FAA ALASKAN REGION

Capstone II

Investment in Safety

The *Capstone* Program is a joint industry and FAA Alaskan Region effort to improve aviation safety and efficiency by putting cost effective, new technology avionics equipment into aircraft and providing the supporting ground infrastructure. The demonstration areas are non-radar environments where most of the air carrier operations have been limited to Visual Flight Rules (VFR). Phase II *Capstone* is equipping aircraft used in Southeast Alaska with a government-furnished Global Positioning System (GPS) based avionics package. This system employs the first certified application of the Wide Area Augmentation System (WAAS) for the enroute portion of flights on routes in Alaska that are outside the operational service volume of ground based navigational aids.

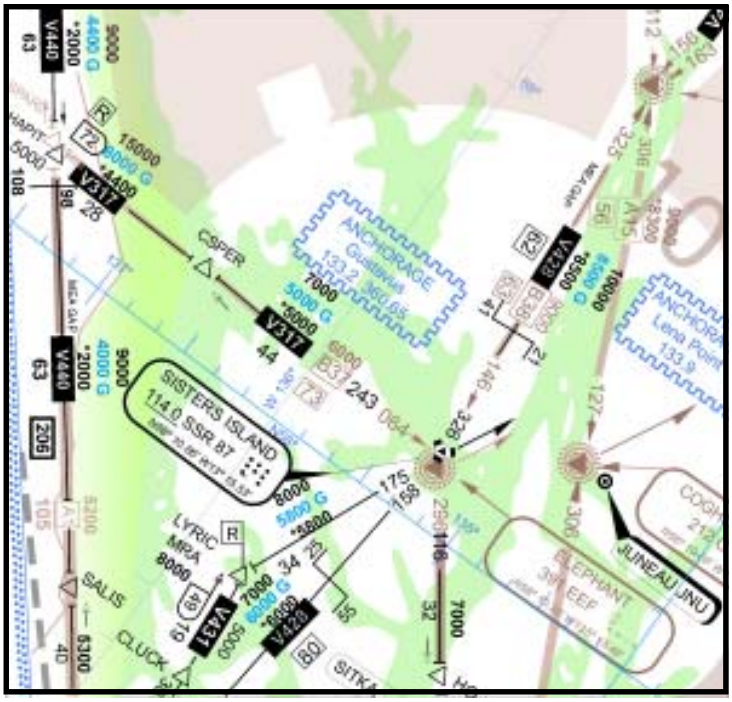
Phase II *Capstone* equipment and procedures have added more than 40,000 feet of useable Instrument Flight Rules (IFR) airspace over 1500 miles of published airways, will increase the number of airports served by instrument approaches, and will enable surveillance coverage for IFR air traffic control services with improved communications.

Special Federal Aviation Regulation 97 was approved by Administrator Marion Blakey effective March 13, 2003. This rule authorizes properly trained pilots using Technical Standards Order C145a/C146a GPS WAAS navigation systems to fly on air traffic routes at special (lower than usual) GPS Area Navigation (RNAV) altitudes using only the specified GPS/WAAS avionics for navigation.

In addition to enhanced safety and new operational capabilities, the *Capstone* program is providing real world information and experience that is essential for modernization of the National Airspace System (NAS).

Mission Statement

- *Capstone* is a technology focused Safety Program in Alaska which seeks near term safety and efficiency gains in aviation by accelerating implementation and use of modern technology.
- *Capstone* links multiple programs and initiatives under a common umbrella for planning, coordination, focus and direction.
- *Capstone* develops capabilities and requirements jointly with FAA, the Alaskan community and aviation industry in a manner consistent with future NAS plans and concepts, and implements in a manner leading to self-equipage.



Technical Information

A - Directional Scale
B - Bearing to Waypoint
C - Heading Indicator
D - Indicated Airspeed
E - Airspeed Tape
F - Horizon
G - Waypoint Symbol
H - Course Deviation Indicator
I - Ground Track
J - Altitude Tape
K -Pitch Scale
L - Altitude Readout
M - Verticle Speed Indicator
N - Flight Path marker
O - Skyway
P - Waypoint Information

1 - Wind Vector & Data
2 - Density Altitude
3 - Heading Indicator
4 - Directional Scale
5 - Color Coded Terrain
6 - Ownship Position
7 - Intersection
8 - Warning/Caution/Advisory Flags
9 - Zulu Clock
10 - Omnibearing Selector
11 -Dead Stick Glide Area
12 - Range Ring Scale
13 - Waypoint Information
14 - Destination Data
15 - Fuel Totalizer
16 - Start Waypoint (NRST or DIR - only)

Primary Flight Display - The daylight visible color display employs proven Heads Up Display (HUD) symbology overlaying a real-time 3 dimensional virtual reality view of the outside world. This provides the IFR pilot with the simple visual cues for navigation and aircraft control like those used in VFR conditions and eliminates the need to scan multiple instruments or mentally interpret complicated enroute and approach procedures.

Multi-Function Display - This daylight visible color display can be configured to show a moving map, a Horizontal Situation Indicator, traffic, terrain, or weather displays. Combined with the PFD, the two units provide a complete flight and navigation system via computer generated screen displays of data provided by various discrete sensor modules. Additionally, to provide backup, this instrument can be switched to a Primary Flight Display mode.

Warning/Caution/Advisory System - Both Instruments include an Integrated Auditory System that monitors a wide variety of parameters and provides visual and auditory annunciations for conditions that demand pilot awareness. Warnings are accompanied by a red flag and repeat until acknowledged or corrected by the pilot. Cautions are accompanied by an amber flag and are annunciated only once. Advisories are accompanied by a green flag or no flag and a voice annunciation or warble.

Terrain Awareness and Warning System - The TAWS is designed to provide the pilot with increased situational awareness and reduce Controlled Flight Into Terrain accidents. Using information from onboard sensors and a terrain database, along with flight path intent information from the Electronic Flight Instrument System (EFIS), a “look-ahead” capability provides warnings and alerts well in advance of potential hazards, allowing time for the pilot to make the necessary maneuvers for terrain avoidance.

Traffic Alerting/Surveillance - Once integrated with a Universal Access Transceiver data link, the system will also provide traffic alerting capabilities using Automatic Dependent Surveillance - Broadcast (ADS-B) technology. ADS-B was certified for surveillance services during the first phase of Capstone and will be used for surveillance purposes throughout Southeast Alaska.

For more information visit the *Capstone* website at: www.alaska.faa.gov/capstone