WAAS/SBAS | Flight Management Systems

UNIVERSAL® AVIONICS
SYSTEMS CORPORATION

"When we created the WAAS/SBAS-FMS, our mission was to design a system that delivered performance in every category, while demonstrating superiority in all of them.

The WAAS/SBAS-FMS – unsurpassed precision and accuracy."

CNS/ATM Ready

The avionics systems you invest in today must be able to support the next generation of Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM). They will need the processing power, speed, memory and interface capabilities to meet the growing demands of the world's next generation flight environment.

Since introducing the original UNS-1 Flight Management System over 27 years ago, we have continually taken the industry forward with a pilot-focused vision of flight management. Today's WAAS capable Flight Management Systems build upon our popular market-proven product design, offering more advanced features and interfaces, and a growth path to meet the requirements of the future.

WAAS/SBAS-FMS Family LP/LPV Monitor, UNS-1Lw, MCDU, -1Fw and -1Ew

Navigation Improvements

Wide Area Augmentation System / Satellite-Based Augmentation System Capabilities

With the WAAS/SBAS-capable FMS, you have access to all RNAV (GPS) approach types including the most precise and accurate GPS-based approaches available today. With Minimum Descent Altitudes (MDAs) as low as 200-feet with 1/2 mile visibility, this approach type improves safety and accessibility to airports which have much higher minima or no IFR approach at all.

The WAAS/SBAS-FMS meets stringent internal monitoring requirements to provide guidance to any of the MDA levels available for RNAV (GPS) approach guidance:

- Localizer Performance with Vertical (LPV)
- Lateral Navigation/Vertical Navigation (LNAV/VNAV)
- LNAV-only

Advantages of WAAS/SBAS-FMS:

- LPV approach capability provides you with ILS-like guidance down to near CAT I ILS minimums (as low as 200-feet with ½-mile visibility).

- The integral GPS/WAAS receiver is certified to provide navigation accuracy within 0.01 nm with 99.999% availability when in the WAAS coverage area.

- Enhanced integrity and accuracy monitoring removes the RAIM prediction requirement.

- Allows you to plan GPS approaches to your flight plan destination as well as an alternate.

- Allows approaches at smaller municipal airports at night when no local altimeter setting is available.

- Access to all RNAV (GPS) approaches – there are currently over 1,500 RNAV (GPS) approaches approved for use with WAAS worldwide, and more are being added every day.

- Universal's GPS/WAAS receiver is TSO-146b, Class Gamma-3 and the WAAS antenna was the first to receive the TSO-C190 certification for a WAAS antenna.

Advanced Technology

Hardware

We have continually and innovatively used advancements in computer technology to increase cockpit safety. Our WAAS/SBAS-FMSs provide the latest generation platform for system development. We have incorporated advanced-technology LCD flat panel displays which offer superior sunlight readability, higher resolution and wider viewing angles.

Software

Designed by pilots for pilots, the intuitive system operation allows you to comfortably manage even the most complex flight maneuvers efficiently and quickly. The system provides the pilot with the greatest situational awareness, most efficient data entry and concise informative displays. The net result is more pilot heads-up time and increased flight safety.

Manufacturing

Our state-of-the-art manufacturing facility includes advanced double-side surface mounting robotics for circuit board assembly. For increased reliability, all of our products undergo Highly Accelerated Life Testing (HALT) during development and Highly Accelerated Stress Screening (HASS) during production.

Highest-Rated Product Support

Our customers are our greatest assets, and we remain committed to them and to the systems they operate. We pride ourselves on this commitment which is further evidenced by exemplary ratings in independent product support surveys. Our talented, knowledgeable staff of product support specialists is available 24/7 to assist in maintaining the reliability of your flight operations. We also provide assistance with installations and certifications as well as classroom and personalized pilot training. As a Universal customer, you will enjoy the benefits of an advanced system, excellent product reliability and superb product support.

An Investment For Your Future   *The WAAS/SBAS-FMSs provide you with a growth path vital to your future*

RNP/ANP

The systems meet emerging Required Navigation Performance/Actual Navigation Performance airspace operational requirements around the world, including European B-RNAV and P-RNAV. As RNP SAAAR requirements develop, WAAS/SBAS equipment will be a key enabler to provide 0.1 RNP capabilities.

Datalink

Each FMS provides control and display functionality for our UniLink Communication Management Unit, offering air-to-ground, two-way datalink capabilities. A host of features are available today, including full ACARS messaging, position updates, clearances, weather, D-ATIS and more. The WAAS/SBAS-FMSs combine with UniLink® to offer a Communication, Navigation, Surveillance (CNS) suite which will allow you to take advantage of the routing/communication benefits available in the NextGen CNS/ATM environment.

TAWS

Our systems are also designed to interface with both our Class A and Class B TAWS Terrain Awareness and Warning Systems. TAWS increases situational awareness by providing visual terrain displays relative to current and predicted aircraft position supplied by the WAAS/SBAS-FMS. Alerts in accordance with standard Ground Proximity Warning System modes are also provided. The WAAS/SBAS-FMS and TAWS combine to realize the highest level of safety in protecting against Controlled Flight Into Terrain (CFIT) accidents.
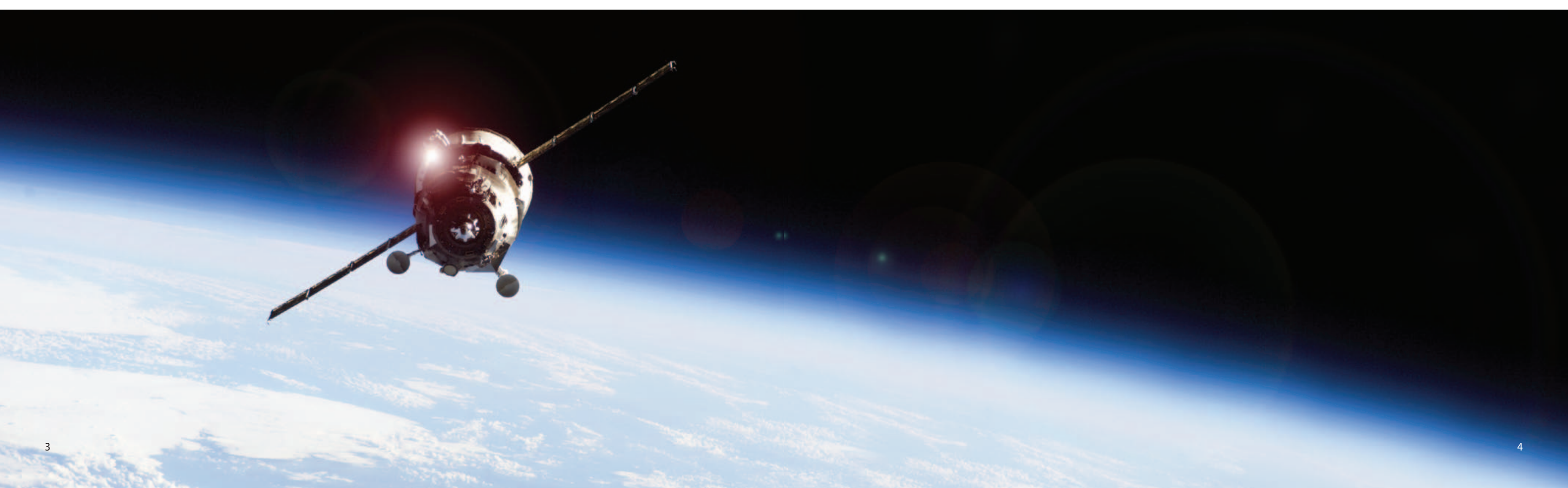
The UASC WAAS/SBAS-FMSs

Our WAAS/SBAS-FMSs combine the benefits of advanced programming; compact, lightweight packaging and installation flexibility. Our three basic models provide you with the ability to select the optimum system to meet your desired features and capabilities and match your aircraft equipment interface requirements.

