



# Low visibility Procedures

Capt Alex Fisher  
British Airways

## In the Beginning....

- On 27 October 1965 a BEA Vanguard crashed at Heathrow in a visibility of 350m, all 36 onboard died
- The accident investigation queried the validity of the weather minima then in use
- A Public Committee was set up...

DRAFT

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Board of Trade

**WEATHER MINIMA  
FOR PUBLIC TRANSPORT AIRCRAFT**

The Report of the Weather Minima Committee

London Board of Trade 1969

The basis of our  
current Aerodrome  
operating Minima

52 Approach and landing  
Accidents in 8 years

SAFETY CONTROL OF POOR WEATHER APPROACHES TO LAND

Approach and landing accidents in adverse weather

10. In the period January 1962 to May 1969 there were 52 approach and landing accidents to United Kingdom registered aircraft engaged in public transport operations and 22 of these occurred in adverse weather. Details of the adverse weather accidents are at Appendix A. Some of the accidents took place in weather bordering on the minima of the operators concerned but the study of the accident reports by the Committee did not provide conclusive evidence that minima were too low.

11. The majority of the adverse weather accidents in the United Kingdom occurred at the less well equipped aerodromes and deficiencies in aerodrome facilities were factors in four out of eight accidents which happened to British operators' aircraft at foreign aerodromes. There were only two approach and landing accidents in adverse weather to foreign airlines at United Kingdom aerodromes in the seven year period but most landings in this country by foreign airlines are confined to

22 of them  
in adverse  
weather

# Weather Minima Committee recommended:

- An approach ban based on Runway Visual Range (RVR)
- RVR minima of about 600m (up from 250)
- Minima to be based on approach success probability to minimise missed approaches
- RVR measurement on all runways used in less than 1000m visibility
- ...we are still doing all that

# Effects of the Weather Minima Committee

- Encouraged Autoland (the only way to operate below 600m)
- Now safe landings are performed in as little as 75m RVR
- Dramatic reduction in accident rate
- No fatal landing accidents in less than 600m  
'Cat 2 or 3' landings... (?)

# Did they get the right answer?

- Yes and no
  - Changes to regulations and minima were correct, but...
  - The accident wasn't a **LANDING** accident but a missed approach
  - Actual causes were failure to understand and use the attitude indicator, and the 'somatic' illusion
  - Both of these have resurfaced since – Saab 340 at Zurich, and A320 at Bahrain.

## Brief History of Category 3

- First autoland in passenger service July 1965  
Trident 1 G-ARPB
- First Fail Operational autoland certification  
1972 –RVR 270m – no practical use until  
1979 100m)
- Caravelle Fail passive operation RVR 150m –  
1967
- First Zero Decision Height (no view of the  
runway required) 1982 Lockheed L1011



# Low visibility Procedures

1. Needed to safeguard runways from intrusion
  - Sadly too many instances of collisions during low visibility take-off
2. Needed to protect the guidance system
  - ILS is a vulnerable aid
  - ..but so far, LVPs have been successful in preventing problems

# LVP - Incursion Prevention

- Specified for landing protection from beginning
  - Aerodrome perimeters controlled
  - Runways to be protected by Red stop bars, or procedural means (eg 1 at a time)
- Regulators were slow to protect take-offs
  - Traditional take-off minima 150m, guidance purely visual so not linked to Cat 3
- All change after Teneriffe crash
  - Though visibility there was about 600m....
- There is a massive attack currently underway on runway incursions
  - Getting lost isn't the main problem, most are caused by simple misunderstandings

