Unprecedented Look-Ahead Capability
Class A and Class B Options to Meet Your Aircraft Requirements

TAWS

Terrain Awareness and Warning Systems

Three Unique Views: Map, 3-D Perspective and Profile
Depiction and Alerting of Man-Made Obstacles
Obtain the Highest Degree of CFIT Protection

UNIVERSAL® AVIONICS SYSTEMS CORPORATION

Offering the Highest Protection Against CFIT Accidents

Aircraft inputs such as position, altitude, air speed, glideslope and flight plan along with internal terrain and airport databases allow TAWS to predict a potential conflict between the aircraft's future flight path and terrain. The resulting unprecedented look-ahead capability provides warnings and alerts well in advance of potential hazards, allowing time for the pilot to make the necessary maneuvers or data corrections for terrain avoidance.

TAWS: Class A & B

Two classes of TAWS are offered to meet your aircraft and regulatory requirements, TAWS Class A and TAWS Class B. Providing the highest level of protection against Controlled Flight Into Terrain (CFIT) accidents, TAWS Class A provides all the functionality of the Class B system, plus a terrain awareness display to the aircraft's display system and a "fully autonomous" Ground Proximity Warning System (GPWS).

Universal Avionics' TAWS Class A system will also support smart bank angle alerts, minimum callouts and altitude callouts at selected altitudes. It also provides the class-specific, required RTCA DO-161A and TSO-C92c GPWS, warning of imminent contact with the ground.

Approved in accordance with TSO-C151b requirements, Universal's TAWS Class A and Class B systems both offer:

- Forward Looking Terrain Avoidance (FLTA) based on terrain data and the aircraft's state and predicted flight path
- Premature Descent Alerts
- Attention alerts (aural "Five Hundred" callout and alerts based on temperature-compensated GPS altitudes)
- Indications of imminent contact with the ground.

Crisp, Clear Graphics

Universal Avionics' TAWS integrates with the FMS to provide an additional unique predictive alerting feature, based on information in the flight plan.

TAWS provides an exceptionally crisp and clear graphical depiction of actual terrain, in three view formats (Map View, 3-D Perspective View and Profile View), on the FMS CDUs or flight deck displays such as the MFD-640 or EFI-890R/MFD-890R.

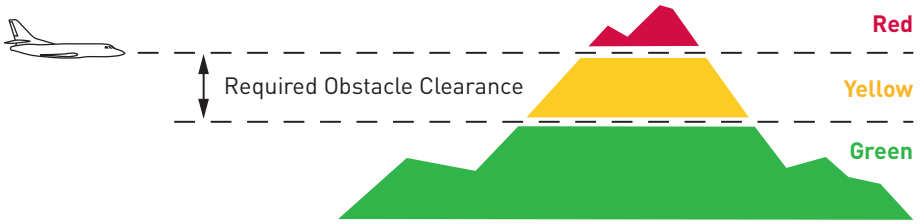
Terrain Data

The high-resolution terrain database is stored in internal flash memory and updated using the Data Transfer Unit via a high-speed Ethernet bus. It features a data point approximately every 0.5 mile world-wide and up to 0.1 mile at mountainous airports. The terrain database also includes data for depicting oceans and large inland bodies of water.

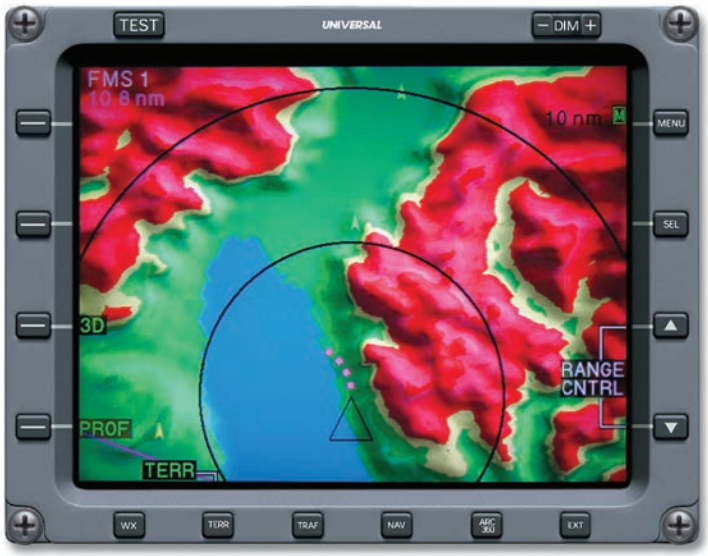
Obstacle Data

Depiction and alerting of man-made obstacles is available in the Class A and Class B systems as an optional configuration in the TAWS software. The Obstacle Database, required for depiction of man-made obstacles, contains the latest obstacle features. Use of obstacle alerting requires the installation of an external annunciator on the flight deck.

