



Federal Aviation
Administration

HTAWS-TSO C194 UPDATE

Presented to: AEA Rotorcraft Forum
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Date: 21-August-2013



Issue:

- Different relative terrain height colors have different meanings for different HTAWS OEM designs.
- Most use Red/Yellow in some form
- DO-309 silent on relative terrain height depiction specifics

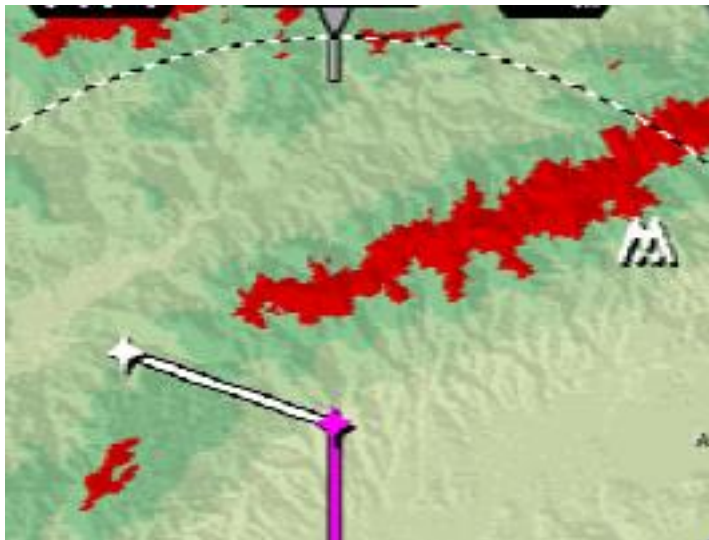
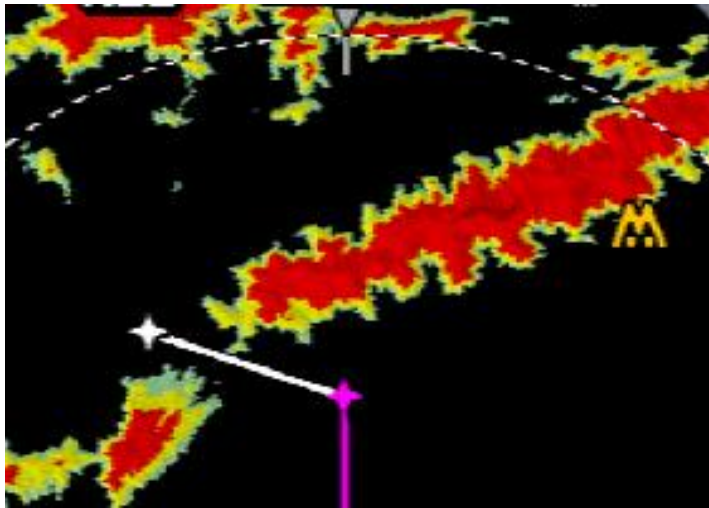
DO-309 HTAWS MOPS → C194

- C194 References DO-309
- 309 Requires:
 - Color display of terrain relative to aircraft's horizontal/vertical position
 - Color for terrain/obstacle elevation visually distinct
 - Pilots can readily determine if terrain and obstacle is a threat
 - Choice of colors should carefully consider the helicopter ops environment.

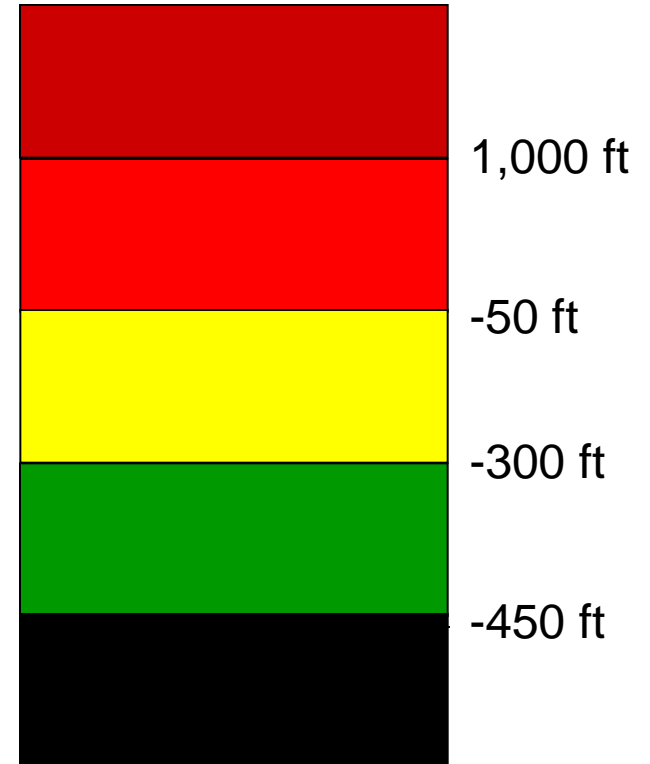
Why is this an issue?

