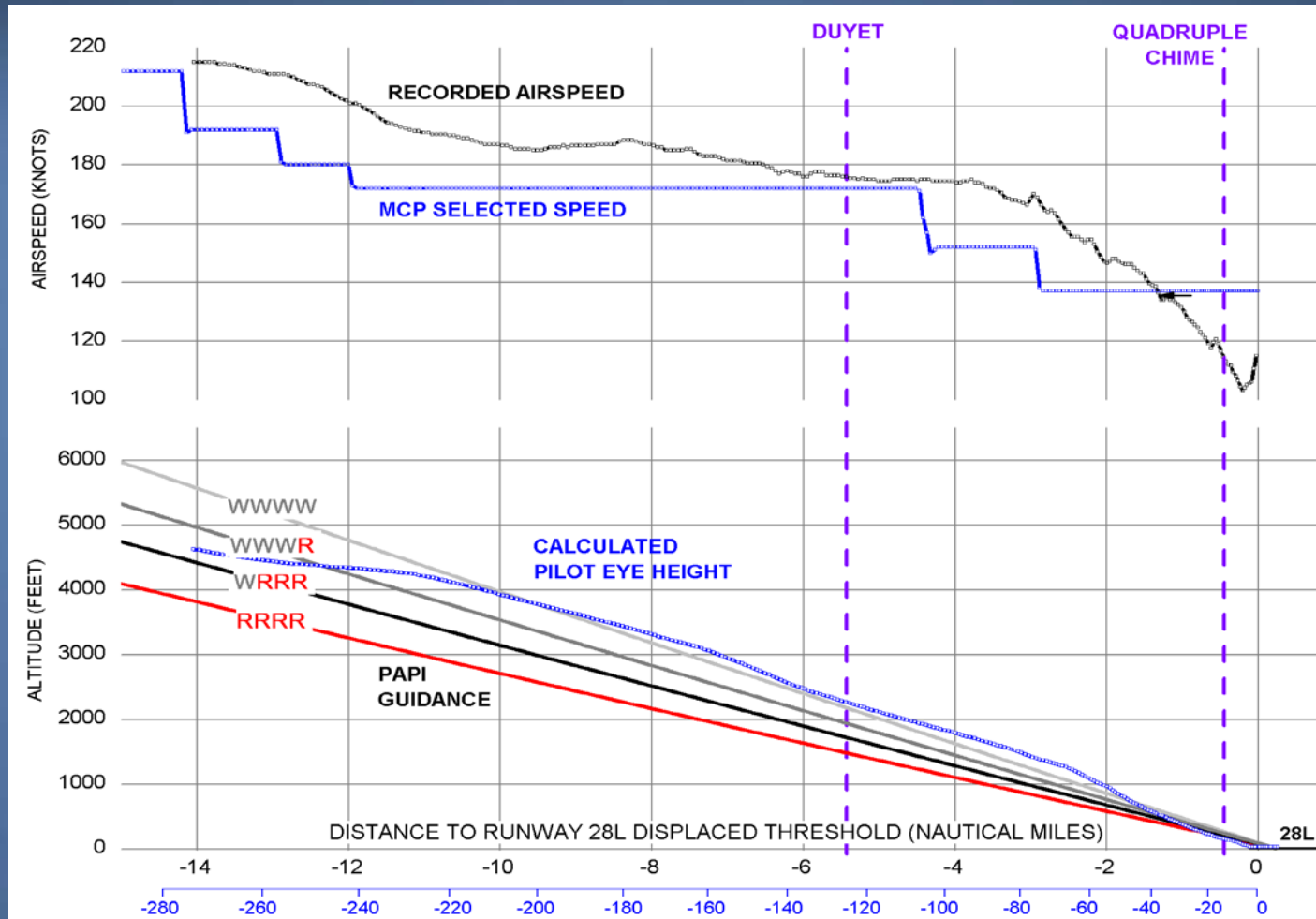
## *Operational Factors*

Asiana Flight 214, B777  
San Francisco, CA  
July 6, 2013

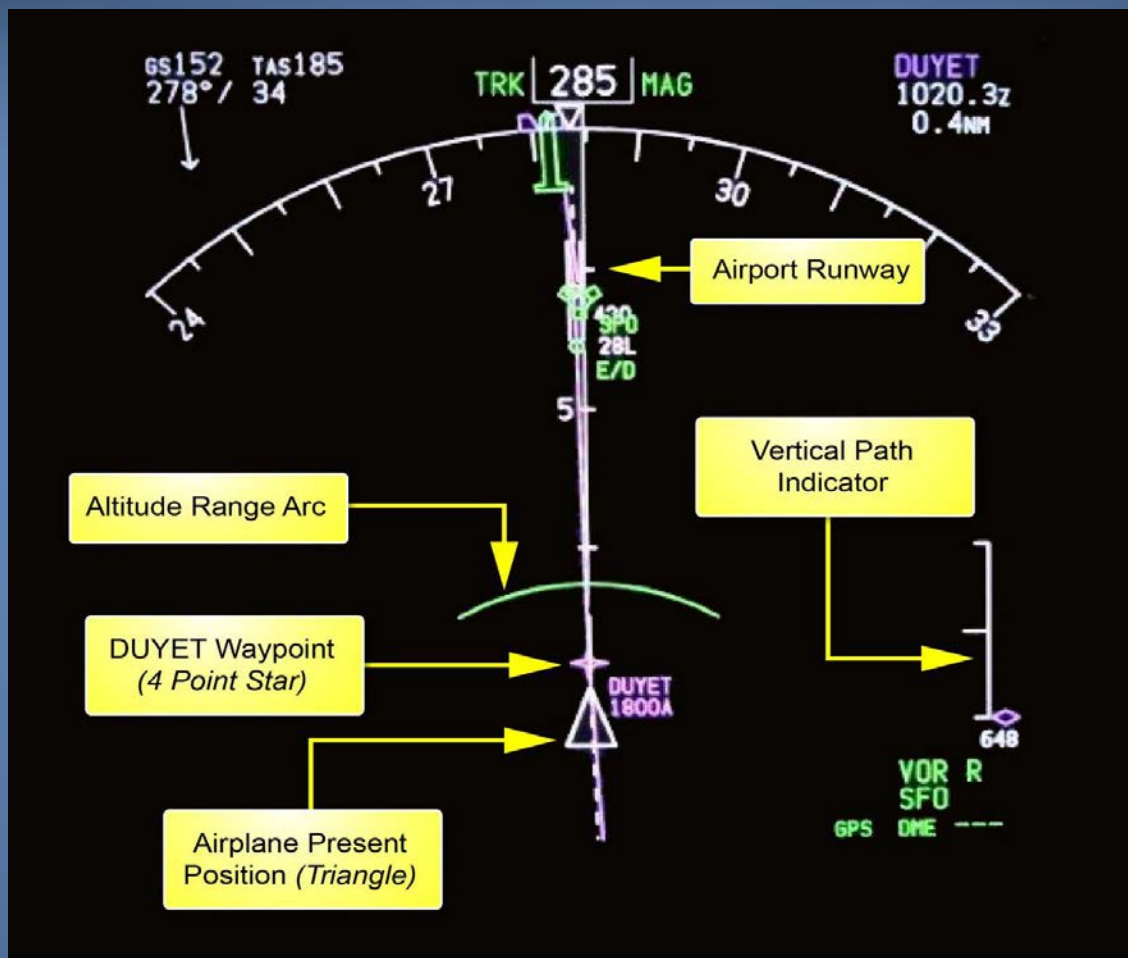
Senior Air Safety Investigator



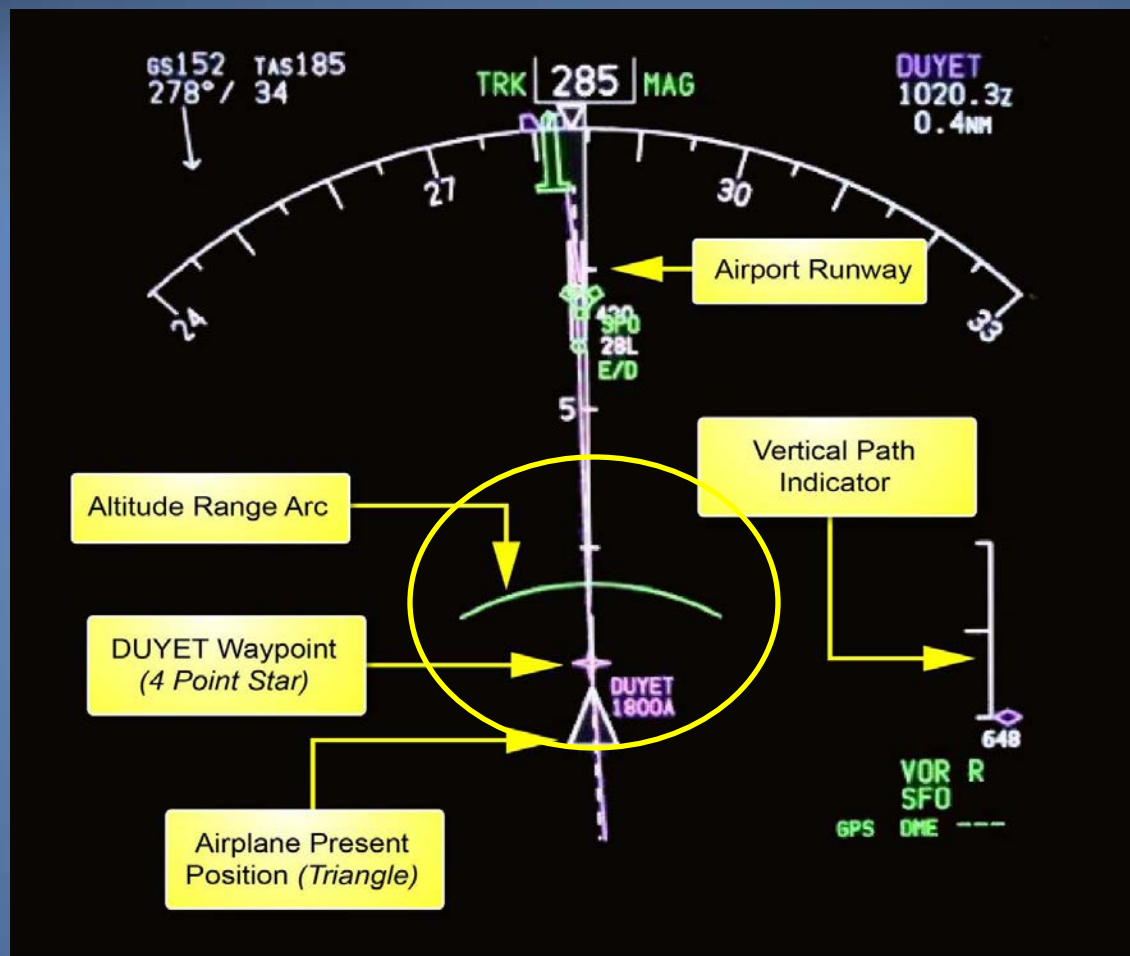
# Profile View of Approach



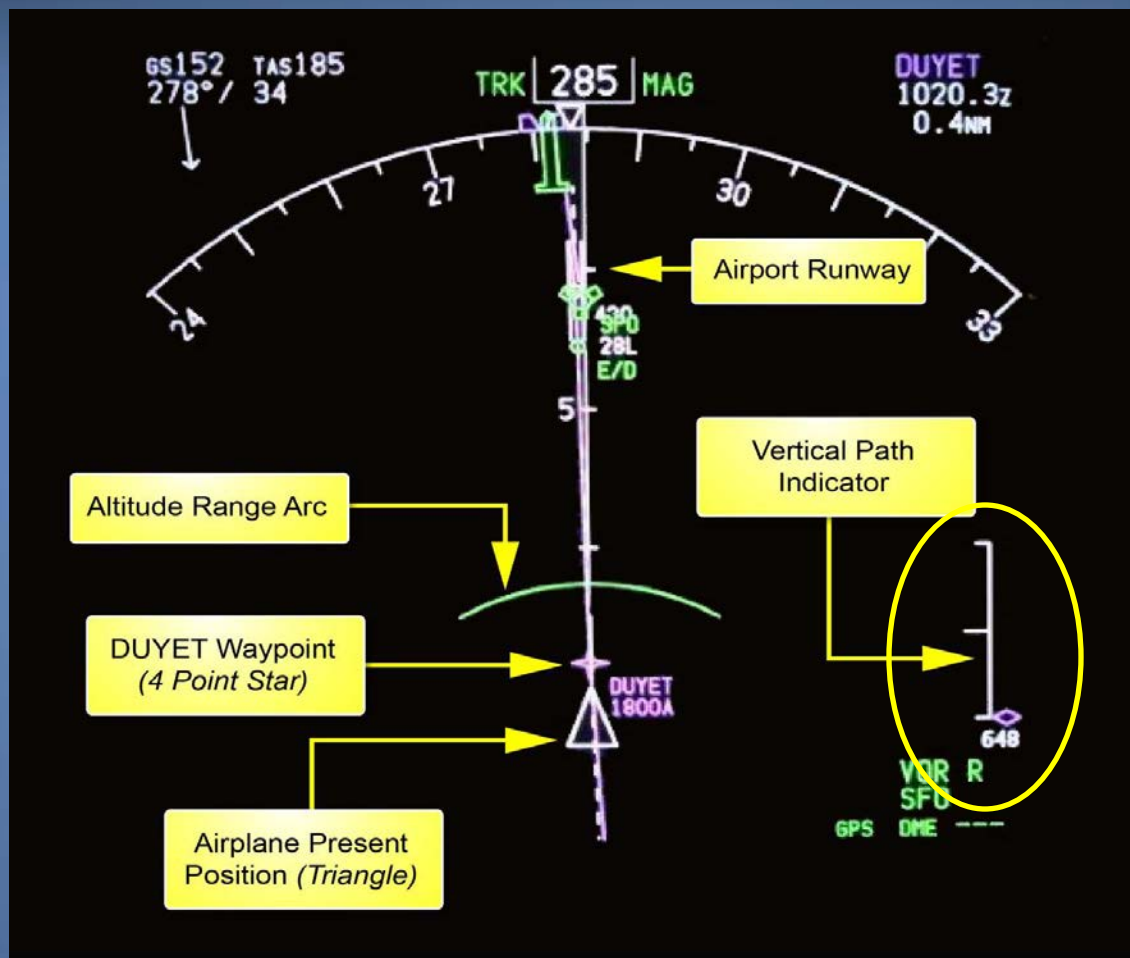
# Navigation Display (ND)



# Altitude Range Arc



# Vertical Path Indicator





# Final Approach Before FLCH Selected



# Final Approach Before FLCH Selected



# Final Approach

- PM delayed setting flaps 30
- PF selected FLCH SPD just before the PM selected flaps 30
- PF did not call out mode change