WAAS/SBAS Flight Management Systems Features

	UNS-1Ew	UNS-1Fw	UNS-1Lw
Flat panel color displays	Integral	CDU	CDU
MCDU (video/graphics std.)		■	■
5-inch (video/graphics opt.)	■	■	■
4-inch (video/graphics opt.)		■	■
Internal 12-channel GPS/WAAS	■	■	■
TSO-C146c, Class Gamma-3	■	■	■
FDE prediction program for remote/oceanic ops	■	■	■
Company route storage	2,000	2,000	2,000
Clearance-language format	■	■	■
Nav Database	64 MB	64 MB	64 MB
SID/STAR procedures	■	■	■
Airways	■	■	■
Approaches	■	■	■
Plain-language references	■	■	■
ARINC 424 procedural leg guidance	■	■	■
Heading Mode	■	■	■
VNAV	■	■	■
Fully coupled	■	■	■
Computed top-of-descent	■	■	■
Target vertical speed	■	■	■
Vertical direct-to	■	■	■
Holding patterns	■	■	■
Included in navigation database	■	■	■
Manually defined	■	■	■
3-D Approach Mode	■	■	■
Laterally coupled	■	■	■
Vertically coupled	■	■	■
Fuel Management	■	■	■
Fuel flow inputs	4	4	4
Take Off/Landing	■	■	
Frequency Management	■	■	■
UniLink® compatible	■	■	■
Wx graphics	■	■	■
Text messaging	■	■	■
TAWS compatible	■	■	■
TAWS graphics	■	■	■
Universal Cockpit Display compatible	■	■	■
SCAT-I GPS approach compatible	■	■	■
WAAS planned growth	■	■	■
LAAS planned growth	■	■	■

UNS-1Ew

The UNS-1Ew features an all-in-one-package design which includes control/display functions and the navigation computer with integral GPS/WAAS receiver all in a single unit. The system includes a graphics- and video-capable 5-inch diagonal display with a housing depth approximately 9 inches.

A special package version, the -1Espw, has a reduced depth of 7 5/8 inches and is available for all-digital aircraft installations.

UNS-1Fw

The UNS-1Fw is comprised of a Flat Panel Control Display Unit (FPCDU) and a remotely mounted navigation computer unit. Three FPCDUs are available: a compact FPCDU with 4-inch color display, the standard FPCDU with 5-inch color display and an airline-type Multi-Function CDU (MCDU). All CDUs provide graphics support for weather images as well as video display capabilities for TAWS and camera interfaces. The 4- and 5-inch FPCDUs are both just 3 1/4 inches deep. The navigation computer is housed in a 2-MCU sized Line Replaceable Unit (LRU) which includes the integral GPS/WAAS receiver. The UNS-1Fw incorporates extensive input/output capabilities for advanced system integration.

UNS-1Lw

The UNS-1Lw is comprised of a 4- or 5-inch FPCDU and remotely mounted navigation computer. The navigation computer is housed in a 2-MCU sized Line Replaceable Unit (LRU) which includes the integral GPS/WAAS receiver.

MCDU

Developed for airline or special mission operations, the MCDU features additional ARINC 429 I/O ports which can support up to six ARINC 739 interfaces for ACARS, Satcom and future NextGen CNS/ATM systems.

Control and Display

Our FPCDUs use the latest technology in active matrix liquid crystal color displays. They feature the highest contrast, lowest reflection and greatest horizontal and vertical viewing angles available, and offer superb sunlight readability. Unique parallax control is also provided. The system uses two character sizes and line graphics to enhance data recognition. All CDUs are capable of displaying graphics and video as available from our UniLink®, TAWS, Vision-1® and other compatible sources.

Line select keys, function keys and a full alpha numeric keyboard provide for quick and easy data selection and entry. The durable faceplate with flush-mounted keys reduces the possibility of mis-keyed data entries.

The most complex flight maneuvers are easily managed with a few simple keystrokes, thanks to the advanced menu operating format, list-reference-number entries, logical data sequencing and cursor prompting. The result means less time interpreting displays, less time entering data, more time dedicated to situational awareness and an overall increase in the safety of your flight.

NVIS (Night Vision Imaging System) compatibility is also available for the 4-and 5-inch FMS displays.

Capabilities

As our latest-generation platform, the LPV-capable WAAS/SBAS-FMSs have the power, speed, memory and interface capabilities to grow with the evolving NextGen CNS/ATM environment, taking advantage of new advancements so you can be assured that your system will remain at the industry's leading edge.

The sophisticated software provides you with a myriad of features including instant access to an extensive navigation database which includes full SID/STAR procedures, airways and approaches along with ample storage capacity for your company routes.

A "Best Computed Position" is based upon inputs from the internal GPS/WAAS receiver, auto-scanning DME-DME measurements and data from your complement of external navigation sensors. Enroute maneuvering features include a dedicated Direct-To function, FMS heading commands, PVOR (Pseudo-VOR) tracking, full-featured VNAV and user-defined holding patterns. Our advanced 3-D approach mode is IFR certified and provides ILS-like guidance to LPV, LNAV/VNAV and LNAV minima for RNAV (GPS) approaches.

Interfaces

Full interface capability is provided for flight guidance systems, autopilots and cockpit displays utilizing both digital and analog formats. You can navigate with the WAAS/SBAS-FMS from takeoff to touch-down comfortably and precisely.

Multiple navigation sensor compatibility allows you to interface additional navigation sensors to match your operational requirements. Select from external GPS, Inertial, Loran C and/or Hybrid Sensors.

In addition, up to four fuel flow sensor inputs, accommodating a variety of formats, are utilized for fuel and performance management calculations depending on system capabilities.

Configuration Module

A configuration module mounted on the system's rear connector identifies the aircraft's specific parameters including the communication formats, all I/O ports, specifications of navigation sensors, air data, EFIS displays, flight guidance systems, fuel inputs and others. Variables can include type, limits and scaling for interface compatibility and safety requirements, thereby customizing the features of each WAAS/SBAS-FMS for your operation and aircraft.

The easily programmed module also simplifies in-field upgrades and sensor complement modifications. It provides quick configuration verification as well as positive identification of aircraft model for aircraft-specific performance data as applicable.

The Flight Planning function provides the pilot with the quickest, most efficient means of creating a flight plan, and the most pilot-friendly method of altering the flight plan elements as desired or required by Air Traffic Control. It has been engineered to incorporate the greatest level of safety, with numerous built-in safeguards such as the entry of list-referenced selections which reduce both keystrokes and errors.

To generate an active flight plan, you may copy a previously-stored route from the route database, load a flight plan from disk, uplink a flight plan via datalink or create a new one with the WAAS/SBAS-FMS. The method for creating a new flight plan or a new route to be stored is the same. Both are created using the following elements: Departure Airport, Departure, Enroute Waypoint(s) and Airway(s), Gap(s), Arrival, Approach and Destination Airport. Each time a stored route is copied for use as an active flight plan, the WAAS/SBAS-FMS uses information from the current navigation database for each of the elements stored in the route.

Once you identify the Departure Airport, the WAAS/SBAS-FMS will successively present custom-tailored lists from which you can conveniently select the current runway, departure (SID) and transition. In addition to individual waypoints, both low and high altitude airways can be accessed for route creation. Simply select the waypoints of entry and exit on each airway used and the WAAS/SBAS-FMS will fill in all the waypoints between. After entering your destination airport, a similar progression of smart prompts is utilized to input your desired arrival (STAR) and approach elements.

With a couple of keystrokes an entire element of your active flight plan is easily changed as required in response to a new departure clearance, a new arrival route, a change in runway, etc.

Prior to departure, a flight plan summary page provides a synopsis of the proposed flight, complete with distance, time and fuel requirements. The flight plan can be conveniently displayed in clearance language format or numerous other formats which allow you to access data for each waypoint or each leg of your flight, including time and distance calculations for points enroute and to your destination. The entry of wind data for flight plan waypoints increases the accuracy of position predictions and ETAs.
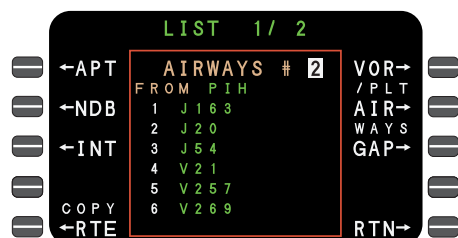

Menu format provides selections for flight plan displays, SIDs, STARs, approaches, flight plan storing and reversing.

Select the runway, SID and transition; the full procedure for the desired departure will be added automatically to the flight plan.

Normal view of flight plan pages shows a wealth of information including altitude restrictions.

Flight planning is simplified by using High and Low Altitude airways.

All the airway waypoints between your entry and exit will be automatically inserted into the flight plan.

Select the runway, STAR and transition; the full procedures for the desired arrival will be added automatically to the flight plan.
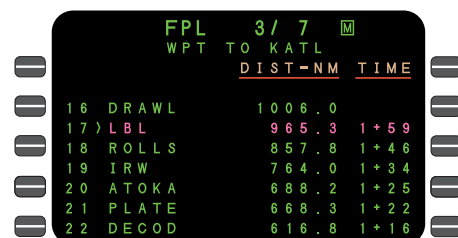

Your flight plan can be displayed in clearance language format.