# ILS Signal at Cardiff before Hangar

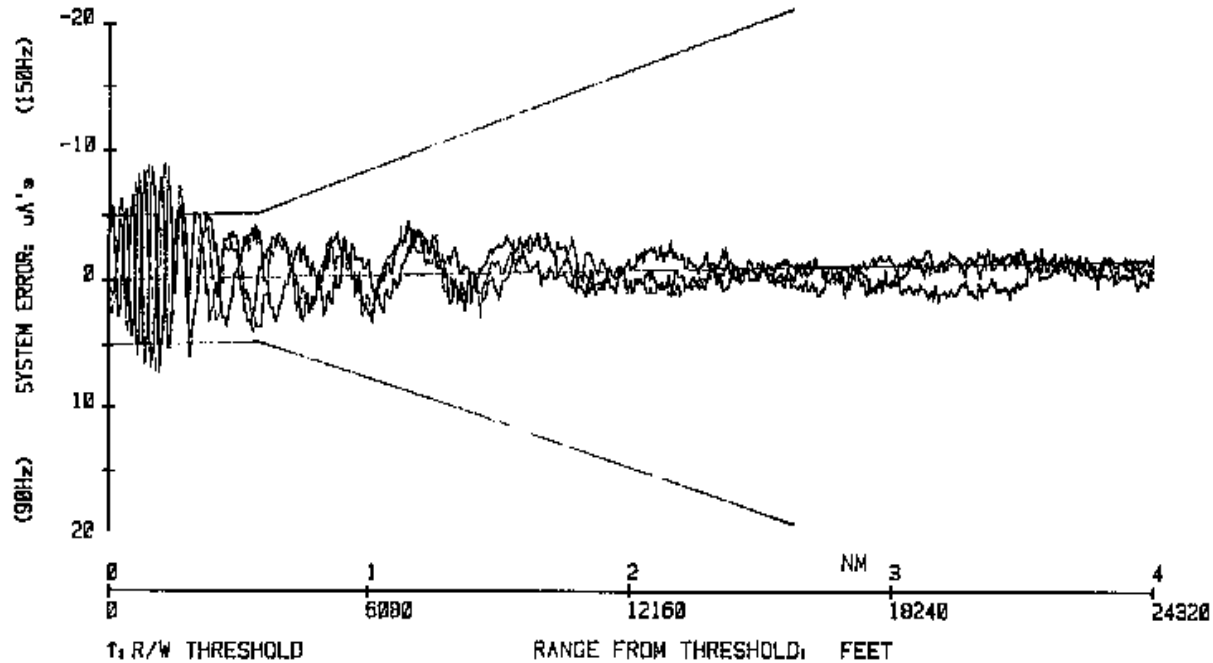


Fig. 1. ILS signal prior to BA hangar being built

