

No. 2804

UASC FMS Compliance with FAA Advisory Circular 90-100A

NOTE: Revision C of this Service Letter adds information regarding RAIM Prediction Information requirements on page 5.

Overview

FAA Advisory Circular (AC) 90-100A, *U.S. Terminal and En Route Area Navigation (RNAV) Operations* provides operational and airworthiness guidance for these procedures.

This Service Letter provides information about how AC 90-100A affects flight crews using Universal Avionics Flight Management Systems in the operation of the RNAV procedures.

Information

According to AC 90-100A paragraphs 7.c. (1), (3), and (4), the following systems meet the functional and accuracy requirements:

- Aircraft with a TSO-C129/C129A (Class B or C) sensor and meeting the requirements in a TSO-115b FMS installed for IFR use in accordance with AC 20-130A
- Aircraft with TSO-C129/C129A (Class A1) equipment installed for IFR use in accordance with AC 20-138 or AC 20-138A
- Aircraft with TSO-C146a installed for IFR use in accordance with AC 20-138A

UASC Flight Management Systems (FMSs) listed in the following table meet the above functional and performance criteria for U.S. RNAV routes, Instrument Departure Procedures (DPs or SIDs), and Standard Terminal Arrivals (STARs) in accordance with AC 90-100A provided that:

- The FMS and GPS have been installed and approved for IFR use in accordance with AC 20-130A or AC 20-138A
- The FMS is receiving usable GPS signals
 - GPS integrity annunciation is not present
 - GPS# NOT NAV, GNSS# NOT NAV, or WAAS# NOT NAV message is not present
 - GPS# FAILED, GNSS# FAILED, or WAAS# FAILED message is not present
 - GPS# DESELECT, GNSS# DESELECT, or WAAS# DESELECT message is not present
- No GPS satellites are scheduled to be out of service

If these conditions are met the aircraft can depart without further action. Under most conditions at least one GPS satellite will be scheduled to be out of service. When this is the case it will be necessary for the user to conduct a RAIM prediction for the intended flight to verify that no GPS RAIM outages of more than five minutes will occur; reference FAA AC 90-100A, paragraph 8.a.(5). Universal Flight Planning (UFP) software is used for RAIM prediction on all compliant UASC systems.

The following table lists the UASC FMS systems that are compliant with FAA AC 90-100A when GPS is in use and meets predictive RAIM requirements. Systems containing software versions 603.4/703.4 and higher are compliant when utilizing DME/DME/IRU. These systems have not demonstrated compliance with DME/DME RNAV per the requirements of Appendix 1 of AC 90-100A. Systems not listed have been determined to be non-compliant.

System	Part Number	SCN	Approval Using GPS (Note 1)	Approval Using DME/DME/IRU (Note 2)	Database Integrity	Eligible to fly RNAV "Q" or "Tango" Route	Eligible to fly RNAV SID/STAR/ODP	Eligible to use Substitution or RNAV Alternate Means of Navigation (US Only)
UNS-1B+	1190-XX-211X	601.X 701.X	Yes	Yes (Note 2)	Yes	Yes	Yes	Yes
UNS-1B+	1190-XX-211X	602.X 603.X 604.X 702.X 703.X 704.X	Yes	Yes (Note 2)	Yes	Yes	Yes	Yes
UNS-1C	1017-XX-XXX	601.X 701.X	Yes	No	Yes	Yes	Yes	Yes
UNS-1C	1017-XX-XXX	602.X 603.X 604.X 702.X 703.X 704.X	Yes	Yes (Note 2)	Yes	Yes	Yes	Yes
UNS-1C	1017-3X-XXX	705.X	Yes	Yes (Note 2)	Yes	Yes	Yes	Yes (But not for VOR substitution)
UNS-1C	1017-4X-XXX	600.X	Yes	No	No	Yes	No	Yes (But not for VOR substitution)
UNS-1C+	10172-XX-XXX	800.X 801.X 900.X 901.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1C+	10172-XX-XXX	802.X 803.X 902.X 903.X	Yes	Yes	Yes	Yes	Yes	Yes

System	Part Number	SCN	Approval Using GPS (Note 1)	Approval Using DME/DME/IRU (Note 2)	Database Integrity	Eligible to fly RNAV "Q" or "Tango" Route	Eligible to fly RNAV SID/STAR/ODP	Eligible to use Substitution or RNAV Alternate Means of Navigation (US Only)
UNS-1Csp	1019-XX-XXX	601.X 701.X	Yes	No	Yes	Yes	Yes	Yes
UNS-1Csp	1019-XX-XXX	602.X 603.X 604.X 702.X 703.X 704.X	Yes	Yes (Note 2)	Yes	Yes	Yes	Yes
UNS-1Csp	1019-3X-XXX	700.X	Yes	No	No	Yes	No	Yes (But not for VOR substitution)
UNS-1Csp	1019-4X-XXX	600.X	Yes	No	No	Yes	No	Yes (But not for VOR substitution)
UNS-1Csp+	10192-XX-XXX	800.X 801.X 900.X 901.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1Csp+	10192-XX-XXX	802.X 803.X 902.X 903.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1D	1192-0X-XXX1XX	600.X	Yes	No	No	Yes	No	Yes (But not for VOR substitution)
UNS-1D	1192-X0-11110X	602.X 603.X 604.X 702.X 703.X 704.X	Yes	Yes (Note 2)	Yes	Yes	Yes	Yes
UNS-1D	1192-3X-XXX1XX	700.X	Yes	No	No	Yes	No	Yes (But not for VOR substitution)
UNS-1D	1192-X0-11110X	601.X 701.X	Yes	Yes (Note 2)	Yes	Yes	Yes	Yes
UNS-1D+	11922-XX-XXXXXX	800.X 801.X 900.X 901.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1D+	11922-X0-XXXX0X	802.X 803.X 902.X 903.X	Yes	Yes	Yes	Yes	Yes	Yes