You can view and edit wind data for flight plan waypoints, increasing accuracy of position predictions and ETAs.
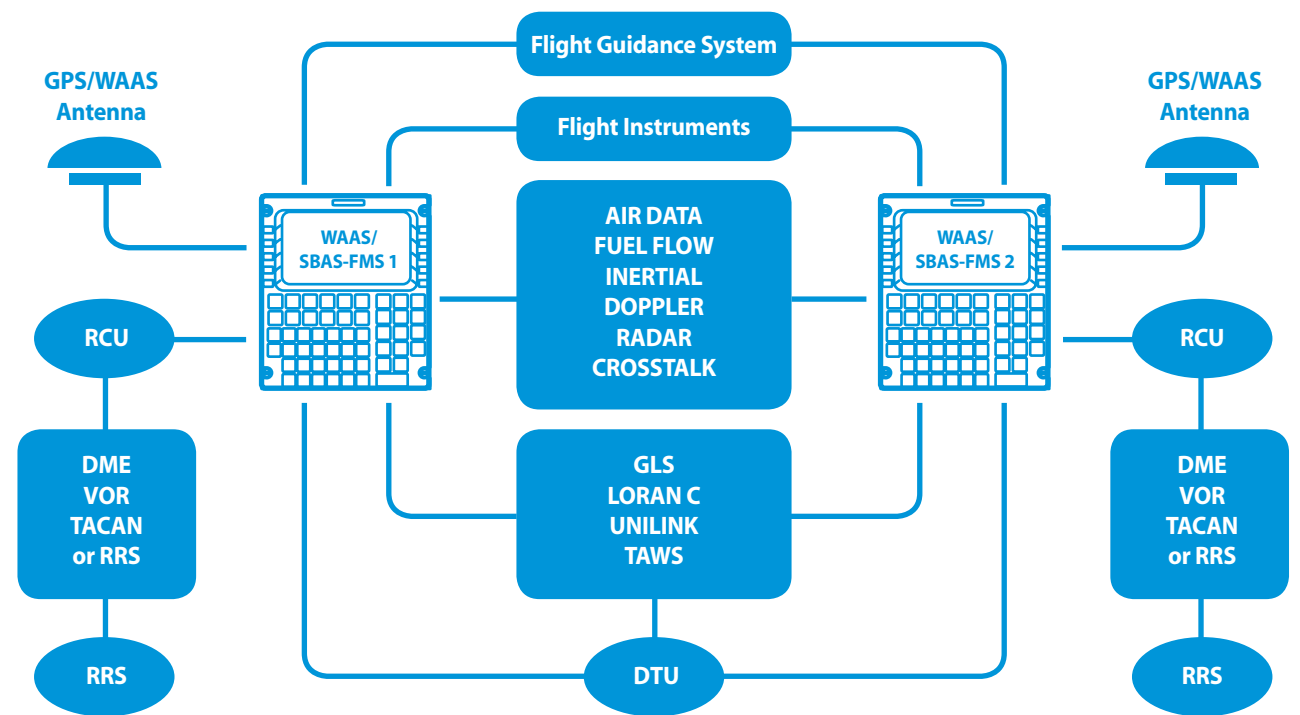

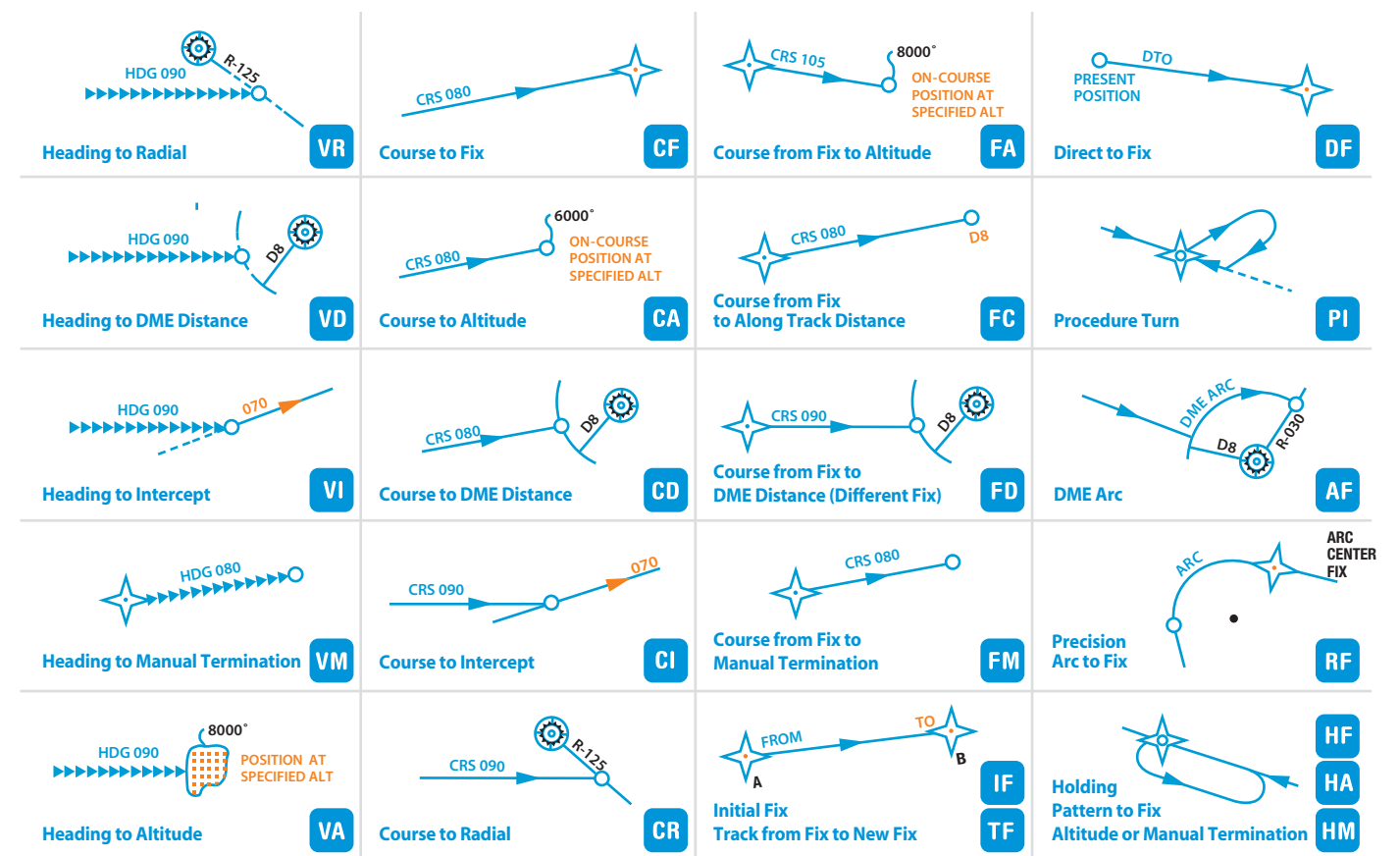*Review time, distance and fuel requirements for the flight plan created.*

Flight plans can be viewed in several formats providing valuable enroute time/distance/location information.

## System Architecture *WAAS/SBAS-FMS system architecture diagram*

Procedural Leg Types *The WAAS/SBAS-FMSs can fly all ARINC 424 procedural leg types*

Heading to Radial — VR
Course to Fix — CF
Course from Fix to Altitude — FA
Direct to Fix — DF
Heading to DME Distance — VD
Course to Altitude — CA
Course from Fix to Along Track Distance — FC
Procedure Turn — PI
Heading to Intercept — VI
Course to DME Distance — CD
Course from Fix to DME Distance (Different Fix) — FD
DME Arc — AF
Heading to Manual Termination — VM
Course to Intercept — CI
Course from Fix to Manual Termination — FM
Precision Arc to Fix — RF
Heading to Altitude — VA
Course to Radial — CR
Initial Fix — IF
Track from Fix to New Fix — TF
Holding Pattern to Fix — HF
Altitude or Manual Termination — HA, HM

NAV

The WAAS/SBAS-FMS will fly all procedural leg types in accordance with ARINC 424. This sophisticated capability allows you to fly the most complex procedures such as a heading to altitude, precision arc, procedure turn, holding pattern and more – all the necessary maneuvers required to accurately fly SIDs, STARs and approaches. Crosstrack and vertical scaling are provided in accordance with enroute, terminal and approach criteria set forth in TSO-C146b. The NAV function also displays the Required Navigation Performance (RNP) associated with your current leg/maneuver as referenced from the navigation database, along with your Actual Navigation Performance (ANP). Line select keys provide quick access to off- flight plan maneuvers such as establishing a parallel-offset course, tracking to/from a Pseudo-VOR, heading commands, holding patterns, arrivals and approaches.

Most important, all these maneuvers are controlled by the WAAS/SBAS-FMS while the flight guidance system conveniently remains in FMS mode.