# ILS Signal after Hangar Built

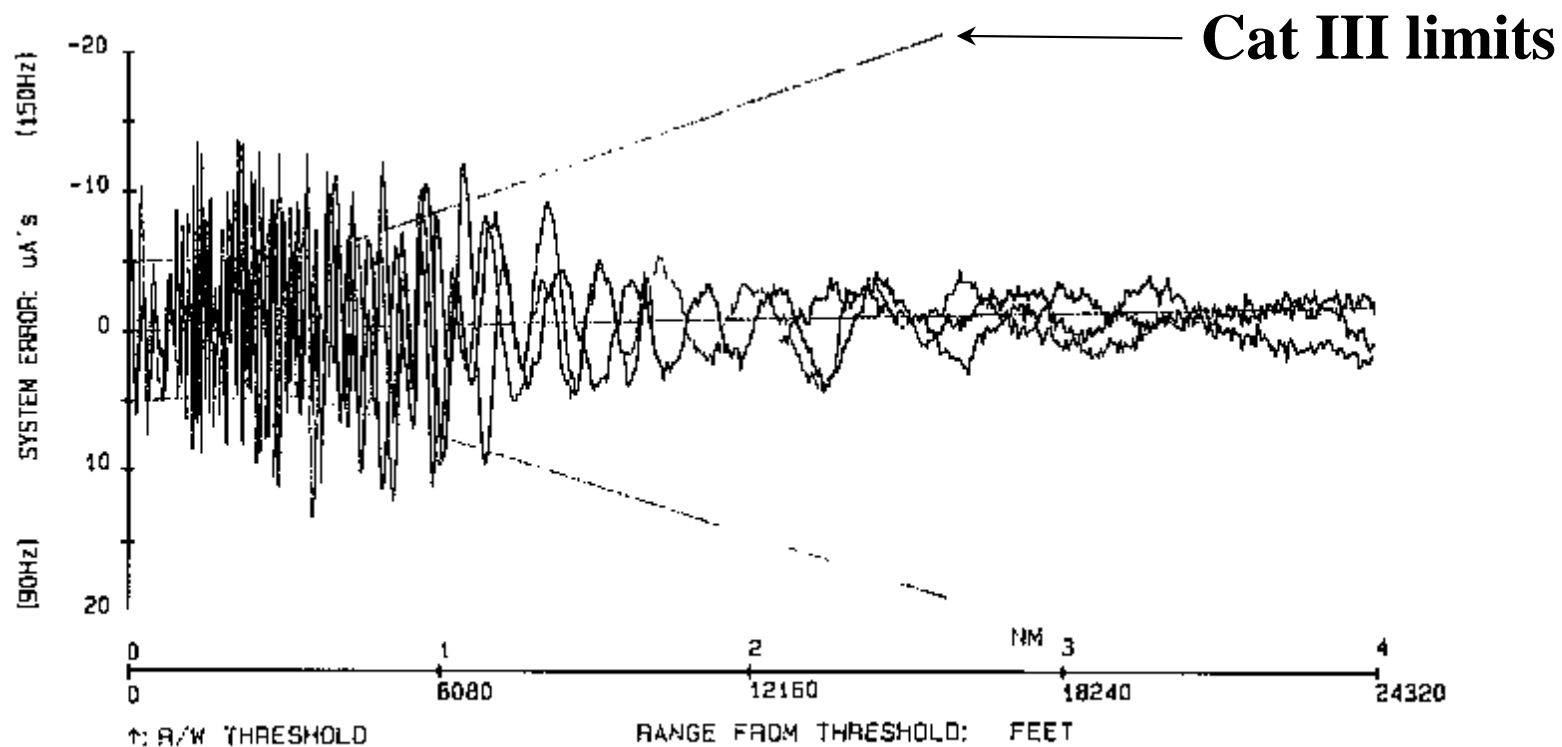


Fig. 2. ILS signal after BA hangar built