- Autoflight system began a climb



# Final Approach: FLCH SPD Selected



# Final Approach

- PF counteracted the commanded climb by disconnecting the A/P and moving thrust levers to idle
- The A/T mode switched to HOLD

[illegible]



# Final Approach

- PF – “flight director off”
- PF’s F/D off and PM’s F/D on, but only after turning both F/Ds off
- Never off at the same time
- Would have put A/T in SPD mode and controlled airspeed



# Cycling F/D Switches

- Cycling F/Ds an informal practice
- Done on circling but not visual approaches
- When A/P and both F/Ds are off, A/T resets to SPD mode
- No mention in 777 FCOM/FCTM

# Final Approach

- Flight passed through a 3° glidepath at about 500 feet
- Stabilized approach criteria not met
- Descent rate 1,200 fpm, throttles remained at idle
- No 500 foot callouts

# Final Approach

- PM – “speed” at 90 ft and 110 knots
- PM – added go-around thrust
- Column full aft
- Stick shaker activated
- Airplane did not have the performance to go around at that point

# Visual Approach Training

- PF's first visual approach without glideslope outside simulator
- PF "stressed" about visual approach with no glideslope
- Simulator practice unlike accident scenario



# Instructor Pilot Training

- The PF needed more active coaching
- PM did not intervene in time
- PM's simulator training very structured
- No trainee supervised during instructor Operating Experience (OE)

# Manual Flight

- Asiana policy was maximum use of automation
- Autopilot usually left on to 1,000 ft
- Sometimes manual flight needed
- FAA has addressed need for more manual flight
  - SAFO 13002
  - New required Part 121 training

# Manual Flight

- PF did not trim below 170 knots
- PF was experienced but lacked critical flying skills
- More manual flying would improve pilots' ability to cope with maneuvering changes



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