

Docket No. SA-530

Exhibit No. 8 - K

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

Honeywell Submission

Helicopter EMS Safety Solutions

(13 Pages)

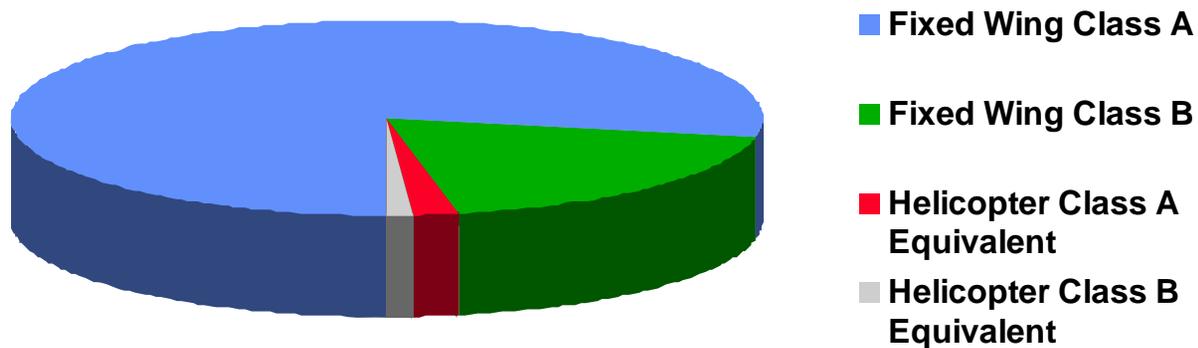
Helicopter EMS Safety Solutions

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Honeywell

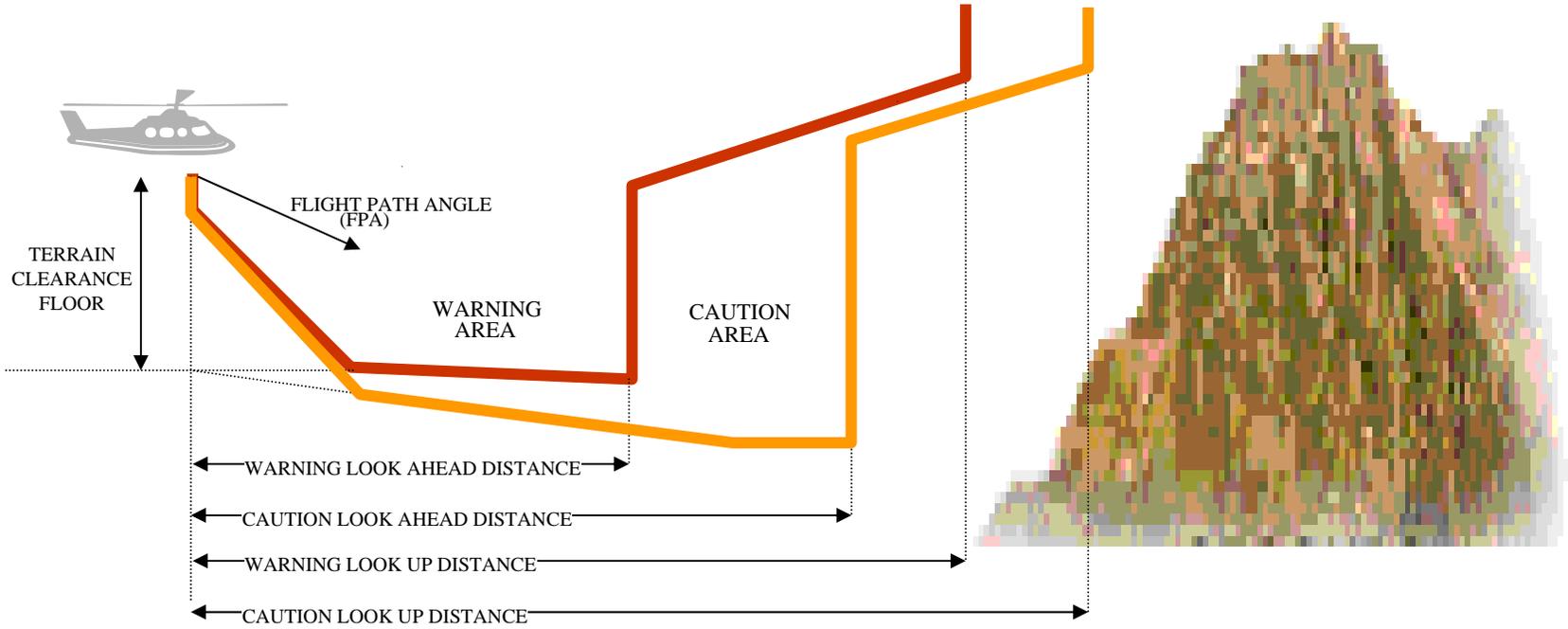
EGPWS Experience

- **Over 50,000 systems with 600,000,000 flight hours**
 - **78% Class A TAWS**
 - **19% Class B TAWS**
 - **2% Helicopter Class A equivalent – MK 22**
 - **1% Helicopter Class B equivalent – MK 21**



