



The View from Washington

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The Future of Navigation: GPS and Beyond

In the early days, aviation relied on dead reckoning for navigation: following rivers and valleys and taking fixes from mountain peaks and other landmarks. In 1921, the era of night flight began with the introduction of airway bonfires. Literal bonfires were lighted along a prescribed route between landing fields to allow mail planes to fly after dark. Lighting the transcontinental route began between Chicago, Ill., and Cheyenne, Wyo., and regular night service commenced in 1924.

The next major advancement in navigation wasn't until five years later with Gen. James Harold "Jimmy" Doolittle's famous flight in 1929. Doolittle made the first completely blind take-off and landing on Sept. 24, 1929, at Mitchell Field, N.Y., proving the practicality of instrument flight.

After that, technology changes followed. Advancements came first in radio navigation and radio communications capabilities. Then, technology advancements in radio designs were made. As early as the mid-1920s, the FAA and its predecessor agencies leveraged the advancements in capabilities to require new technology equipment for operations in certain airspaces.

The latest equipment mandate for general aviation operations in controlled airspace came with Mode C transponder requirements. It wasn't until 1989, when most aircraft operating in controlled airspace were required to be equipped with automatic pressure altitude reporting equipment with Mode C capability.

There have been other equipment

mandates for commercial operators in recent years, but for the most part, general aviation — or at least light GA — has been protected from such mandates for the past 20 years.

It appears without equipment mandates, there are three basic reasons for avionics upgrades: equipment failure; access to specific airspaces or international operations; or an upgrade in technology.

In the early 1920s, navigation was by landmarks during the day and bonfires at night. By the late 1920s, the era of instrument flight was introduced. With the cost of avionics today, the owner of an aircraft is justifying the investment by trying to guess what will be on the avionics radar screen for flight operations in 12 to 14 years — the next 1920s: 2020.

The issues of user fees and FAA funding recently have been debated in the halls of Congress. While the debate regarding user fees raises contrary views among the various advocacy groups, many seem to publicly support the FAA's NexGen: next generation of flight.

NexGen is pretty basic. The aircraft technology isn't anything as futuristic as we watched in "Star Trek," although personal communicators (cell phones) have become a reality. The capabilities don't create a new flight management process. What NexGen does is leverage the technological advances the industry has made available.

The most recent indication of what the next generation of flight will need for navigation made aviation headlines a few months ago: "Your GPS May

Not Be Enough," "FAA Revokes IFR Approvals for GPSs" and so on.

But by now, the headlines have faded and, hopefully, your customers have quit calling to ask questions.

What is the Future of GPS Technology?

Let's go back to investigate the root cause of the latest issue. The FAA revised two guidance documents regarding GPS use: the "Aeronautical Information Manual" and AC 90-100.

The FAA's AC 90-100A is a revision to AC 90-100, originally published in 2005. The revisions to AC 90-100 are intended to harmonize the United States RNAV performance criteria with that of the International Civil Aviation Organization recommendations. AC 90-100A has little impact on light GA aircraft operations today — but it might in the future.

The primary issue in the media seemed to be the apparent loss of the use of GPS in lieu of ADF and/or DME. While this has been reinstated, the core issue opens up the discussion of what might happen in the future.

The first area to look to is the technical standard orders TSO C129 and C146.

TSO-C129a prescribes the minimum performance standard airborne supplemental area navigation equipment using global positioning systems must meet to be identified with the applicable TSO marking.

TSO C129a is for supplemental area navigation equipment. There are three main classes of C129 GPS and multiple subclasses.

According to the TSO:

1) Class A — equipment incorporating both the GPS sensor and navigation capability. This equipment shall incorporate receiver autonomous integrity monitoring (RAIM) as defined by paragraph (a)(3)(xv) of this TSO.

- Class A1 — en route, terminal and non-precision approach (except localizer, localizer directional aid (LDA) and simplified directional facility (SDF) navigation capability.

- Class A2 — en route and terminal navigation capability only.

2) Class B — equipment consisting of a GPS sensor that provides data to an integrated navigation system (flight management system, multi-sensor navigation system, etc.). The equipment consisting of a GPS sensor must meet all of the Class B requirements specified in this TSO in order to be identified with a Class B marking.