Autopilot-Coupled VNAV
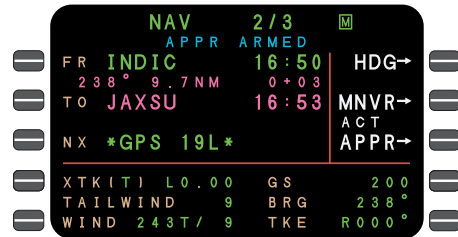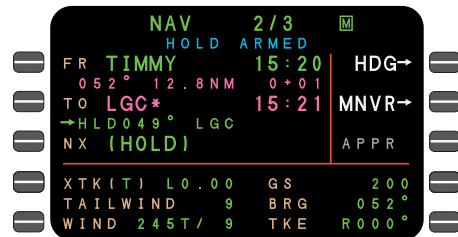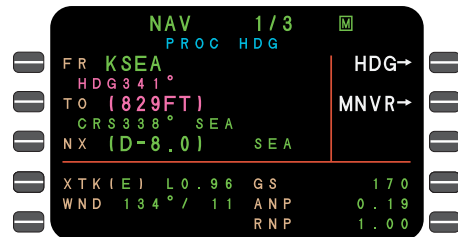
Line select keys provide access to WAAS/SBAS-FMS-commanded Heading Mode, maneuvers such as holding patterns and PVOR tracking, and the Approach mode.

Heading Mode

Whenever you need to fly radar vectors, you can do so easily by accessing the FMS Heading Mode with the HDG line select key on the normal NAV display. Simply enter your desired heading to activate your command. With compatible EFIS/FGS these heading commands are interactive with the flight guidance heading select knob.

The WAAS/SBAS-FMS remains on the NAV Heading page allowing you to meet new heading assignments as required and providing you with information pertaining to the current navigation leg. If the commanded heading will intercept the current navigation leg, the INTERCEPT line select key option will be available to arm the WAAS/SBAS-FMS for automatic capture.
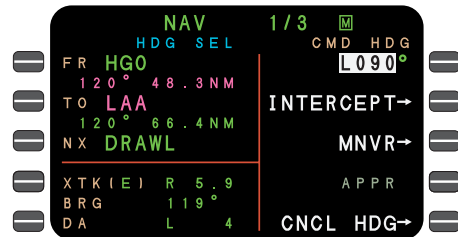
Headings can be flown through the WAAS/SBAS-FMS, complete with auto intercept selection and interactive heading bug control.
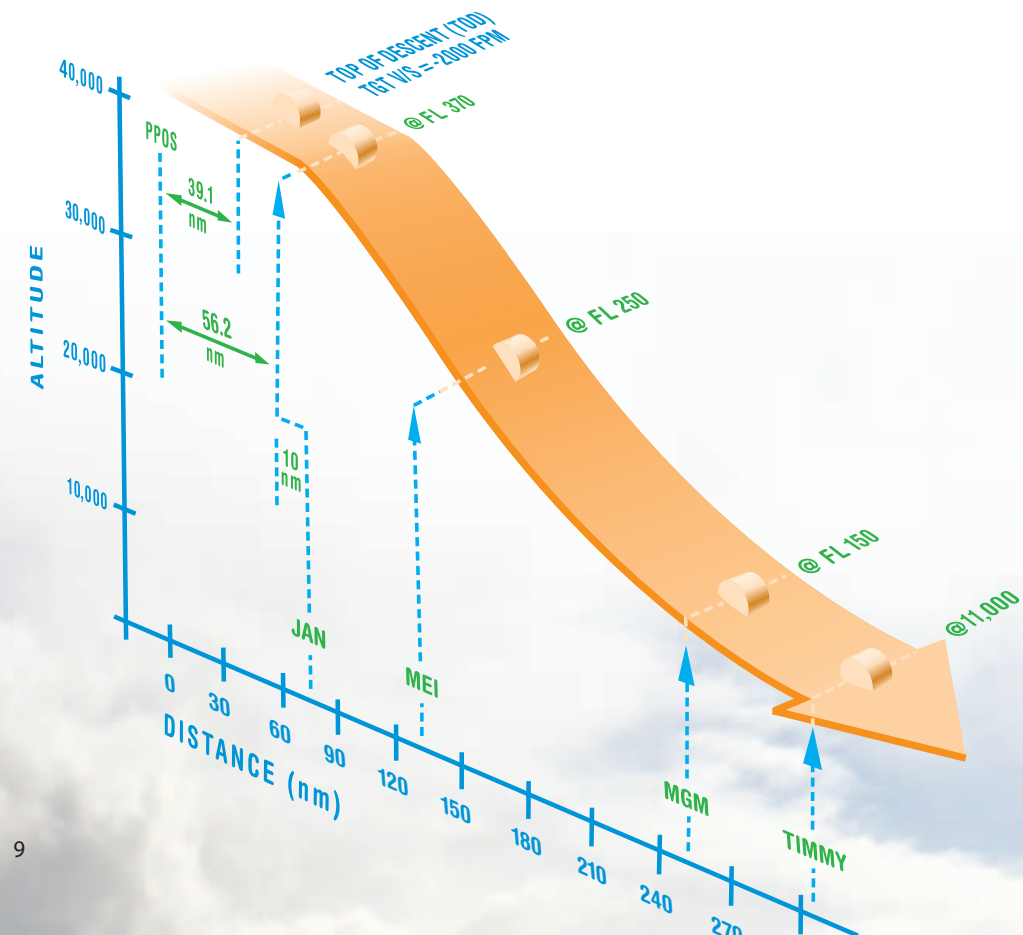
DTO

The DTO function key is specifically dedicated for flight plan changes in response to "Direct-To" clearances. The WAAS/SBAS-FMS easily takes you from your present position direct to any point on or off your flight plan using circular arc steering. If the desired waypoint is on the flight plan, it may be selected by entering its list reference number. If the desired waypoint is not on the flight plan, the LIST function can be used to access other waypoints/airports within the surrounding area from the database, or the identifier can be manually entered into the field. If the DTO waypoint entered was on the flight plan, the display will return to the normal NAV page. If the DTO waypoint entered was not on the flight plan, the system will prompt for a "next" waypoint in order to link the newly defined leg into the flight plan.

Turn direction options (LEFT, RIGHT) allow the pilot to force the turn direction in those cases when ATC commands a "long way around" Direct-To.
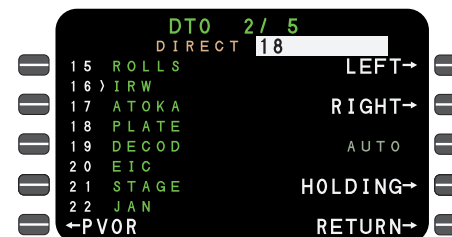
Logical, easy-to-use Direct-To function.

Performance-based Navigation

Required Navigation Performance (RNP) and Area Navigation (RNAV) are key aspects of any airspace modernization program. Performance-based navigation is proven to save fuel, relieve congestion and reduce delays at many airports, domestic and international.

Universal Avionics is the technology leader in both RNAV and RNP. The WAAS/SBAS-FMS meets RNP/ANP airworthiness requirements for U.S. RNP procedures in addition to European B-RNAV and P-RNAV operations.
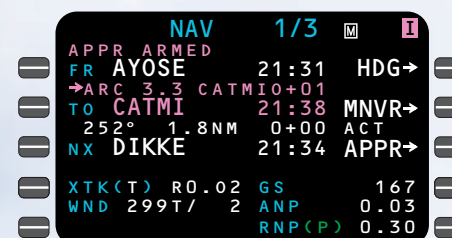
The RNP associated with the current leg is displayed on the NAV pages. The RNP value is obtained from the navigation database when provided for that leg; otherwise it is the FMS default value for the current phase of flight.

VNAV

Our WAAS/SBAS-FMSs incorporate the most advanced concepts in vertical guidance and control. VNAV pages provide for such features as computed Top-Of-Descent, Target Vertical Speed indication and selection, and Vertical Direct-To commands.

Vertical waypoints can be conveniently defined with altitudes or Flight Levels, and lateral offsets.

The WAAS/SBAS-FMS outputs vertical deviations for flight guidance displays. Pitch commands are output to the autopilot for fully coupled descents.
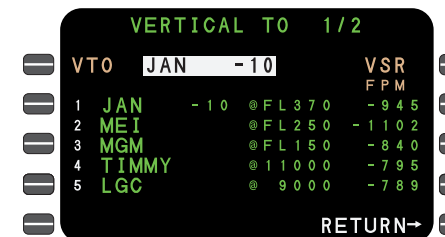
VNAV capabilities include multiple-step profiles, computed Top-Of-Descent, Target Vertical Speed, and Vertical Direct-To.

Holding Patterns

Holding patterns are accurately flown through the WAAS/SBAS-FMS automatically, complete with appropriate entry procedure: direct, parallel or teardrop. The navigation database includes holding patterns that are part of departure, arrival, approach and missed-approach procedures. The aircraft will fly the normal flight plan legs and then automatically enter the holding pattern upon reaching the holding fix. You may also manually define a holding pattern by specifying the holding fix, inbound course, turn direction and either time or distance of holding leg. When armed, the holding pattern will be entered automatically upon reaching the fix. A DTO HOLD command is also provided to enable you to go direct to a holding fix at any time.