- **Algorithms/modes are tailored specifically for helicopter operations**
- **Allows pilots to land helicopters anywhere**
 - not restricted to an airport or a runway
- **Allows pilots to fly closer to the terrain/obstacle, horizontally and vertically, without issuing alerts**
- **Low Altitude Mode for operations in close proximity to terrain/obstacles**
 - Look-ahead and look-down curves adjusted to allow closer terrain/obstacle clearance
 - Terrain Display remains fully operational
- **Inhibit Mode for operations in extremely close proximity to terrain/obstacles**
 - All alerting is inhibited
 - Terrain Display remains fully operational
- **High resolution terrain/obstacle database**
 - 6 arc seconds world-wide where available
 - 11 separate loadable regions (1 region can be loaded into each LRU)
 - Database updates are currently available on average 3-4 times per year

H-EGPWS Algorithm



H-EGPWS Features

- **MK 21 meets full intent of the H-TAWS TSO (C194)**
- **Plus:**
 - **Geometric altimetry**
 - **Bank Angle callout**
 - **Peaks Display**
 - **Vertical Situation Display of terrain (VSD) on compatible displays**
- **MK 22 adds:**
 - **Radio Altitude input, and associated GPWS modes:**
 - ◆ Excessive Descent Rate (Mode 1)
 - ◆ Excessive Closure Rate/Rising Terrain (Mode 2)
 - ◆ Descent After Takeoff (Mode 3)
 - ◆ Insufficient Terrain Clearance (Mode 4)
 - ◆ Descent Below Glideslope (Mode 5)
 - **Tail Strike callout**
 - **Autorotation callout**
 - **AVAD altitude callouts for North Sea operations**
 - **Dual terrain display capability**
 - **Envelope modulation for improved alerting**

H-EGPWS Installation

- **LRU (and mounting tray if required)**
- **Associated wiring**
- **Interface to existing/compatible display**
- **GPS – internal or external**
 - **Internal GPS is provided in every H-EGPWS – requires a GPS antenna to be installed**
 - **All H-EGPWS are also compatible with ARINC 743/743A external GPS receivers**
- **Annunciator/Switch Panel (for lights and switches)**
- **Total Cost Estimate – parts, installation, and certification**
 - **Minimum compliant system – ~\$25K to \$35K**
 - **Does not include the display – required for TSO-C194**

