TECHNO-SKEPTICISM

A REALITY CHECK

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by

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I. INTRODUCTION

The new era of satellite positioning and timing is now some 15 years old, with GPS in widespread use and Galileo arriving soon. This remarkable technology has been adopted for an infinite variety of uses and has created wealth worldwide, very much including the developing world. GNSS technology, as GPS/Galileo/GLONASS are generically labeled, is found in nearly all IFR aircraft, large and small.

Nevertheless, in the world of aviation, we in the US have not acknowledged the limitations of GNSS. This has caused a misallocation of funds and has led us down a number of blind alleys. The US reputation abroad, once so predominant, has suffered grievously.

Equally important, perhaps much more important, the over-focus on technology has caused FAA/DOT to overlook more immediate and practical solutions to the number one ATC problem – capacity. A recent study noted that only 5% of needed new capacity would be provided by technology.

This technology-first culture arose in the early 1990's and the ATO is working to find a cure. But the culture is not dead. The negative consequences to the economically fragile & hub-dependent US air carriers will be profound as the capacity crunch returns.

II. GPS SOLE MEANS

This is my favorite subject in my declining years. Suffice to say, without going into detail, that GNSS signals are extremely vulnerable to interference because of low power, as the recent nationwide collapses of GPS/ WAAS from solar flares on October 29 and November 20 indicate. This is not a GPS failure – it's just a limitation, and not a serious problem for the 95% of users who are not in aviation. But for safety of life issues,

such as in aviation, it's intolerable. GPS is also a single thread system, subject to system-wide interference from a single event, and that is also unacceptable.

This limitation is now widely understood and accepted, internationally, in spite of initial and continuing representations to the contrary by FAA. It is now clear that no sane airline will fly with only GPS nav on board, nor will an ATS provider turn off all its ground-based navaids and surveillance.

Equally important, the pilots and controllers are on record objecting to GNSS sole means. This is an important safety issue. Sole means will not be accepted by controllers and professional pilots.

In spite of the thumbs down by pilots, controllers, and Eurocontrol, and deep skepticism in ICAO meetings, FAA has refused formally to state that GPS sole means is unsafe and can never be approved. There is a reason for this.

III. THE "TRANSITION" PLAN

FAA has published a "Transition Plan to Sat Nav." This document shows a near term shut-off of about half the ILSs in the US. Now that LAAS has been cancelled, this is not possible.

This is immensely significant because the transition plan permitted continuation of the rationale for many of the Sat Nav projects. The original cost benefit studies were, and are, based on the assumption that all the ground-based navaids can be put in the crusher eventually and, as a result, usage on aircraft of all the new technology gear would be 100% and a lot of infrastructure cost would be avoided. Given the assumptions, it's hard to argue against the conclusions. But the assumptions are wrong. Only part of the navaids can be removed, and nearly all the avionics will be retained on aircraft. Furthermore, much of the new

technology avionics will not be installed at all because it is duplicative of what aircraft already have – such as LAAS versus ILS, and WAAS for air carrier aircraft.

The transition plan, and much of the other technology content in FAA future planning documents, is no longer correct. A good way to start the correction is to abandon the term "Transition to Sat Nav." The future will feature a mix of basic GPS on all aircraft, a limited use of WAAS on GA aircraft, and most of the existing terrestrial CNS/ATM systems. This combination gives us ultra-high accuracy, safe redundancy, and all the performance we need for airspace redesign. We are not going to transition to Sat Nav.

IV. AFFORDABILITY

Most of the air carriers have told FAA that they will not purchase any new avionics (and precious few new aircraft) because they are broke. This is indisputably true.

Advocates for new technology have adopted this as an explanation for the airlines' failure to equip with the new gear. But this is misleading. Broke or solvent, users must decide that new equipment gives a benefit exceeding the cost. If the business case cannot be made (as in "value analysis") it won't be purchased by the users and should not be installed by FAA. This is especially true if most existing FMSs meet all the accuracy requirements for RNP, as is the case.

V. HUMAN FACTORS

Finally, human factors. Personally I hate the term because it is so abstract and bloodless. It distracts from a critical people problem.

The end state of the new technology is a fundamental change in the roles of pilots and controllers – which I find unsettling.

Modern glass cockpits now give pilots a splendid moving map display of ATC charts, terrain, and weather. Adoption of CDTI can place other nearby aircraft in the picture as well. This basically puts a small replica of the controller's screen in front of the crew. But what is the purpose?

It is clear to me that the end goal is to transfer some, and perhaps all, responsibility for routing and separation from the controllers to the pilots. FAA leaders recently said that new avionics would put more and more responsibility for flying and control in boxes in the aircraft. This disturbs me.

As a pilot, I know how much concentration and skill is required to fly an airplane safely. And I have watched controllers in centers and tracons riveted to their screens as they sort out the streams of various types of aircraft. Can we safely add separation to the pilot's duties? And can controllers maintain concentration and intervene instantly while just watching traffic?

I am very doubtful that this shift of responsibility is good for pilots or controllers, not to mention passengers. And I know that both pilots and controllers have expressed reservations about this trend. But the voices have been muted. Perhaps these concerns should be restated.