While in the holding pattern, estimated time of arrival at the fix will be displayed in UTC at all times and will be updated each time the fix is overflown, based upon current TAS and wind conditions. The system will also alert you if the groundspeed is too high to remain in protected airspace.

When cleared to proceed, the aircraft will continue the current holding circuit until overflying the holding fix and then proceed to the next waypoint. You can also exit the pattern at any time by initiating a Direct-To command.

Holding patterns are accurately flown through the WAAS/SBAS-FMS automatically, complete with appropriate entry procedure: direct, parallel or teardrop.

3-D Approach Mode

Once near your destination, you can easily link the appropriate approach for the active runway into your flight plan. Approaches and runways from the navigation database, and those which have been pilot defined, are easily accessed.

The navigation database contains precision and non-precision approaches, including bent and curved approaches with multiple step-down fixes. When you select the approach transition and approach, the transition, approach and missed approach procedure are inserted into the flight plan. Using the appropriate navigation sensor input, the WAAS/SBAS-FMS will fly a three-dimensional precision or precision-like approach to any airport in the world. Computed pseudo-localizer and pseudo-glideslope information will be output to the flight guidance system and displays, providing a stabilized descent complete with accurate approach scaling and sensitivity, as well as distance to touchdown.

The WAAS/SBAS-FMS incorporates a unique subsystem that provides high-level integrity monitoring required for RNAV (GPS) approaches. By using altitude from the Wide Area Augmentation System GPS satellites, the WAAS/SBAS-FMS provides reliable position information for localizer performance with vertical guidance (LPV) approach minima. Approach Levels of Service (LOS) for LPV, LNAV/VNAV and LNAV approaches are displayed on the FMS approach pages as well as through external annunciations for increased situational awareness.

Approaches can be flown fully coupled and are approved for published WAAS/SBAS and non-precision approaches. With compatible EFIS/autopilot, the WAAS/SBAS-FMS "Nav-to-Nav" feature will provide a smooth transition to an ILS approach once the Localizer and Glideslope signals are captured.

The WAAS/SBAS-FMS can also be configured to provide Cold Temperature Compensation, automatically calculating altitude corrections for landing in areas of extreme cold.

The WAAS/SBAS-FMSs will interface with our GLS-1250 GPS Landing System which can provide SCAT-I precision approach capabilities at specific airports.
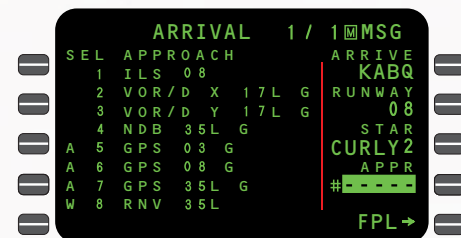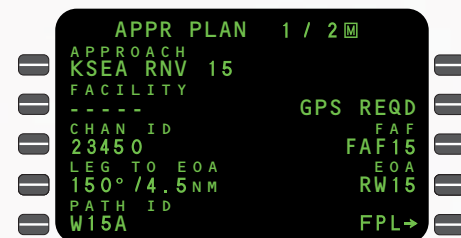
Select and link approach into flight plan.

WAAS/SBAS-FMS Approach Mode provides 3-D guidance on GPS, GPS-overlays (VOR/DME, VOR and NDB), RNAV, LOC, BC, VOR/DME, and VOR approaches – IFR approved.
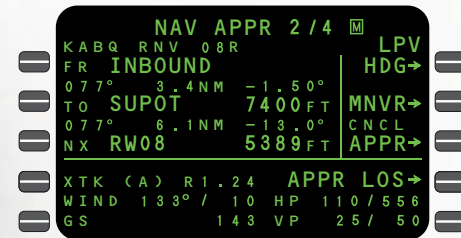
WAAS/SBAS-FMS Approach Mode provides ILS-like guidance with LPV, LNAV/VNAV and LNAV level of service for RNAV (GPS) approaches.

FUEL

Using inputs from the fuel flow sensors, the WAAS/SBAS-FMSs provide real-time fuel management with the most extensive fuel information and calculations available – the kind that can eliminate unnecessary fuel stops, save you time and money and provide increased safety.

Specific range and endurance are provided along with fuel, time and distance predictions for your destination. Fuel requirements are easily accessed and evaluated for alternate destinations as well. For your convenience, data can be entered and displayed in either pounds or kilograms.
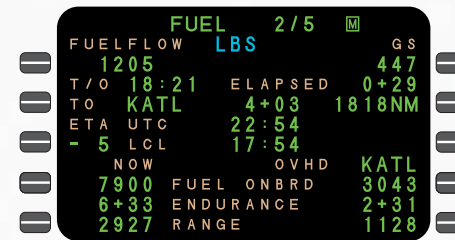
Extensive real-time fuel information.

Real-Time Fuel Management
(lbs/Kg Selectable)

- Gross weight
- Fuel on board
- Ground nm/lb (or Kg)
- Air nm/lb (or Kg)
- Range
- Endurance
- Equivalent Still Air Distance (ESAD)
- Fuel overhead destination
- Range overhead destination
- Endurance overhead destination
- Landing weight
- Alternate destination planning

PERF

The UNS-1Ew and -1Fw WAAS/SBAS-FMSs provide a Performance option for select aircraft types for which performance charts from the Airplane Flight Manual are digitized and stored in memory.[1] These FMSs will use pertinent data such as GW, ALT, OAT, etc., to provide exact values for V1, VR and V2, along with Takeoff N1. V-bugs may also be driven through the WAAS/SBAS-FMS. Required field lengths are computed and displayed, factoring in your entry of runway conditions.
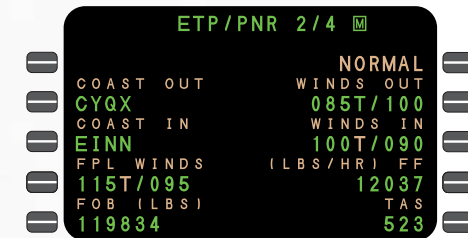
During climb and cruise, maximum power setting values are presented. For landing, Vref is calculated along with approach speeds for different flap settings.
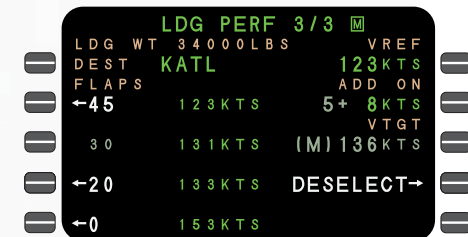
T/O speeds, runway length and N1 settings from AFM Performance Charts stored in memory.
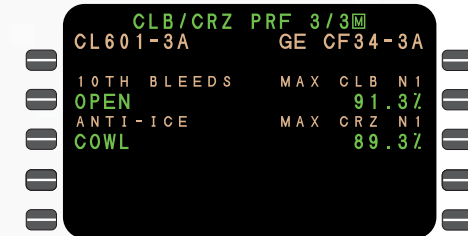
Dynamic N1 values for climb and cruise are continuously updated.

Real time values are provided for the Equal Time Point (ETP) and Point of No Return (PNR).

*VTGT based on Vref plus add-ons for flap settings and/or pilot-entered wind gust factor.*

DATA

The DATA function key provides access to a variety of navigation data management capabilities.

Pages provide easy access to your stored navigation database for detailed review of SIDs, STARs, approaches, runways, airways, intersections, navaids and airports. Your pilot-defined database can be accessed and edited, allowing you to create new or modify your pre-defined departures, arrivals, approaches, runways, airports, waypoints, alignment points and stored routes. Your non-editable company route database can be accessed as well.

Other DATA pages provide access to, and control of, your complement of navigation and air data sensors. The status of each navigation sensor and its position as compared with the WAAS/SBAS-FMS "Best Computed Position" is displayed. Sensor selection/deselection, position updating, UniLink® communications and TAWS display controls are available through this function as well.
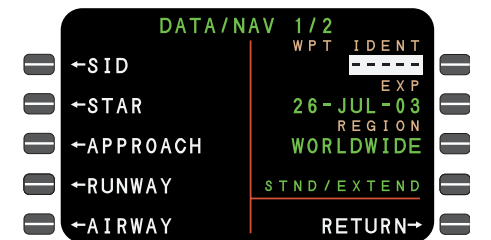
Quick access to database items.
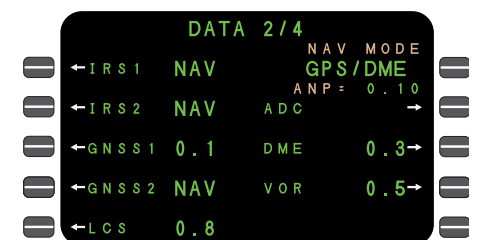
Easy sensor status access and control.
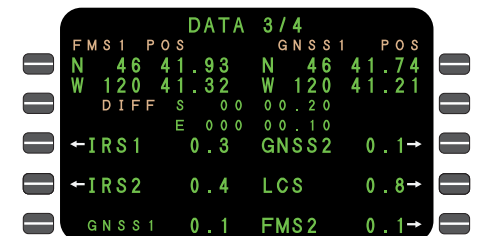
Best Computed Position based on individually tracked sensors.