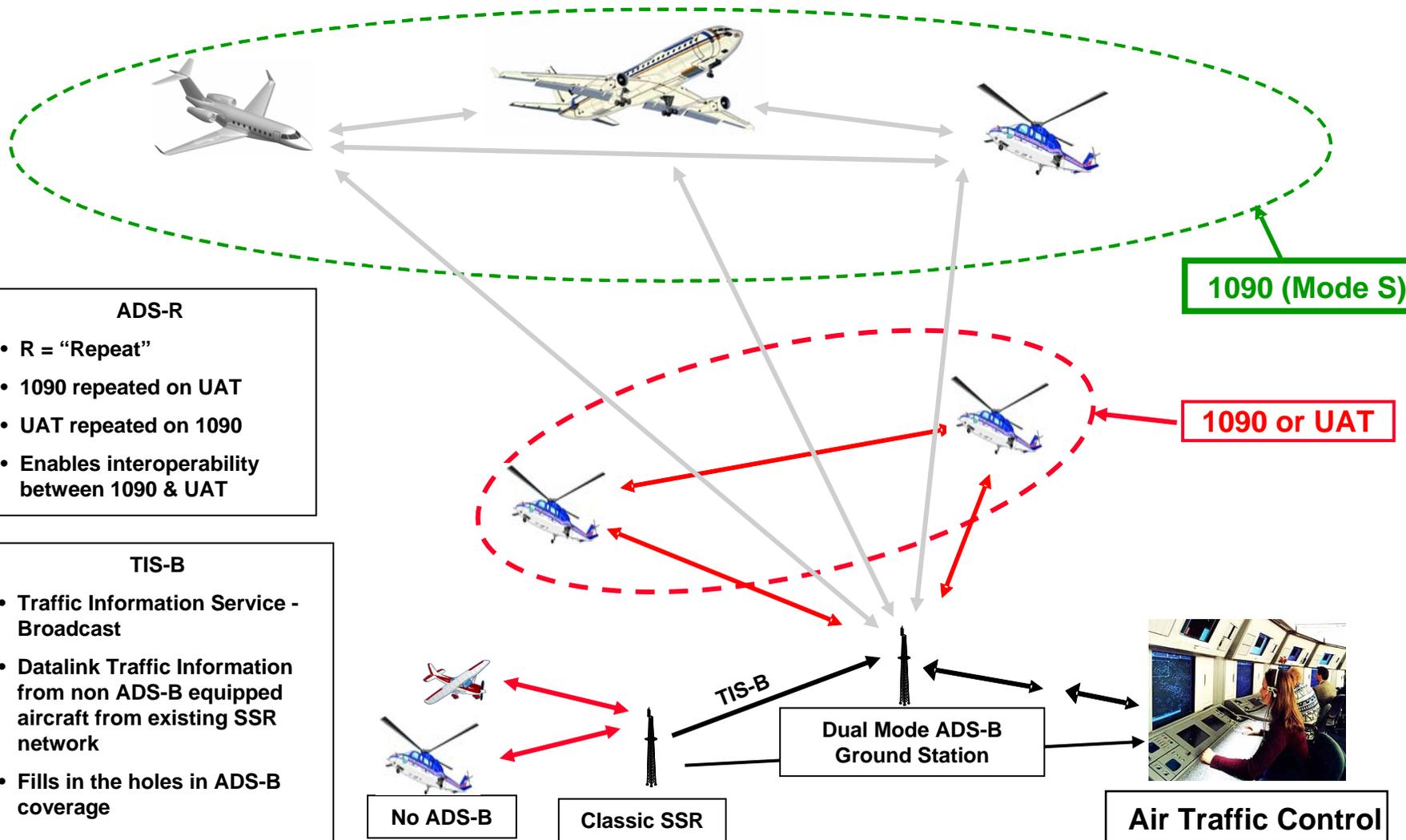
H-EGPWS Testimonials

- “If a pilot really makes a huge mistake and gets himself in a situation where he shouldn’t, and that’s in the clouds and in a valley, you’ve got a way to fly out of the valley.” *Blue Hawaiian Helicopters on Maui*
- “[Helicopter EGPWS] functions as a second set of eyes in the single pilot cockpit.” *Evergreen Helicopters -operator for Providence Alaska Medical Center*
- “Following Hurricane Katrina, Arkansas Children’s Hospital deployed one of our medically configured S76 C+ helicopters to assist with the evacuation of patients from the city of New Orleans. The Angel One Pilots found the EGPWS to be an invaluable safety tool by providing assistance in remaining clear of all the numerous unlit towers and buildings that surround some of the New Orleans’ downtown hospitals. The EGPWS is an effective and economical safety tool the hospital uses to reduce and manage aviation risk.” *Arkansas Children’s Hospital*
- Additionally, EGPWS provides situational awareness of an unlit towers. “One night on approach to our hospital a 300 foot tower had lost its lighting and was not NOTAM’d out of service”. *Arkansas Children’s Hospital*

Other Relevant Safety Systems

- **ADS-B**
 - Improves situational awareness of nearby aircraft
- **Synthetic Vision Systems**
 - Improves situational awareness of terrain and obstacles during night and low visibility operations
 - Based on H-EGPWS database
- **Cable Warning / Obstacle Avoidance**
 - Multi-sensor data fusion with terrain/obstacle database
 - Detects cables and low visibility obstacles
 - Provides audio/visual cueing to enable hazard avoidance
- **Weather Radar**
 - Cockpit display of real-time hazardous weather
- **Recorders**
 - Increased ability to understand and address safety issues

ADS-B



ADS-R

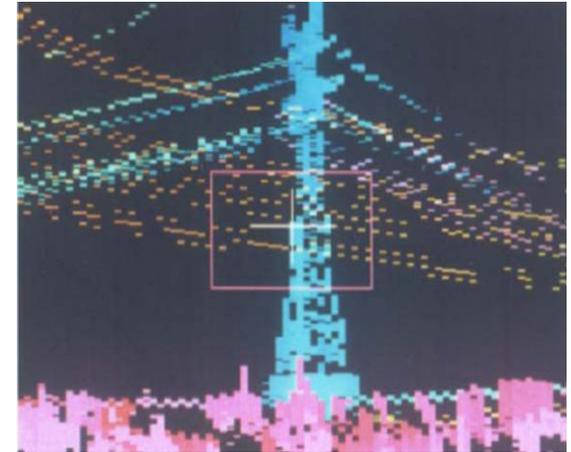
- R = "Repeat"
- 1090 repeated on UAT
- UAT repeated on 1090
- Enables interoperability between 1090 & UAT