# ILS with Hangar & Aircraft at Hold

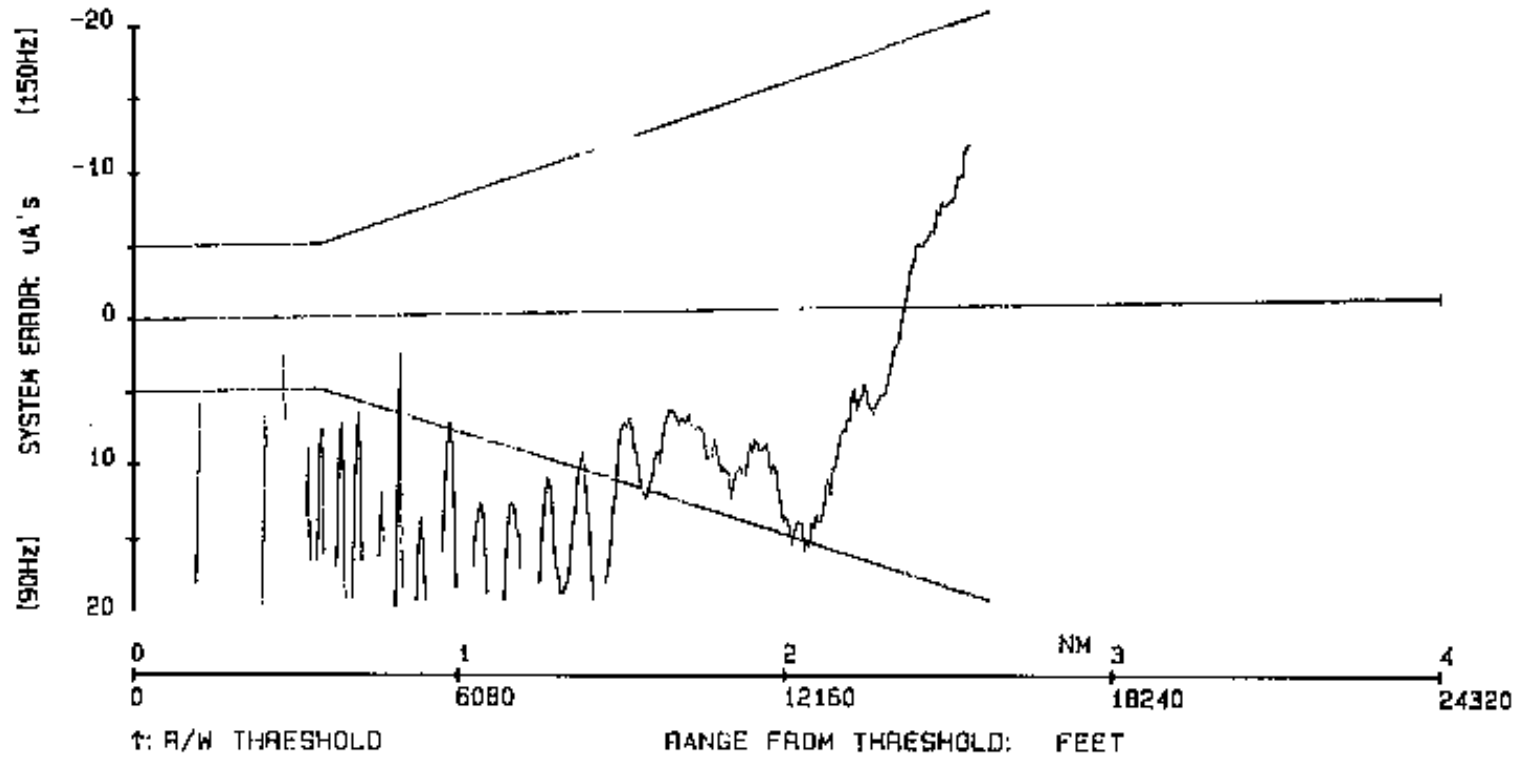


Fig. 3. ILS signal with aircraft at holding point and hangar in place