[1] *Contact Universal Avionics for availability of performance data option for specific aircraft types.*

LIST

Universal's unique LIST function provides a quick and efficient means to access and enter data, minimizing alphanumeric entries and reducing input errors. The "smart" lists are geographically prioritized based on aircraft position and course, then alphabetized on each page. You can quickly enter airports, navaids, intersections and airways all by simply entering the list reference number corresponding to the data desired.

Plain language references for airports, VHF and NDB navaids eliminate confusion over airport/navaid identifiers. In addition to providing an advanced shortcut for flight planning, making entries through the LIST function increases both the accuracy and the safety of off-flight plan maneuvers.
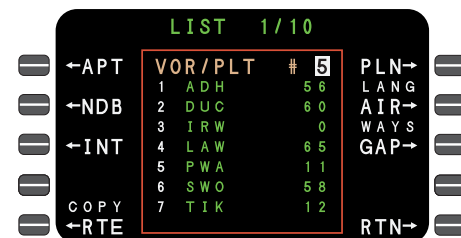
Computer "smart" LISTs present data for quick and accurate selection.


Plain language references eliminate confusion over navaid and airport identifiers.


TUNE

Frequency management capabilities allow you to tune your NAV and COMM radios through the WAAS/SBAS-FMS – completely interfaced with your existing Radio Management Unit.[2] The WAAS/SBAS-FMS presents a list of suggested COMM, Nav and NDB frequencies pre- selected based on aircraft position and phase of flight. Additionally, the pilot can customize the radios tuned through the WAAS/SBAS-FMS by storing an "active" and up to four "preselect" frequencies. A "recall" feature allows you to swap the active with the last frequency tuned without affecting the preselect frequencies.

VOR and NDB frequencies can be readily tuned by their navaid identifier or choosing from the suggested frequency list utilizing the LIST function or by simply typing in the identifier. The WAAS/SBAS-FMS will automatically tune the appropriate frequency.
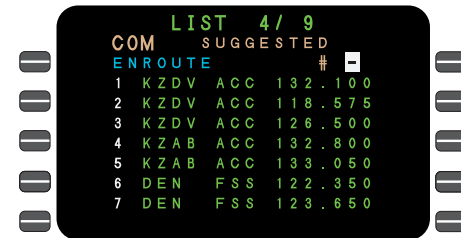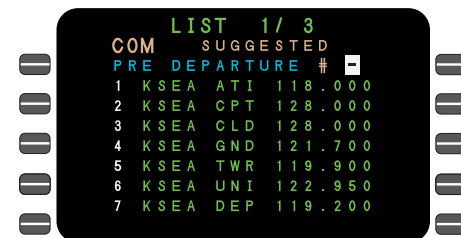
Suggested COMM frequencies are based on aircraft position and phase of flight.
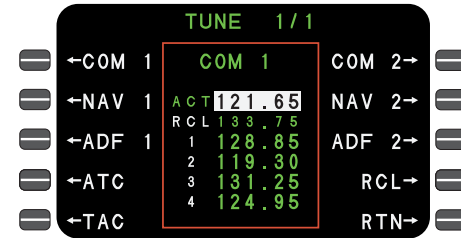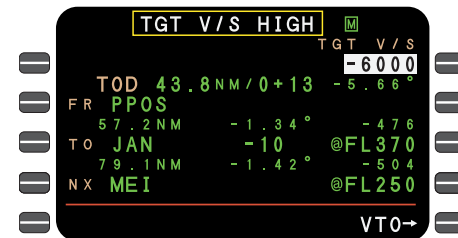

Frequency management through the WAAS/SBAS-FMS.
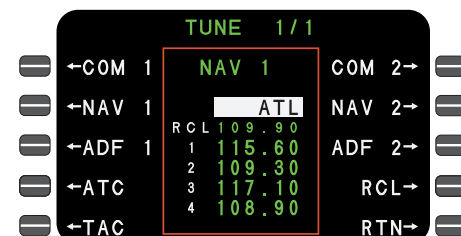
Direct alpha identifier tuning for VORs and NDBs.

MSG

An extensive library of messages has been programmed into the WAAS/SBAS-FMS. The message annunciator alerts the pilot of system status advisories, including way-point alerts, sensor watchdog functions, TAWS alerts and self test. "Pop-up" messages in response to invalid entries further simplify system operation. The MSG key may also be used to access datalink (UniLink® or AFIS) communications should this optional equipment be installed.

UniLink may be accessed from the message page.

2 Optional Radio Tuning Unit required in some installations. A separate, fully integrated advanced Radio Control Unit is also available.

Navigation Database

SBAS coverage and worldwide database regions

Navigation Database Elements

Airports: Public-use with plain language references for locations having one hard surfaced runway at least 2,000, 4,000 or 5,000 feet long depending on the coverage selected.

Navaids: VHF navaids including VORs, VOR/DMEs, VORTACs, TACANs, DMEs and ILS/DMEs, and NDBs. Plain language references are provided for all database navaids.

Enroute Waypoints: Enroute waypoints (intersections) for on- and off-airway navigation.

Terminal Waypoints: Named waypoints (intersections) which are part of a SID, STAR, or approach procedure.

SIDs: Standard Instrument Departures including enroute and runway transitions for database airports.

STARs: Standard Terminal Arrival Routes including enroute and runway transitions for database airports.

Airways: All airway routes published by government agencies.

Approaches: Precision and non-precision approaches including ILS, LOC, BC, GPS, RNAV (GPS), VOR/DME/RNAV, VOR, VOR/DME, TACAN and NDB. Includes transitions and missed approach procedures.

Runways: Runways at included airports with a minimum length of 2000, 4000 or 5000 feet, as applicable.

Communication Frequencies: As a feature of Frequency Management, COMM radio, NAV and NDB frequencies are presented, as needed, from pre-departure through arrival and landing.

Navigation Database Subscription

Navigation database subscription service is available directly from Universal Avionics. The navigation data are published on a 28-day cycle. The data may be downloaded from our website or sent to you through the mail. The WAAS/SBAS-FMSs dual bank database feature allows you to conveniently pre-load the next database cycle immediately. The WAAS/SBAS-FMS will automatically activate the new database cycle when first powered up after the effective date. Each update completely refreshes the entire database, including those waypoints used within your stored routes and pilot-defined procedures. All onboard WAAS/SBAS-FMSs can be updated simultaneously. Database updates are loaded into the WAAS/SBAS-FMS over a 10baseT Ethernet connection from the Data Transfer Unit (DTU). The DTU can be mounted in the aircraft or is available as a portable unit.

Database Integrity

The WAAS/SBAS-FMSs data is safely stored in non-volatile flash memory devices which do not require batteries for data retention. The navigation databases are produced and provided in accordance with the highest quality standards as specified in DO-200A/ED-76. Universal Avionics holds a FAA Type 2 letter of acceptance for its navigation database.

SSDTU

The Solid State Data Transfer Unit (SSDTU) represents the next generation of data upload and download equipment for your aircraft. Interfacing with other Line Replaceable Units (LRU), the SSDTU features flash memory technology that adds speed and ease of use to your data transfers. The SSDTU will replace the floppy and ZIP disks of the DTU and DTU-100, as well as the CD/DVD-ROM of the Accessible Data Unit (ADU). This all-in-one unit facilitates centralized unloading/downloading for WAAS/SBAS-FMS databases and for ASU charts, checklists and E-DOCS.

Supporting Universal Serial Bus (USB) and Secure Digital (SD) mass storage devices, the SSDTU incorporates high-speed USB and SD media ports directly in the faceplate. These media ports support and function as disk drives. The SSDTU appears as a network file server to other interfaced LRUs, and transfers data files between the media ports and the LRU using a high-speed Ethernet data bus connection.

Lighter and smaller than the DTU-100, the SSDTU measures 2.25 inches high, 5.75 inches wide, and 7.58 inches deep and weighs just 2.4 lbs. To accommodate a variety of uses, the SSDTU will be available in fixed-mount and portable versions. The SSDTU will be certified to FAA TSO-C109 and EUROCAE ETSO-C109 certification criteria.