TIS-B

- Traffic Information Service - Broadcast
- Datalink Traffic Information from non ADS-B equipped aircraft from existing SSR network
- Fills in the holes in ADS-B coverage

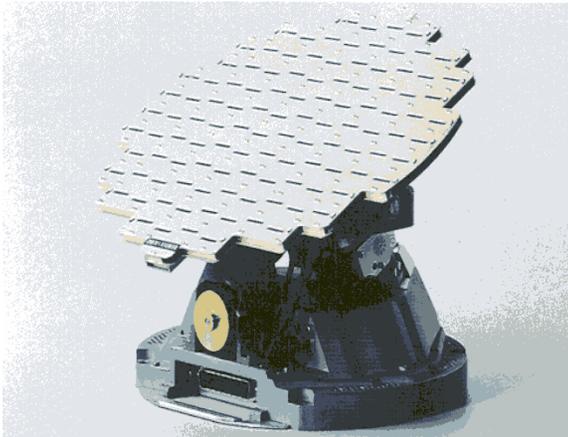
Cable Warning / Obstacle Avoidance

- High resolution imaging sensor to
 - **Identify cables and wires**
 - **see thru degraded visual environments (DVE)**
 - ◆ sand, dust, weather, blacked-out flight
- Integrated System includes
 - **94GHz MMw Radar**
 - ◆ Antenna
 - ◆ Processor module
 - ◆ 20 lbs system weight
 - **Avionics Processor**
 - ◆ Core Processors (GPP & IPM)
 - ◆ Evidence Grid Processing
 - ◆ DTED database
 - ◆ EVS Processing



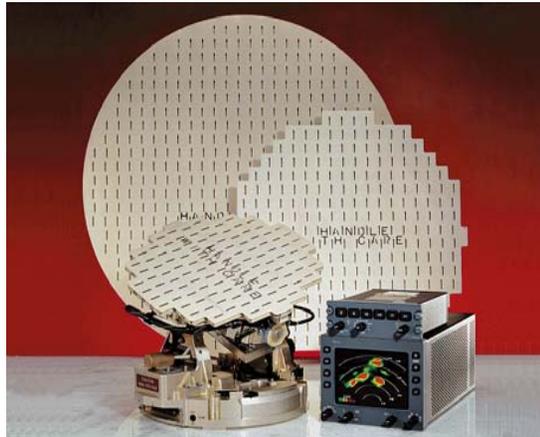
Weather Radar

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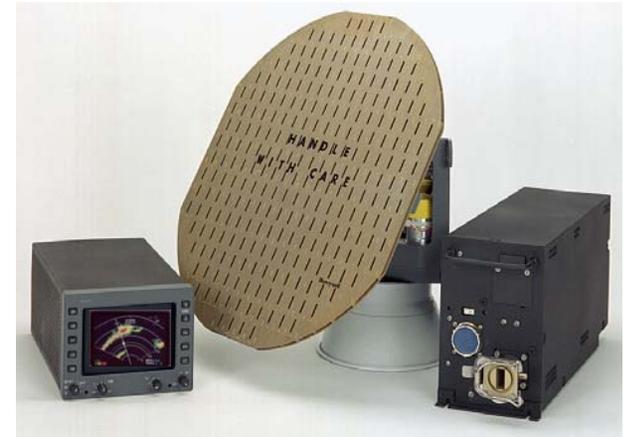
**ART-2000/2100
Family**

- Light helicopters
- High performance
- Vertical profile on fixed azimuth
- Altitude compensated tilt angle correction



**Primus 880/660/440
Family**

- Helicopters
- High Power: 10KW
- Current industry standard
- Next generation P990
 - Auto scan
 - Vertical profile



**Primus 700/701
Family**

- Search and rescue
- High Power: 10KW
- Dual-map mode
- Sea search and terrain map
- Minimum range: 450 feet

Recorders

- **Non-ARINC form factor**
- **Separate (FDR, CVR) and Combi configurations**
- **Light weight, simple installation**
- **Exceeds all industry (TSO/ED/DO) requirements**
- **Provisioned for future datalink recording**
- **3 or 4 voice channels, 30/60/120 min voice; 64/128/256 wps 10 hours recoding**



“Combi” Recorder – Integrated CVR/FDR Recorder