

# FLIGHT TEST SAFETY WORKSHOP

## Situation Awareness and Highly Integrated Avionics Systems

Presented to: **Flight Test Safety Workshop**

By: Jim Richmond  
Aircraft Certification Service  
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Date: April 29, 2009



Federal Aviation  
Administration





NC8407

LEFT ENGINE    CENTER ENGINE    RIGHT ENGINE

HIGH

LEAN











# Significant changes in Avionics

## Three areas of change

- GPS navigation
- System integration
- Pathway presentation











# Systems Integration

– Flat panels doing everything

Attitude

Nav/Com

Airspeed

Clock

Altimeter

Engine gages

Heading

Temperature

Fuel

Other



# Integrated Avionics Suppliers

## Partial list

Aspen

Blue Mountain

Garmin

IS&S

NARCO

Rockwell Collins

Shadin

Avidyne

Chelton

Honeywell

L-3

OP Tech

Sagem

Tru Trak

Becker

Dynon

Insight Instruments

Lowrance

Panasonic

Sandel

Universal



# Aspen







# Avidyne





# Avidyne



# Avio NG



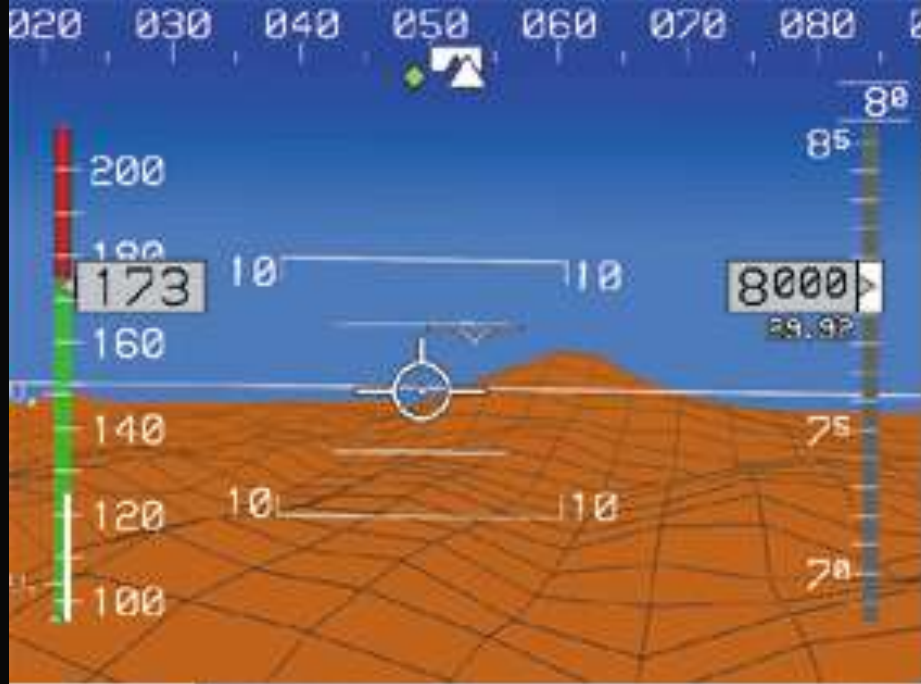
# Blue Mountain

(for Experimental Category Aircraft)









# Chelton





# Dynon

DYNON AVIONICS

EFIS-D100





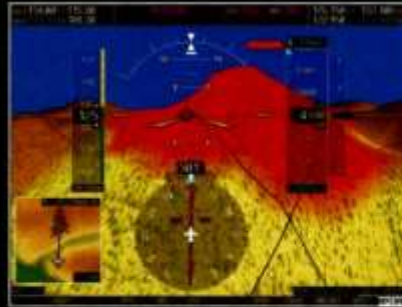


# Garmin G1000 Displays



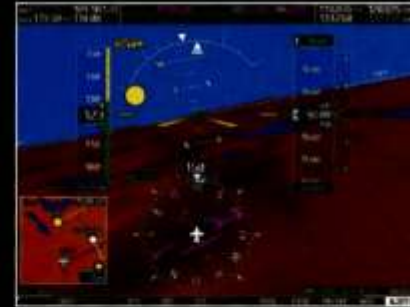
## Pathways in the sky.

Rectangular pathway "windows" spaced no more than 1,000 meters apart help pilots visualize and follow their intended route of flight. Guidelines in each corner of the pathway windows point in the direction of the active flight plan leg.



## Seeing red?

Terrain alerting with Garmin SVT is totally unambiguous. Potential terrain conflict areas are indicated by a color overlay on the topography. Amber for caution, Red for WARNING.



## Watch for oncoming traffic.

Using familiar TCAS symbology in a three-dimensional form, Garmin SVT makes it easier to spot moving traffic. You can see if they're above or below your altitude. And as intruders get closer, the symbols get larger.



## Identify that runway.

When flying into an unfamiliar airport, SVT helps simplify the approach. Airports are shown with identifier signs. And runway surfaces, numbers and thresholds are clearly depicted in 3-D. Also, the destination runway in your active flight plan is outlined in white – just so there's no confusion.



## Persistence pays off.

Inadvertent entry into an unusual attitude situation can be tough on pilots and airplanes. But with Garmin SVT, a "persistent" strip of color on the display shows "which way the ground or sky went" – to aid in orientation and recovery.



## Obstacle alerting.

When visibility is low, it's reassuring to have Garmin's Towers and Obstacles database looking out for non-terrain structural hazards. Color-coded 3-D symbols are depicted on SVT if the highest point is within 1,000 feet vertically of the aircraft.

# Honeywell APEX





# L-3 Smartdeck



# SMARTDECK

Integrated Flight Controls & Display System




# Rockwell Collins





# Sagem



# Sandel



# Universal



Pilatus PC-12



# Bendix-King

## APEX EDGE SERIES



## APEX EDGE SERIES









# So the Real Question Is

- The new integrated cockpits improve situational awareness and, therefore, improve safety.....
- But can the pilot effectively cope with the new avionics in all situations?



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