SSDTU Faceplate

Universal Flight Planning

The Universal Flight Planning (UFP) Windows-based software package provides you with off-line flight planning and GPS Fault Detection and Exclusion prediction capabilities using a personal computer and your subscription navigation database, all while in the comfort of your office, flight department or hotel room.

Pilot Data

The software allows you to create and edit items in your Pilot Database such as routes, waypoints, departures, arrivals, approaches, etc. Routes are created and stored using "clearance format" elements, such as airports, departures, transitions, airways, arrivals and approaches. Up to 200 pilot-defined routes can be stored in memory. You can conveniently determine ETEs while varying routes, compute fuel requirements and more. These pilot-defined elements can be transferred to and from the WAAS/SBAS-FMS using the data transfer unit. The UFP program is compatible with earlier versions of FMS Pilot Databases as well.

2,000 Protected Company Routes

In addition to pilot-defined routes, the WAAS/SBAS-FMSs offer a unique protected database for up to 2,000 company routes created only off-line with the UFP program. When these company database elements are transferred to the WAAS/SBAS-FMS, they reside in read-only memory, and can be accessed, but not altered. When you select any stored route for your active flight plan, the WAAS/SBAS-FMS will automatically access the current subscription database and load all of the waypoints and procedures for each element of the stored route. You can always modify your active flight plan. With a few simple keystrokes, you can easily change complete elements such as departures, arrivals and approaches as desired or required by Air Traffic Control.
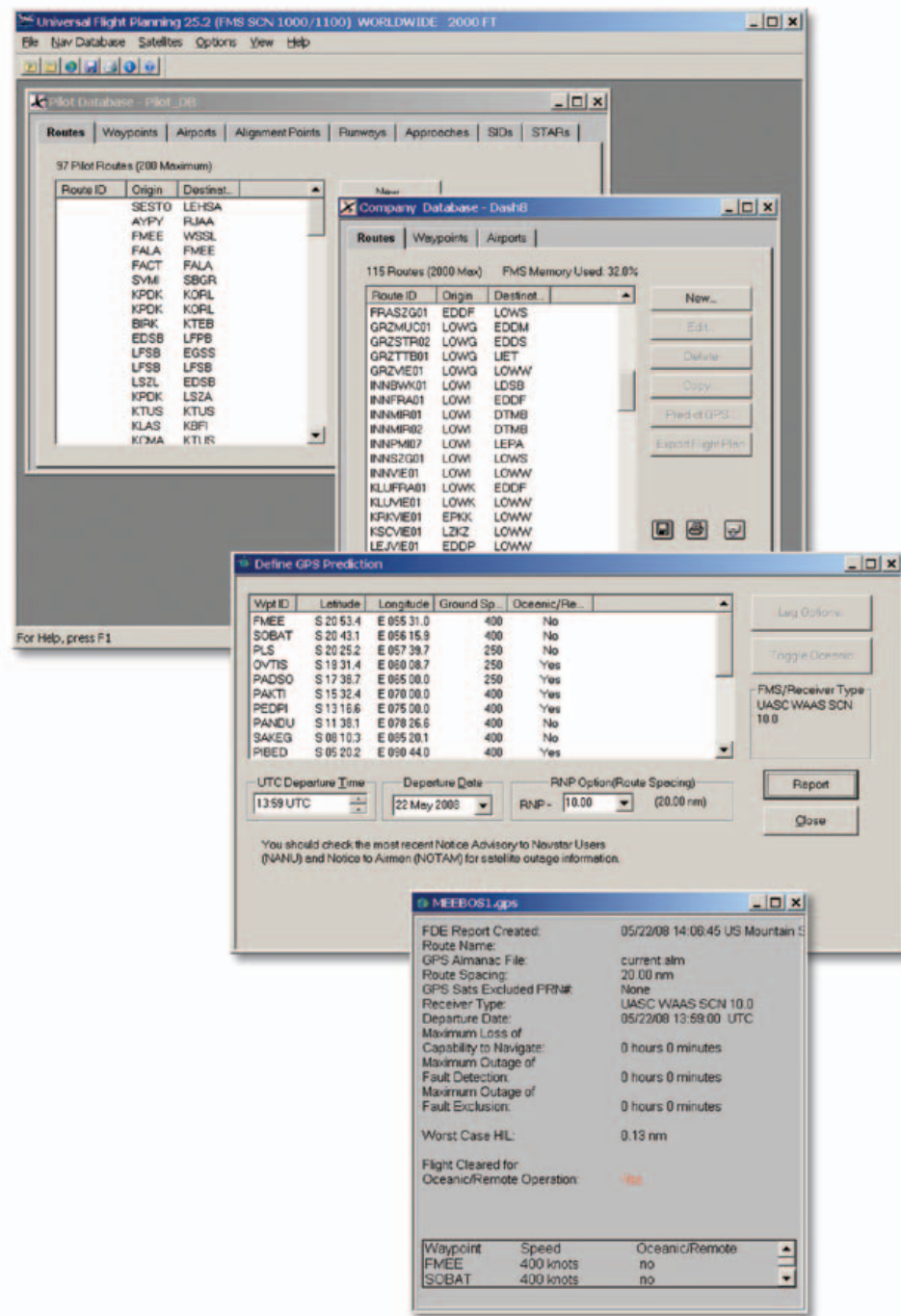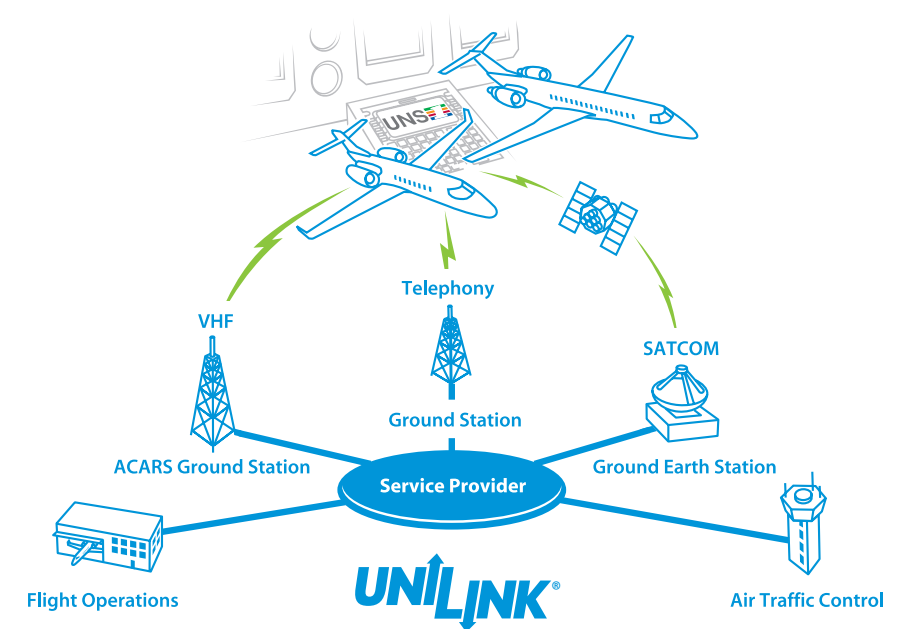
UniLink®

The optional UniLink® Communication Management Unit (CMU) provides you with air-to-ground, two-way datalink capabilities. It is housed in a separate 1-MCU sized LRU and can support single, dual or triple WAAS/SBAS-FMS installations.

Current capabilities include flight planning, clearances, weather information in textual and graphic formats, SIGMET advisories, position reporting, D-ATIS, messaging and more.

Various transmission media are supported including VHF (internal available), Satcom, telephony, and provisions for HF and external VDL mode 2 VDR.

The UniLink® CMU will enable you to take advantage of the upcoming benefits available in the CNS/ATM environment of the future.

Weather graphics

Flight Information Services

Features accessed from Main Menu

UniLink® RTE page with uplink received

UniLink® Communication Management Unit provides air-to-ground two-way datalink

LP/LPV Monitor

Not every operator has the cockpit space for a second WAAS/SBAS-FMS that is required for Localizer Performance with Vertical (LPV) guidance. For these customers, we offer the LP/LPV Monitor – a 2-MCU LRU specifically designed to provide LPV approach capabilities for single WAAS/SBAS-FMS installations.

The LP/LPV monitor provides monitoring and positioning information for RNAV (GPS) approaches with LP and LPV minima. The unit incorporates a second SBAS receiver operating with the most advanced software ever developed to monitor the guiding WAAS/SBAS-FMS during critical LP/LPV operations.

Together, the LP/LPV Monitor and WAAS/SBAS-FMS make it possible to obtain operational approval for WAAS LPV approaches in single WAAS/SBAS-FMS installations. Approach procedures with LPV level of service offer minimum decision altitudes as low as 200 feet with ½-mile visibility. Currently, there are over 1,500 LPV approaches available in the U.S., with hundreds more being added every year.