- If HTAWS mandated by change to Part 135:
 - Pilots should be able to move from one system to another without having to re-learn color sets and meanings
- Why?
 - Following slides illustrate the issue.
 - On each slide, predict which terrain color depicts terrain considered a collision threat to the aircraft.

What Color = Terrain at or above aircraft altitude?



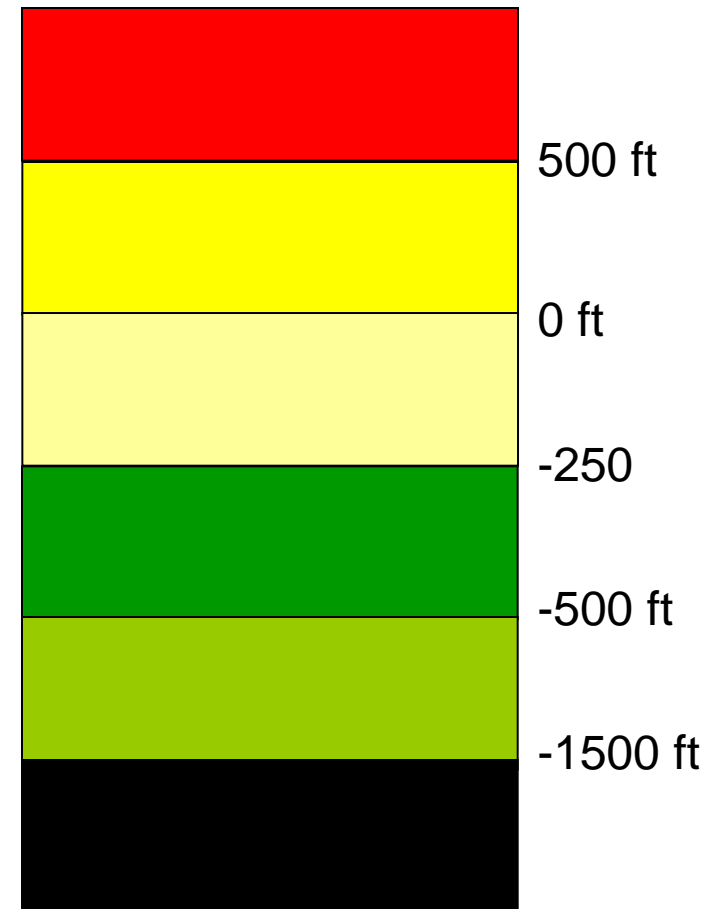
Terrain Elevation Above or Below Aircraft



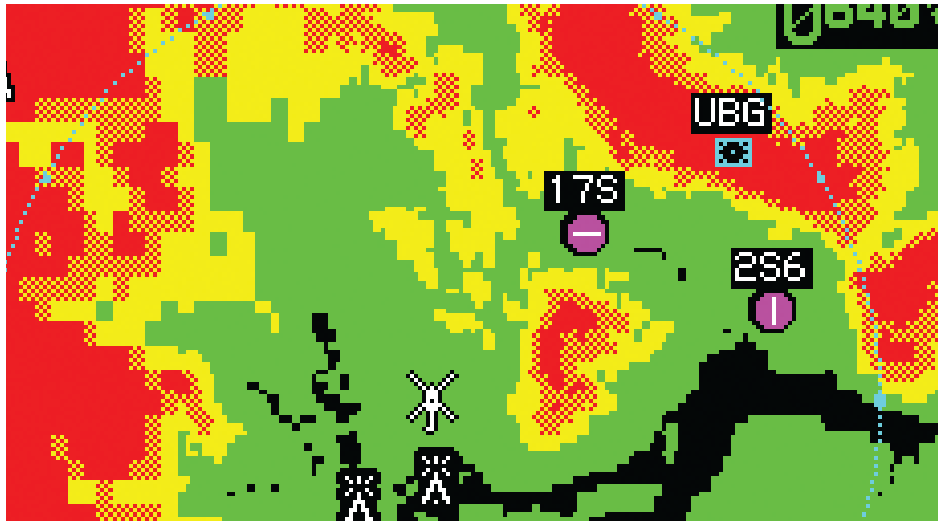
What Color = Terrain at or above aircraft altitude?