# MLS Signal with hangar & aircraft at hold

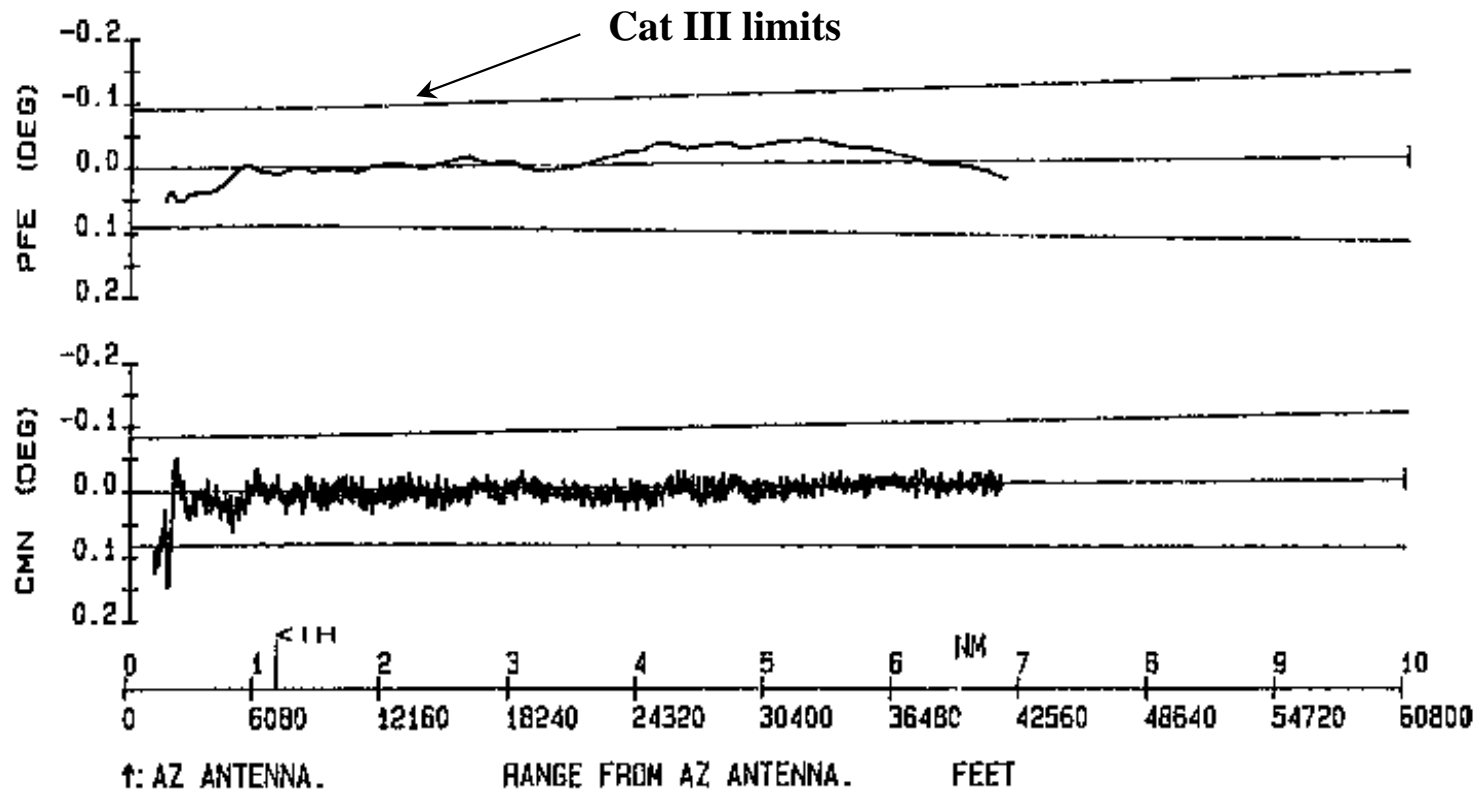
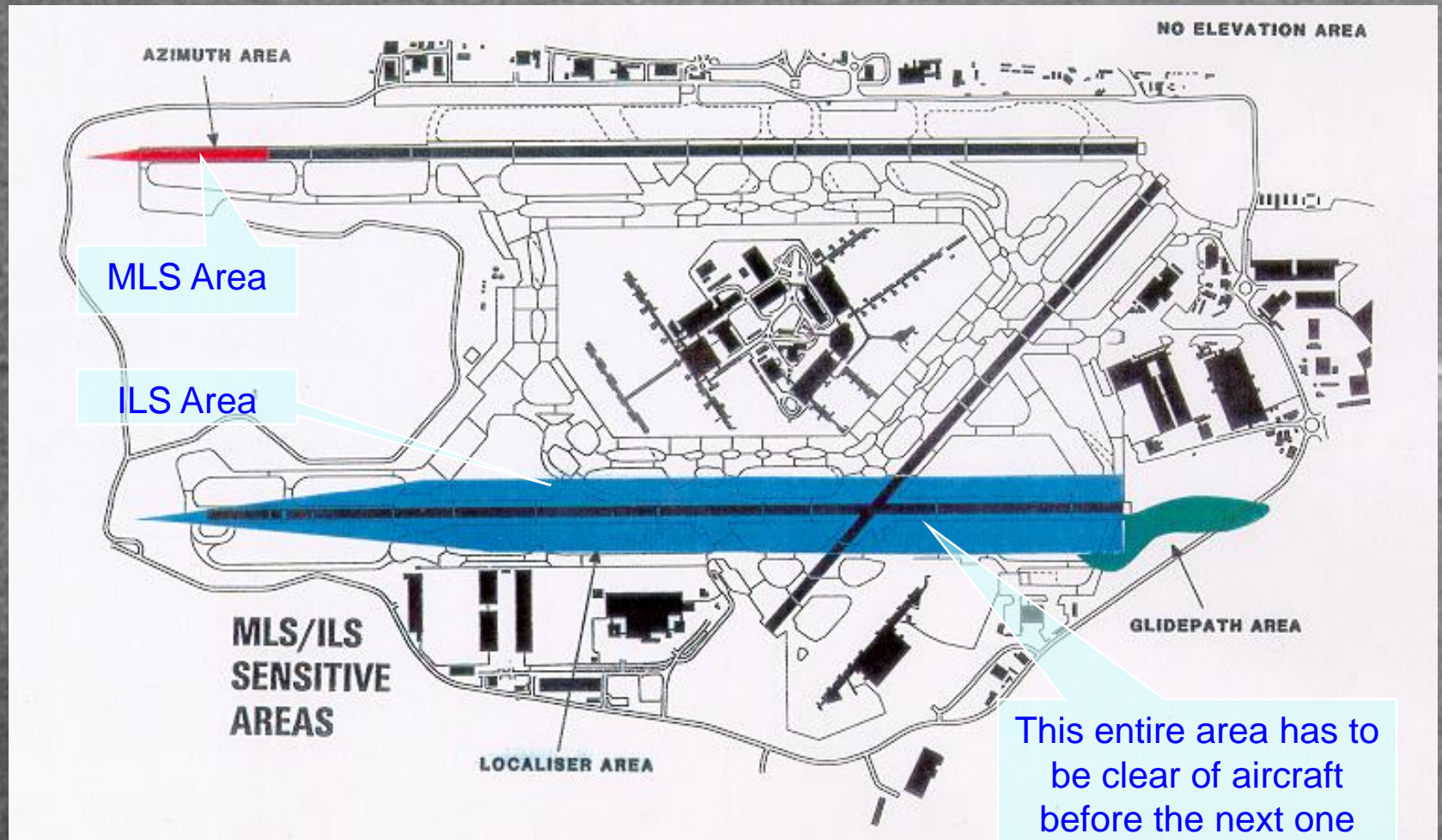