By providing the capability to fly LPV, LNAV/VNAV and LNAV-only MDAs, the LP/LPV Monitor and WAAS/SBAS-FMS system provides maximum operational flexibility. The LP/LPV Monitor will be certified to TSO-C146b, Class Gamma-3 certification criteria.


LP/LPV Monitor

Terrain Awareness and Warning System

The optional Terrain Awareness and Warning System (TAWS) is housed in a separate 2-MCU sized unit and can support single, dual or triple WAAS/SBAS-FMS installations. Both Class A and Class B TAWS units are available to best meet your operational requirements.

The WAAS/SBAS-FMS provides 3-dimensional guidance using the exact procedures from the navigation database, thereby providing the first level of protection against Controlled Flight Into Terrain (CFIT) accidents. TAWS provides you with two additional levels of

protection: increased situational awareness through visual terrain displays relative to current and predicted aircraft position, and alerts in accordance with the appropriate specific Ground Proximity Warning System modes. Aircraft state and intent is communicated from the WAAS/SBAS-FMS via ARINC 429 to the TAWS computer. Map, profile and 3-D perspective views of TAWS-generated terrain video can be viewed on the 5-inch FPCDU and the MCDU.
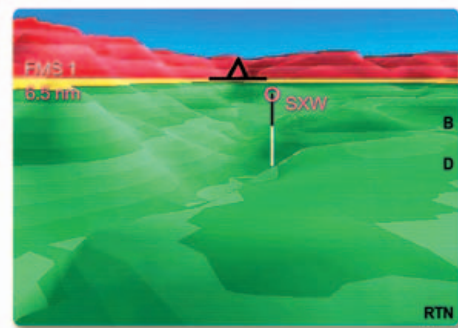
Unique 3-D Perspective View

Graphic Display Capabilities

Video and graphics capabilities are optional features on our 4-inch and 5-inch FPCDUs, as well as on the UNS-1Ew integral CDU. Both video and graphics capabilities are standard features of the MCDU. Video signals can be accommodated from a variety of sources including TAWS, cabin display systems and remote mounted video cameras. A dedicated RS-422 graphics bus can be input to display weather graphics accessed through the UniLink® system.

*UniLink® Communication Management Unit provides air-to-ground two-way datalink.*

*The FPCDU and MCDU support UniLink® weather graphics, TAWS, remote video cameras and cabin display systems.*

Remote video display

Control Display Units

	4-inch FPCDU	5-inch FPCDU	MCDU
System Interface:	UNS-1Fw, -1Lw	UNS-1Fw, -1Lw	UNS-1Fw
ARINC739 Capable:			Yes
Display:	Color	Color	Color
Lines/Characters:	11/24	11/24	14/24
Line Select Keys:	10	10	12
Size:			
■ Height	4.5 in (11.43 cm)	6.375 in (16.9 cm)	7.125 in (18.1 cm)
■ Width	5.75 in (14.6 cm)	5.75 in (14.6 cm)	5.75 in (14.6 cm)
■ Depth	3.25 in (8.26 cm)	3.25 in (8.26 cm)	7.87 in (20.0 cm)
Weight:	3.0 lb (1.4 Kg)	3.8 lb (1.7 Kg)	7.5 lb (3.4 Kg)
Faceplate:	gray or black	gray or black	gray or black
Panel Lighting:	5 or 28 VDC	5 or 28 VDC	5 or 28 VDC
Video: (NTSC RGB format)	optional	optional	standard
Weather Graphics:	optional	optional	standard

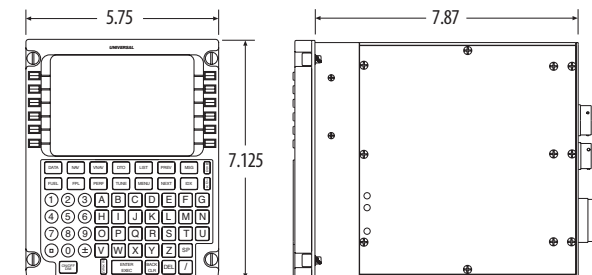### 4-INCH FPCDU
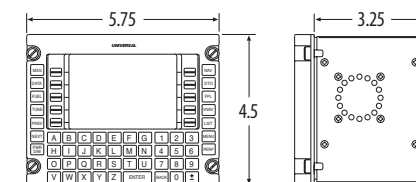
5-INCH FPCDU
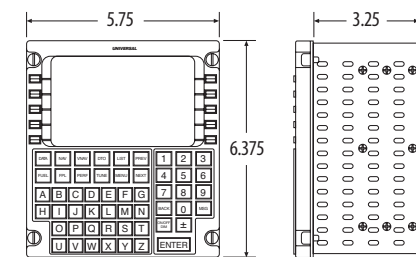
UNS-1Ew
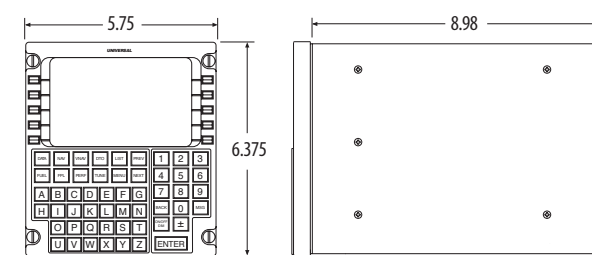
MCDU

Solid-State Data Transfer Unit (SSDTU)

Dzus Mounted

Hard-wired to NCU

Data Format: Digital

SSDTU Data Media:
SD Card or USB Flash Memory
Bi-directional data transfer
via 10Base-T Ethernet
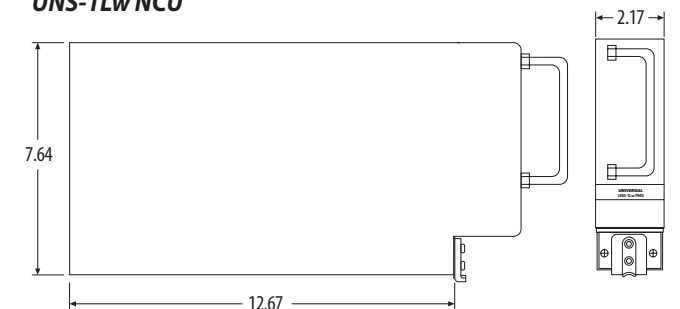
Power:
■ 27.5 VDC nominal
■ 28 Watts nominal

SSDTU Size:
■ Height 2.25 in (5.72 cm)
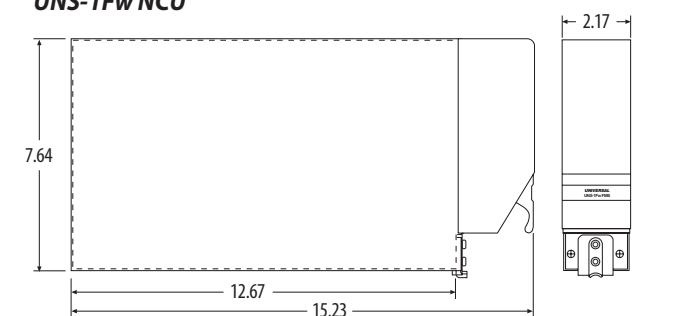■ Width   5.75 in (14.6 cm)
■ Depth   7.58 in (19.3 cm)

SSDTU Weight:
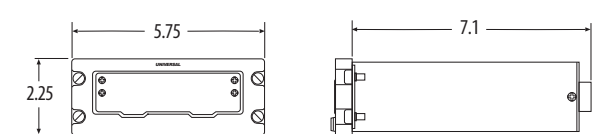■ 2.4 lb (1.08 Kg)
(Portable unit also available.)

UNS-1Lw NCU

UNS-1Fw NCU

SSDTU

UNIVERSAL® AVIONICS
SYSTEMS CORPORATION

Corporate Offices
Marketing/Support

3260 E. Universal Way
Tucson, Arizona 85756
U.S.A.
Tel: (520) 295-2300
    (800) 321-5253
Fax: (520) 295-2395

Midwest Operations

3815 Midco Street
Wichita, Kansas 67215
U.S.A.
Tel: (316) 524-9500
    (800) 255-0282
Fax: (316) 524-9700

European Office

P.O. Box 140
CH-4030 Basel-Airport,
Switzerland
Tel: +41-61-325-3660
Fax: +41-61-325-3665

Internet

www.uasc.com
E-mail: info@uasc.com

Specifications and graphic displays contained herein subject to change without notice.
System features may be limited based on interfacing equipment and type of installation.

Please contact your Universal Avionics marketing representative for the latest product information.

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Vision-1® is a trademark of Universal Avionics Systems Corporation.
UniLink® weather graphic is the property of Universal Weather and Aviation, Inc., Houston, Texas

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WAAS/SBAS-FMS-10/09