- Class B1 — en route, terminal and non-precision approach (except localizer, LDA and SDF) capability. This equipment provides RAIM capability as specified in paragraph (a)(4)(vii) of this TSO.

- Class B2 — en route and terminal capability only. This equipment provides RAIM capability as specified in paragraph (a)(4)(vii) of this TSO.

- Class B3 — en route, terminal and non-precision approach (except localizer, LDA and SDF) capability. This equipment requires the integrated navigation system to provide a level of GPS integrity equivalent to that provided by RAIM as specified in paragraph (a)(4)(vii) of this TSO.

- Class B4 — en route and terminal capability only. This equipment requires the integrated navigation system to provide a level of GPS integrity equivalent to that provided by RAIM as specified in paragraph (a)(4)(vii) of this TSO.

Note 1: Limitations on equipment installations that require the integrated

navigation system with which the GPS sensor is interfaced to provide a level of GPS integrity equivalent to that provided by RAIM should be included in the installation instructions.

Note 2: Systems utilizing VOR and/or DME for integrity monitoring may require modification in the future as changes to the National Airspace System occur.

3) Class C — equipment limited to installations in aircraft approved under 14 CFR Part 121 or equivalent criteria.

- Class C1 — en route, terminal and non-precision approach (except localizer, LDA and SDF) capability. This equipment provides RAIM capability as specified in paragraph (a)(5)(vii) of this TSO.

- Class C2 — en route and terminal capability only. This equipment provides RAIM capability as specified in paragraph (a)(5)(vii) of this TSO.

- Class C3 — en route, terminal and non-precision approach (except localizer, LDA and SDF) capability. This equipment requires the integrated navigation system to provide a level of GPS integrity equivalent to that provided by RAIM as specified in paragraph (a)(5)(vii) of this TSO.

- Class C4 — en route and terminal capability only. This equipment requires the integrated navigation system to provide a level of GPS integrity equivalent to that provided by RAIM as specified in paragraph (a)(5)(vii) of this TSO.

With all the headlines and media attention, the basic criteria for VFR and IFR use of GPS as a supplemental means of navigation as described in the FAA's "Aeronautical Information Manual" basically is unchanged.

In the "Aeronautical Information Manual" prior to March 2007, paragraph 1-1-19 f. addressed the "Use of GPS in lieu of ADF and DME." Change 2 to the AIM, which became effective March 15, 2007, deleted paragraph 1-

1-19 f.

Although paragraph 1-1-19 f. was deleted, which provided use and limitation information, the AIM's Table 1-1-6 still authorizes GPS in lieu of ADF and/or DME for GPS equipment approved (by TSO) for IFR en route and terminal, IFR oceanic/remote, or IFR en route, terminal and approach — essentially those capabilities governed by TSO C129.

TSO-C146B, on the other hand, provides the minimum performance standards for stand-alone airborne navigation equipment using the global positioning system augmented by the satellite-based augmentation system.

The FAA's AIM still contains the information for GPS operations and use. In addition, the AIM has added a section on RNAV. The new RNAV information provides a very real window into the future of GPS operations.

We are on the verge of the next major step forward in area navigation. Although not as clear as the bonfires of the 1920s for navigation, the future needs of navigation equipment can be painted if we look closely at the FAA's roadmap. For a snapshot of the avionics radar screen looking out to 2020, look at the FAA's proposed NexGen and read through the AIM's Chapter 1, Section 2, "Area Navigation and Required Navigation Performance." □

Regulatory Update

United States

Direct Final Rule Issued for IA Two-Year Renewal

On Jan. 30, 2007, the FAA issued a direct final rule, "Inspection Authorization Two-Year Renewal," which amended the renewal period for inspection authorizations and requested comments.

In the June 27, 2007 Federal Register, the FAA responded to the comments received — including the AEA's comments — and confirms the effective date of the rule. The effective date for the direct final rule published Jan. 30, 2007, is confirmed as March 1, 2007.

Under the direct final rule, the expiration date of an inspection authorization changed from March 31 of each year to March 31 of each odd-numbered year. The intent of the rule is to relieve administrative costs associated with renewing inspection authorizations for both the FAA and the IA holders without affecting safety.