Obstacle data is compiled by Jeppesen Sanderson, Inc. and is captured from digital and paper (graphic and tabular) sources provided by governmental civil aviation authorities and military agencies worldwide.



Color-coding is utilized to depict terrain relative to the aircraft's altitude. Red shows terrain above. The yellow band is flight phase dependent reflecting terrain down to 1,000 feet below during enroute, 500 feet in terminal areas, and 250 feet on approach.



The Map View includes a trend vector depicting a 30-second flight path prediction based on aircraft state. The Map View can be configured to automatically pop up onto the display should a conflict be detected.

A map view of terrain can be output using ARINC 708 or WXPD formats for interface with various existing radar displays as well as existing EFIS. The maximum terrain elevation is also displayed.

A unique 3-D Perspective View depicts terrain and obstacles as it would appear if viewed from 1,000 meters (3,281 feet) behind the aircraft. The circle at the top of the waypoint depicts the altitude constraint. A perspectively correct 200-foot high triangle with a concave base and a pole that connects the triangle and the ground represents the 3-D Perspective View Obstacle symbol.

The Profile View shows terrain under the projected flight path. VNAV waypoints from the flight plan can be shown at their respective assigned altitudes. Look Ahead conflict advisories are depicted with a white threat symbol.

Exceeding Mandated Requirements with Options to Match Your Operation*	Class A	Class B
Ground Proximity Warning functions per DO-161A and TSO-92c	■	■
Mode 1: Excessive rate of descent	■	■ *Notes 1, 2, 3*
Mode 2: Excessive closure rate to terrain	■	
Mode 3: Negative climb rate or altitude loss after takeoff	■	■ *Notes 1, 2, 3*
Mode 4: Flight into terrain when not in landing configuration	■	
Mode 5: Excessive downward deviation from an Instrument Landing System (ILS) glideslope	■	■ *RA required*
Mode 6: Altitude Aural Callouts		
"Five Hundred" callout	■	■ *Note 1*
Additional altitude callouts	■ *(opt.) Note 4*	■ *RA required*
Smart bank angle alerts / minimums callout	■ *(opt.)*	
Forward Looking Terrain Avoidance functions per TSO-C151b	■	■
Reduced Required Terrain Clearance Alerts – Generated when the aircraft is currently above the terrain in the projected flight path of the aircraft, but the projected value of terrain clearance is considered unsafe for the phase of flight.	■	■
Imminent Terrain Impact Alerts – Generated when the aircraft is currently below the elevation of a terrain cell along the lateral projected flight path of the airplane and, based on the vertical projected flight path, the system predicts that the terrain clearance will be less than the required terrain clearance for the phase of flight.	■	■
High Terrain Impact Alerts – Generated when the terrain ahead and along the flight path is higher than 1,500 feet above the projected vertical path.	■	■
Flight Path Intent Advisory Alerts – Generated when the terrain ahead and along the flight plan conflict.	■	■
Terrain Display function	■	■
VGA/RGBS Video (Interface to Universal MFD-640, EFI-890R and FMS CDUs. Provides contoured Map View, Profile View and 3-D Perspective View.)	■	■
Honeywell - Primus® EFIS and WXPD displays (See Display Interfaces)	■	■
Rockwell Collins - WXR, Pro Line® and FDS 2000 displays (See Display Interfaces)	■	■
ARINC 708 weather radar displays	■	■
Appropriate visual and aural discrete signals for both caution and warning alerts	■	■
Premature Descent Alerts (PDA) – Generated when the aircraft violates the minimum ground clearance boundary (MGCB) protection along the final approach segment to an airport.	■	■
Temperature-compensated altitude	■	■
GPS altitude	■	■
TCAS and Reactive/Predictive Wind Shear Warnings Prioritization	■	■

■ *Required*
■ *Included*

Note 1: These select GPWS alerts can use Height Above Terrain (HAT) in lieu of Radio Altitude (RA) since RA is not required for these installations.
Note 2: If RA is available, it will be used for these alerts, and the system will revert to HAT if the RA fails.
Note 3: Class A TAWS requires a 2,500 foot or 2,000 foot RA. Either RA may be used for Class B TAWS, but neither is required.
Note 4: A large number of selected altitudes between 10 and 2,000 feet may be configured for audio callout.

** The Universal Class A and Class B TAWS meet the Canadian requirement for Enhanced Altitude Accuracy (EAA) when configured for temperature compensation and GPS altitude.*

Display Interfaces

Additional interfaces under development.
Contact your Universal Avionics representative.