Terrain Elevation Above or Below Aircraft



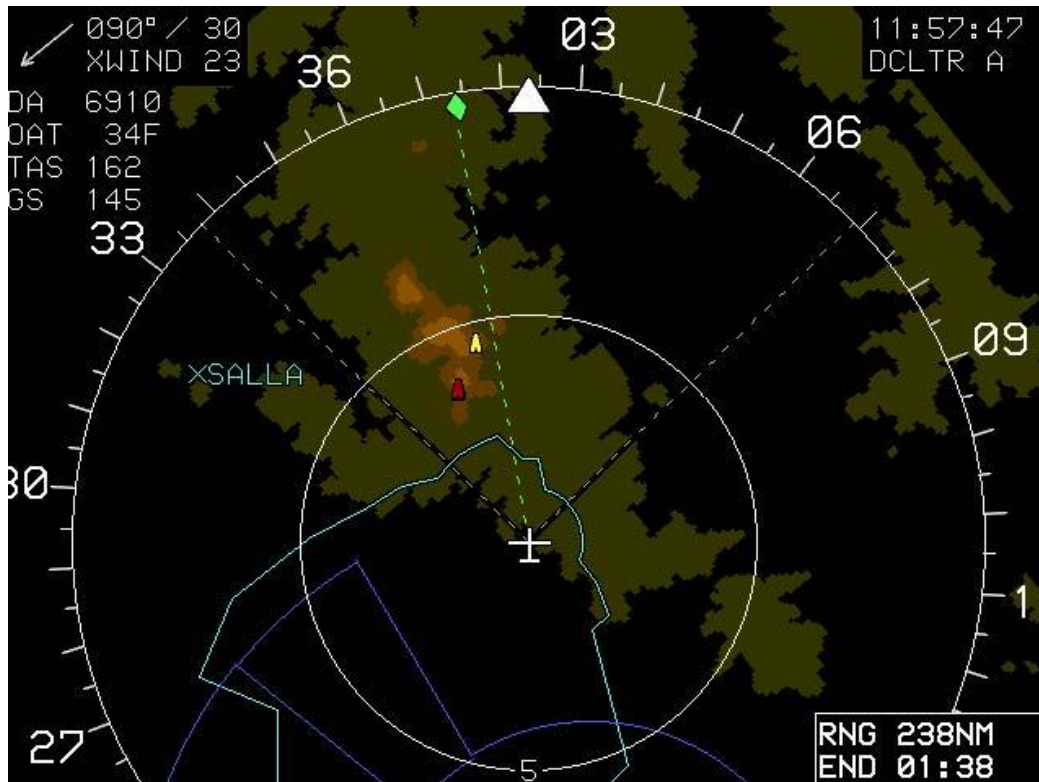
What Color = Terrain at or above aircraft altitude?



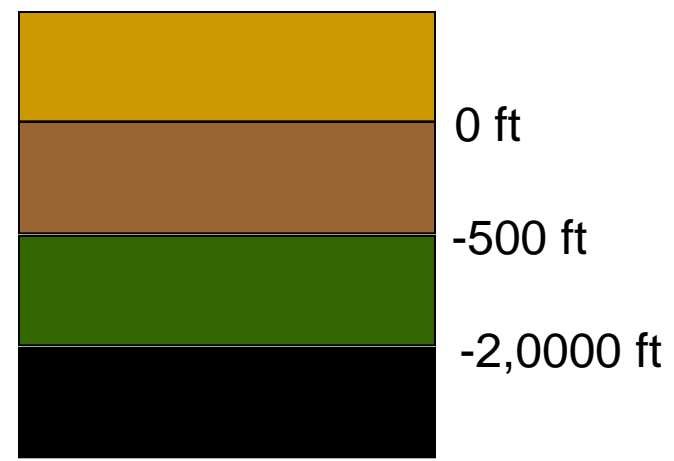
Terrain Elevation Above or Below Aircraft



What Color = Terrain at or above aircraft altitude?



Terrain Elevation Above or Below Aircraft



Rotorcraft Directorate

Standards Staff Recommendation

- For relative terrain height displays (DO-309 section 2.2.1.1 b and c):
 - Terrain considered to be at aircraft altitude and above and terrain within an OEM defined band below (i.e., 0 to 100' feet below) should be depicted using the same color scheme across all platforms. Prefer Red.
 - **Terrain well above aircraft altitude (i.e., 500') may have a different color than altitude at or close to aircraft altitude providing it does not conflict with other colors**
 - Terrain close to but below the aircraft altitude should be depicted using the same color scheme across all platforms.
 - The colors do not need to be “saturated” and can be “subdued” to help HTAWS alert terrain appear distinct when an alert is triggered.

HTAWS TSO Update

- **Goals:** Determine (1) potential for TSO revision to increase color standardization and (2) adequacy of installation guidance (ref new HEMS rule)
- **Activity:** Two meetings
 - April 11, 2013: FAA/Industry Kick-off Meeting
 - May 2013: Two telecons to discuss desired goals:
 - Definitions for colors red, yellow, and green for the depiction of relative terrain
 - Standardize height definitions for terrain above, at, and down to a decided floor below the aircraft's altitude
 - Proximity, or refresh parameters, for awareness of relative terrain
- **Result:** No clear consensus on the issue of updating the relative depiction of terrain (with respect to color standardization) or the adequacy of installation guidance.

HTAWS TSO Update cont'd

- Establish an RTCA Special Committee (end of CY2013)
- Committee to begin first quarter 2014
- Include looking at TSO-C151c and RTCA/DO-161A standards development

HTAWS TSO Update cont'd

– Address following issues:

- Display depiction of Relative Terrain and Obstacle Heights
- Depiction of Cautionary Terrain
- Depiction of Terrain while Terrain is on ground or hover
- Reduced Protection/Low Altitude/Reduced Sensitivity Modes used in low Altitude or off-field activities
- Proximity/Refresh Parameters for awareness of relative Terrain