It is important to note the rule retains the annual activity requirement for each year of the two-year IA period.

Consistent with the annual aspects of the former rule, an IA holder must perform one of the five activities listed in Sec. 65.93 (a)(1)-(5) during the first year of the two-year IA period. A new paragraph (c) states, if the IA holder does not complete one of those activities by March 31 of the first year, the holder may not exercise the inspection authorization privileges after that date.

The FAA received approximately 60 comments in response to the IA renewal period direct final rule. The comments generally were supportive of the two-year renewal period. Many of those who commented said they were pleased to see the FAA become actively involved in reviewing inspection authorization procedures and believed the change would result in saving time

and money.

As part of its comments, the AEA suggested the FAA establish a rating system for IA holders similar to the rating system for repair stations.

The FAA could not adopt the proposals contained in the AEA's comments, nor a number of suggestions from others, without further rulemaking, and the significance of those actions would require the FAA to issue a notice of proposed rulemaking prior to amending the rule. The FAA will evaluate these comments as it considers possible future actions to amend the rules relating to IAs.

FAA Issues Notices, Revisions to 'Airworthiness Inspector's Handbook'

- FAA Notice N8900.7, Revision to Order 8300.10, Volume 2, Chapter 65, and Volume 3, Chapter 37 provides guidance for all principal inspectors and all other assigned aviation safety inspectors on revisions to FAA Order 8300.10, "Airworthiness Inspector's Handbook," Volume 2, Chapter 65, Assess Section 121.373 or 135.431, "Air Carrier Continuing Analysis and Surveillance System," which has been completely rewritten, and cancels Volume 3, Chapter 37, "Monitor Continuing Analysis and Surveillance Program/Revision."

- FAA Notice N8900.6, "Repair Station Authorization to Maintain Canadian Aircraft 1," introduces the revised FAA Order 8300.10, "Airworthiness Inspector's Handbook," Volume 2, Chapter 164, "Evaluate a Part 145 Repair Station and Quality Control Manual or Revision." This chapter has been revised to include guidance and information for aviation safety inspectors assigned to U.S.-certificated repair stations performing maintenance, preventive maintenance and modifications on civil aeronautical products under the regulatory control of Transport Canada

Civil Aviation, and approve those products for return to service.

- FAA Notice 8000.344, "Requirements and Guidance Regarding Proper Use of FAA Form 8110-3," stops the improper use of FAA Form 8110-3, "Statement of Compliance with the Federal Aviation Regulations," and reminds airworthiness aviation safety inspectors they are to conduct their activities in accordance with Title 14 of the Code of Federal Regulations (14 CFR), and FAA advisory circulars, orders, policies and procedures. Failure to do so is in direct conflict with the requirements of FAA Order 8300.10, "Airworthiness Inspector's Handbook," Volume 1, Chapter 10, Inspector Ethics and Conduct.

Notice 8000.344 requires ASIs to:

- Cease requiring air carriers and repair stations to implement procedures that are outside the regulations, guidance and policies.
- Notify air carriers and repair stations required to have Form 8110-3 for minor repairs and minor alterations that Form 8110-3 will no longer be obtained for minor repairs and minor alterations.
- Remove these requirements from air carriers and repair stations procedures that require Form 8110-3 for minor repairs and minor alterations.

Canada

Transport Canada Reorganizes Civil Aviation Standards Management

As part of Transport Canada Civil Aviation's process of adoption of a safety management systems approach to civil aviation, it recently created a new organization grouping together all civil aviation standards activities under one director, Don Sherritt.

According to TCCA, "The new Civil Aviation Standards Branch includes divisions responsible for the development and revision of standards related

to maintenance and manufacturing, safety management systems, aircraft certification, air operators certification and flight operations, aerodromes and air navigation, dangerous goods, occupational health and safety, and cabin safety. It also includes aviation enforcement, safety promotion and education for the aviation industry and program management within the branch.”

Staff members have been transferred from their previous operational standards branches into the new Civil Aviation Standards Branch.

A new TCCA website has been created for the Civil Aviation Standards Branch, with links to the previous operational standards sites. Eventually, the new site will directly address all standards activities. It can be viewed at www.tc.gc.ca/CivilAviation/Standards/menu.htm.