System	Part Number	SCN	Approval Using GPS (Note 1)	Approval Using DME/DME/IRU (Note 2)	Database Integrity	Eligible to fly RNAV "Q" or "Tango" Route	Eligible to fly RNAV SID/STAR/ODP	Eligible to use Substitution or RNAV Alternate Means of Navigation (US Only)
UNS-1E	2017-XX-XXX	800.X 801.X 900.X 901.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1E	2017-XX-XX1	802.X 803.X 902.X 903.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1Ew	3017-XX-2X1	1000.X 1100.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1Esp	2019-XX-XXX	800.X 801.X 900.X 901.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1Esp	2019-XX-X01	802.X 803.X 902.X 903.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1Espw	3019-XX-201	1000.X 1100.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1F	2192-XX-XXXXXX	800.X 801.X 900.X 901.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1F	2192-X0-XXXX0X	802.X 803.X 902.X 903.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1Fw	3192-X0-11110X	1000.X 1100.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1K	1116-XX-111X	601.X 701.X	Yes	No	Yes	Yes	Yes	Yes
UNS-1K	1116-XX-111X	602.X 603.X 604.X 702.X 703.X 704.X	Yes	No	Yes	Yes	Yes	Yes
UNS-1K+	11162-XX-XXXX	800.X 801.X 802.X 803.X 900.X 901.X 902.X 903.X	Yes	Yes	Yes	Yes	Yes	Yes

System	Part Number	SCN	Approval Using GPS (Note 1)	Approval Using DME/DME/IRU (Note 2)	Database Integrity	Eligible to fly RNAV "Q" or "Tango" Route	Eligible to fly RNAV SID/STAR/ODP	Eligible to use Substitution or RNAV Alternate Means of Navigation (US Only)
UNS-1L	2116-XX-XXXX	800.X 801.X 802.X 803.X 900.X 901.X 902.X 903.X	Yes	Yes	Yes	Yes	Yes	Yes
UNS-1Lw	3115-X0-11110X	1000.X 1100.X	Yes	Yes	Yes	Yes	Yes	Yes

NOTES:

- All GPS approvals with Universal Flight Planning program (P/N K12037-7) for RAIM prediction. This is available for download at www.uasc.com.
- Systems containing software versions 603.4 and higher are compliant when utilizing DME/DME/IRU.

RAIM Prediction Information Requirements

Effective as of July 1, 2009, if an aircraft is equipped with a TSO C129a FMS, a RAIM prediction is required for the intended flight. For aircraft equipped with FMSs that are TSO-C145/C146, a RAIM prediction is not required.

NOTE: Per AC 90-100A, if TSO-C145/C146 equipment is used to satisfy the RNAV requirement, the pilot/operator need not perform the prediction if WAAS coverage is confirmed to be available along the entire route of flight. Outside the U.S. or in areas where WAAS coverage is not available, operators using TSO-C145/C146 receivers are required to check GPS RAIM availability.

When using a RAIM prediction service such as www.raimprediction.net, the following information will be required:

NOTE: RAIM prediction sites such as www.raimprediction.net are very conservative and may not accurately reflect actual RAIM operation for UASC equipment. It is strongly recommended that UFP be used to satisfy the requirement.

Receiver Type: wFMSs (WAAS FMSs) are TSO C145/146; Non-wFMSs are TSO C129a.

Report Type: FDE

Baro-aided: (Installation dependent)

- GPS-1200 = Supports pressure altitude aiding for Altitude Aiding Mode, RAIM, and Predictive RAIM
- GPS-1000, GPS-1000A, and GNSS-2400 = If available, pressure or baro-corrected pressure altitude is used for Altitude Aiding Mode. Altitude Aiding is not used in the RAIM and Predictive RAIM algorithms.

Selective Availability:

- GPS-1000 = Selective Availability is ON
- GNSS-2400 (SCN 10.X) = Selective Availability is ON
- GPS-1000A and GNSS-2400 (SCN 11.X) = Selective Availability is OFF

Universal Flight Planning (UFP) Program

- Universal Avionics Systems Corporation's Universal Flight Planning (UFP) program allows off-line GPS RAIM prediction. An Internet connection is required to gain access to the USCG GPS website to update the GPS almanac.

To meet the requirements of AC 90-100A paragraph 8.a. (5), the UFP program allows the user to exclude satellites from predictions based on NOTAM out of service schedules.

NOTE: This Service Letter does not constitute an operational approval. Operators should refer to AC 90-100A to determine compliance.

Material – Cost and Availability

1. Universal Flight Planning (UFP) program (P/N K12037-7) is available from:

www.uasc.com (search for “UFP” at the website search link)

or

Universal Avionics Marketing Division
3260 E. Universal Way
Tucson, AZ 85706
Ph: (520) 295-2300
Fax: (520) 295-2395