Fig. 4. MLS signal with aircraft at holding point and hangar in place

# Sensitive Areas



## Sensitive Areas

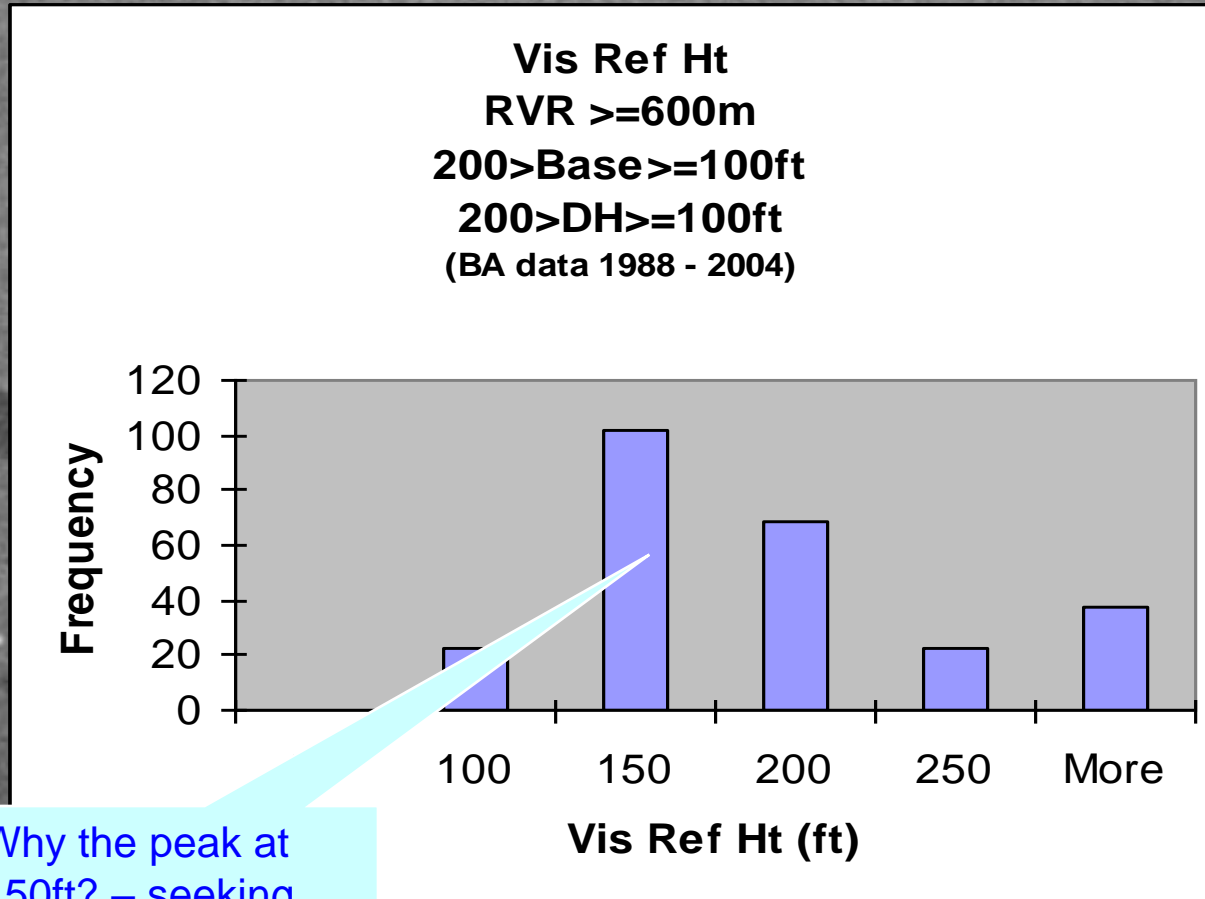
- To achieve clear ILS sensitive area approach separations have to increase to about 6 miles from 3, so capacity reduces by half
- MLS can significantly reduce this loss
  - So could any other guidance system that does not suffer from multipath.. But MLS is the only one we have.
- Currently being installed at London, operational next winter