Transport Canada Reissues Guidance for Audio Alerts, Warnings

TCCA issued AC 500-001, dated June 20, 2007, to replace its aircraft certification policy letter, ACPL 54 Issue 01, dated March 3, 1997, “Audio Alerts and Warnings.”

The purpose of the new AC is to provide guidance for the demonstration of compliance, assessment and approval to assist in the confirmation of compliance with the applicable requirements of the “Airworthiness Manual” in relation to:

- cockpit audio alerts and warnings; and
- switch systems designed to “mute” cockpit speakers, thereby “inhibiting” audio alerts to the flight deck under certain conditions.

The new AC incorporates minor revisions to the technical content of the previous ACPL 54, and can be viewed at www.tc.gc.ca/CivilAviation/IMS-doc/ACs/500/500-001.htm.

Europe

EASA Updates

MDM 032 Working Group Task

The European Aviation Safety Agency is presenting an activity status of “a concept for better regulation in general aviation” as part of the MDM 032 working group task. The basis is the A-NPA 14-2006, published in August 2006, addressing the operation of non-commercial activities of aircraft other than complex motor-powered aircraft.

The activities initiated by the working group include a proposal to create a new pilot’s license, as well as to propose general operating rules for these aircraft to verify the current system of initial airworthiness for aircraft below 2,000kg MTOM can be relaxed.

Contacts with general aviation stakeholders and national authorities have shown a full review of airworthiness regulations was urgently needed. Therefore, a rulemaking group was set up, in which ECOGAS, in cooperation with the AEA, also is represented. The approach should be brainstorming beyond the limits of conventional approaches.

In upcoming months, the individual groups will present proposals on task, including changes to Part M, Part 66 and OPS-O. EASA now is planning to issue an activity status every two months.

Working Procedure E.P010-00

Of interest to any holder and applicant of EASA approval of products, parts and appliances requesting a validation of approval in a third country, is the newly issued internal working procedure, E.P010-00.

This working procedure explains the process of how to support an application in which a certification support for validation is needed. It also includes the certification support for validation, test witnessing, conformity inspections and other compliance finding support.

This process will be applied if a third country acts as the PCA or in case of an EASA/third country authority certification or validation program.

CS-36, Aircraft Noise

For anybody involved in the application or change to a TC or STC, the executive director decision, ED 2007/007/R, amending CS-36, “Aircraft Noise,” is of interest. It introduces the applicable chapters of Annex 16 as acceptable means of compliance for the TC or STC approval. It also introduces ICAO Doc. 9501 as new guidance to the regulation.

Parts and appliances meeting the requirements of a TSO, but for which there is no equivalent ETSO, can be approved only when they are part of an STC. This results in a disadvantage for European parts and appliance producers and installers if there is no equivalent ETSO to the FAA TSO standard.

The agency has recognized this fact and issued terms of reference, TOR ETSO.002, rulemaking task to transpose FAA TSO standards into EASA ETSOs.

If more than one Part 145 organization is involved in the maintenance of a single aircraft between two flights, NPA No 2007-09 might be important. The current system recognizes the single release and the multiple releases of aircraft after maintenance.

The single release of aircraft is a concept in which a final aircraft certificate of release to service is issued before flight by appropriately qualified and authorized personnel following single or multiple maintenance actions. This concept, however, does not properly address the cases in which several approved maintenance organizations are involved in maintenance between two flights because it is not clear which organization is responsible and capable for finally issuing a single CRS of the aircraft. Consequently, in this case, the system becomes similar to the multiple-release concept in which each organization releases its own work.

The NPA is open for comments until Sept. 28, 2007.

NPA 2007-07

Of interest to any Part 145 organiza-

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tion is a newly issued NPA 2007-07 in regards to the privileges of Part 66 B1 and B2 licensed personnel. The NPA proposes a clarification for electrical and avionics systems definition and which avionics tasks can be performed by a B1 license holder.

Furthermore, it proposes an increase in capability of the B2 certifying staff to include electrical troubleshooting and electrical defect rectification. The NPA proposes changes to the AMC material to EC2042/2003.

The NPA is open for comments until September 28, 2007. □

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