Universal Avionics

EFI-890R/MFD-890R
MFD-640
FMS with 4-inch or 5-inch CDU

Honeywell

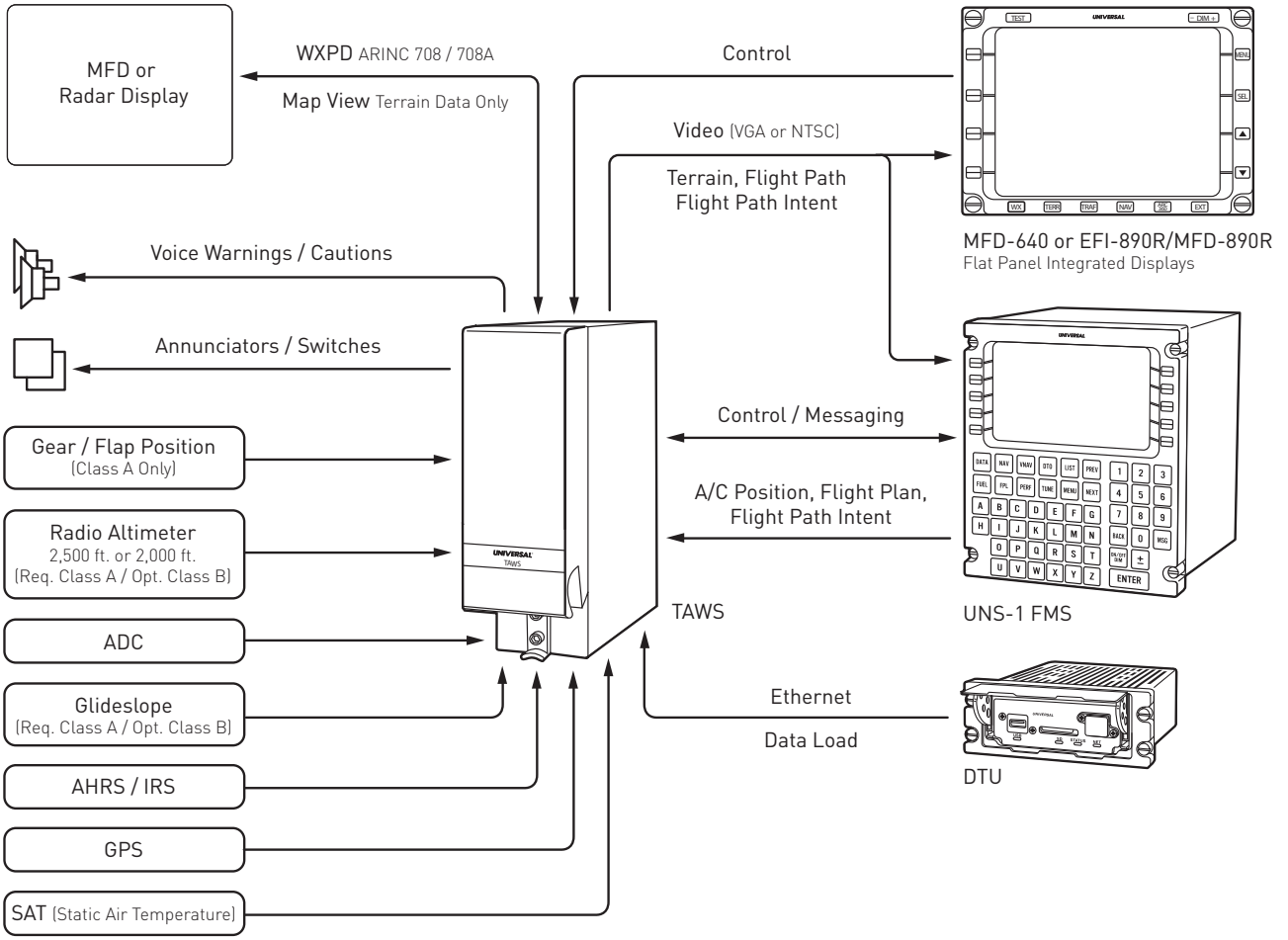
Primus 1000
EFIS-805 (specific versions via WXPD/SCI)
EFIS-10 (ARINC 708)
Primus 880/660/440 series
Primus 800/870/650 (WXPD/SCI)
RDR 4A/B

Rockwell Collins

FDS-2000
PL-4000 EFIS
PL-21 EFIS
EFIS 85/86 (via WXP-850 or WXA-1000)
WXR-850
WXR-70X

Specifications

Size: 2 MCU
Weight: 9.6 lbs (4.7 Kg)
Cooling: Passive cooling fan
Power: 28VDC @ 1.0 Amp nominal
Environmental categories: DO-160D
Minimum Performance Standards: DO-161A
Airborne Ground Proximity Warning Equipment
Software Certification: DO-178B Level C
Criticality level: Major
Terrain Database: DO-200A compliant
TSO: C151b Terrain Awareness and Warning System,
C92c Airborne Ground Proximity Warning Equipment



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