# Capacity concerns

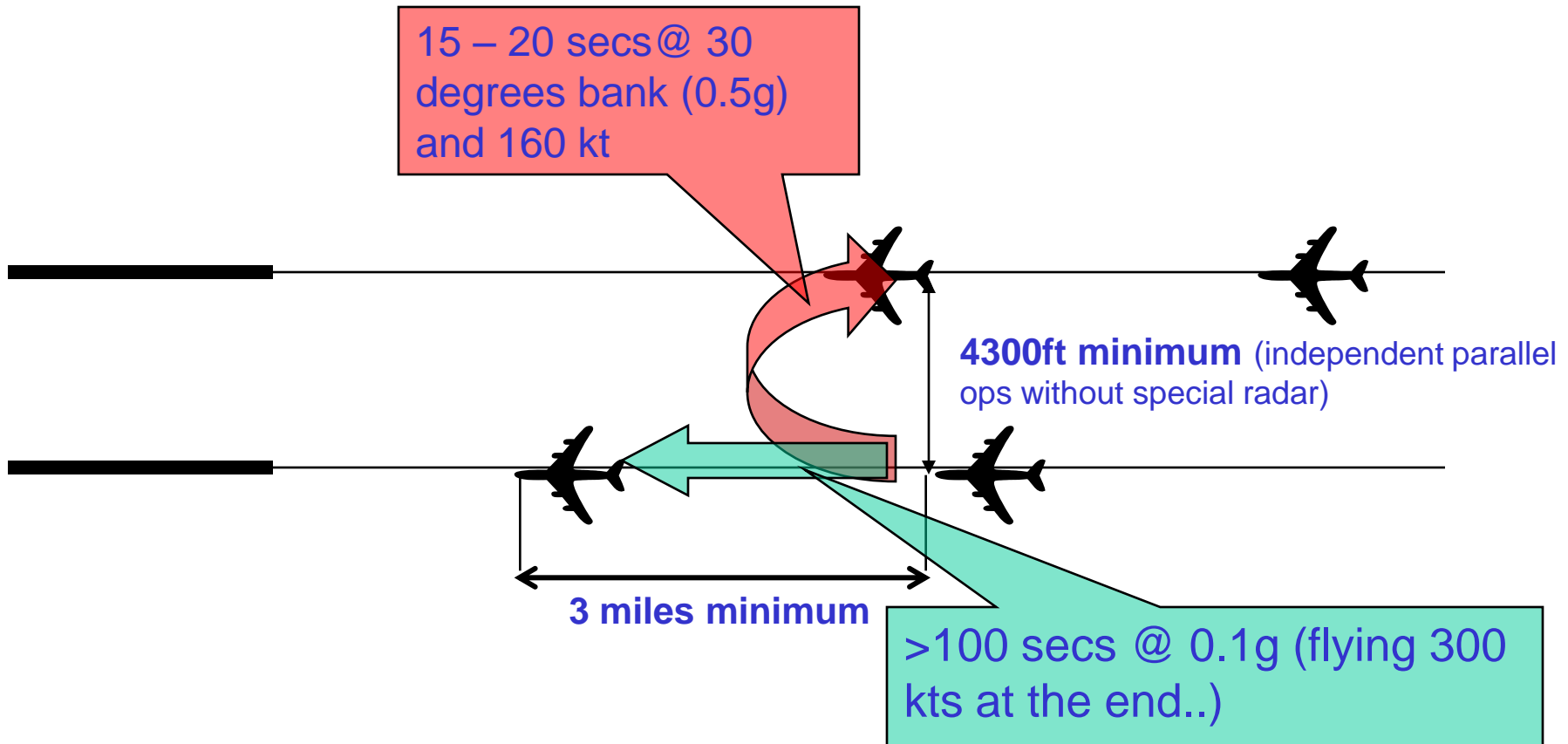
- There are more LVPs than are strictly necessary
- The loss of capacity = diversions at main hubs and/or ground delays
- Confusion reigns over the rules for implementing LVPs due low cloud
- We do not need to implement LVP separations for reported low cloud (WMC report...), only for actual decision height <200ft
- Preparation phase, OK, increased separations, wait.
  - With cloud reported below 200ft and RVR >600m, visual reference is usually acquired at or above 200ft....

# Visual Reference Height



Why the peak at 150ft? – seeking visual reference at DH + 50,,,,

## In trail separation – have we got the right answer?



# Summary

- LVPs have been successful within limits (runway incursion is part of a wider problem)
- LVPs are expensive
- We can reduce this cost without sacrificing safety with imagination and some investment
- We need the same imagination to overcome the effects of wind component
- We don't need to wait for Montreal, we can use Regional Supplementary Procedures

Thank You

