

# GPS

## ... Planning For The Future

A very unusual and unprecedented meeting took place in Washington, DC on January 13. An industry/government task force was convened to explore the issue of air traffic management for the 21st century. Heading the group was retired Lt. Gen. James A. Abrahamson (USAF) formerly head of the government's SDI or Star Wars program and now a vice president of Hughes Aircraft. Requested by FAA, and held under the banner of RTCA (Requirements and Technical Concepts for Aviation), a Washington based, not-for-profit organization, the group is seeking to develop a consensus among government, industry and users for a transition to a Satellite based navigation and Air Traffic "Management" system. You will note the word management has replaced control. Does this mean the FAA might be giving up some control of the skies? Well, that remains to be seen, but they certainly are looking for a way out of the box they find themselves in with the present system.

The new system would utilize satellite-derived navigation information and satellite data link to determine aircraft position, heading, speed and altitude. This would replace radar and allow surveillance of aircraft in areas of the world where radar can never reach, such as the middle of the Pacific Ocean or over Siberia.

The immediate, near term benefit of such a system would allow closer spacing and greater route flexibility on long overwater flights. The present system requires 20 minute spacing between aircraft at the same altitude. Also, there is always the possibility of not being able to obtain the optimum altitudes enroute for maximum fuel economy and thereby depleting fuel reserves. This, combined with unforeseen wind conditions, may result in an extra stop for fuel, which is very costly for the airlines.

This high cost is the prime motivation for the airlines' desire to move quickly into such a system. By establishing a "pseudo Radar", or aircraft situation display, overwater aircraft can be tracked and can thus more easily obtain alternate routing and optimum altitudes and

By DON TAYLOR

EAA 48114

48W280 Chandelle Dr.  
Hampshire, IL 60140-8335

thereby save the airlines lots of money.

While this system is primarily for the airlines or the occasional corporate user, it may also bring some interesting side benefits to those of us who fly general/sport aviation aircraft for fun.

The nice thing about the navigation portion of a satellite based system is that it cannot be user saturated. Only a finite number of aircraft can receive DME information from a given transmitter. Once it is saturated, no one else can get DME distance. Not so with a satellite signal. any number can play. Just like turning on your radio or TV, the signal is there for you to use. If you can tune in a satellite (or preferably 2 or 3 or more), you can use the signals to fix your position through triangulation, just like plotting it with 3 bearings on a map. With more satellites available, you can obtain accurate information not only where you are but your altitude as well.

The task force is looking for satellite navigation accuracy of 100 meters with 95% probability as an initial standard. Why these numbers? Because they represent over 40 years of experience by the FAA with NDB, VOR and other non-precision approaches to minimums of 250 feet and 3/4 mile visibility. In other words, this would equal or better what we are using now, and could be done totally by satellite, thus eliminating a lot of VORs, NDBs, etc. - and that is exactly what is planned. That will save the FAA a lot of money and they like that as much as the airlines do.

Satellite navigation will enable you to find the end of any runway, anywhere in the world in marginal weather without the need for any ground based equipment. That's pretty exciting, and it's coming sooner than you think. Satellite navigation is already on board many boats and in the cockpit of a lot of aircraft. Rapidly developing technology and multiple use is driving down prices, just as occurred with Loran C. Portable Sat Nav receivers are now available at under \$1,300. Trucking companies can track their trucks and a

hiker can carry one to the top of a mountain in his backpack. Auto manufacturers are working on moving map displays, like those in "glass cockpit" aircraft, and this should enable us to have low cost units available soon for the sport aircraft cockpit.

But wait, there's more. The next step is to use data link (and later voice) to communicate via satellite. Here we must use satellite transponder frequencies and this will bring (ultimately) frequency congestion. Aircraft users will have priority, but they will have to share the services with marine and land based users. Use of data link, combined with the proper onboard equipment, allows an aircraft to provide all kinds of information to a ground facility - and an airline can allow passengers to use the system for phone and FAX messages to help pay for the system. The National Weather service can read out high altitude winds and temperatures, which will enable more accurate weather forecasting.

Air Traffic Management will be able to determine the altitude, airspeed, heading, vertical velocity, mach number, track or anything else they need to know from a properly equipped aircraft. Ultimately, this information could also be obtained by other similarly equipped aircraft. When nearby aircraft traffic is displayed on the moving map display, it could be used for collision avoidance as well as traffic flow and separation or sequencing. So, does this mean we don't need air traffic controllers any more? Well, their role will certainly change. The current thinking among the task force is that most communication would be by data link, instead of voice. Picture this scenario aboard a Hong Kong bound 747 over the North Pacific: "Hey, Orville, see if we can get Flight Level 370 - there's nobody at that altitude within 500 miles of where we are." "Right, Wilbur, our screen is clear at that altitude, I'll just punch in the request to Tokyo Center" . . . "Whoops, here comes the reply. There's a conflict with east bound traffic at 370 1,500 miles ahead of us, but we're cleared to 370 as soon as we're established on a track 10 miles south of our current one. Boy, this data link system is really neat, isn't it?" So the airline crew



is happy and airline management is happy and the FAA is happy, but what about us general aviation guys? If we equip our aircraft with data link to supplement the satellite navigation, will we have free access to the Instrument Flight Rules system of the future or will we only be providing FAA a means of policing where we fly? A fairly unsophisticated data link system could provide a simple warning (a flashing light - a bell?) of conflicting, similarly equipped traffic. This is certainly desirable, but it won't work if the FAA becomes a traffic policeman and uses the system for writing traffic tickets.

A satellite based system should provide all pilots with greater enroute flexibility and allow access to airspace that is now essentially closed to many aircraft - if it is properly designed and implemented. And that is really the key. How will the system be used?

Our current FAA air traffic control managers are on record as favoring this new system and they have pledged their full cooperation. This may be more understandable if you consider the present system. Visualize a segment of airspace above you that contains ten 747s spread out over several hundred miles. Now reduce that to a radar display about half the size of your desk. The uncrowded sky immediately becomes a crowded radar screen. In addition, you have reduced 3 dimensional airspace to 2 dimen-

sions, so now you must attach an altitude block to each of the aircraft displays. Now, we will begin to control the heading, airspeed and altitude of all ten of these aircraft with a party line communication system. Is this any way to fly airplanes? Of course not. There is a better way. We must allow the pilot to see the other aircraft through an on-board display and let him go back to flying the aircraft. Air traffic management can monitor and assist in resolution of conflicts, using voice only when necessary. The satellite based navigation and airspace management system proposed offers an opportunity to redefine the role of air traffic management. We must go back to the basics that brought us the present system, the need to prevent two aircraft from running together when they are unable to see each other. This is the basic requirement . . . micro-management of routes, altitudes and airspeeds by a ground based entity is not required.

So, as we peer into the future, we see Harold Homebuilder preparing for a flight from Hometown Airpatch to Podunk Municipal Airport with a Sat Nav approach at Podunk. Harold entered the route on his computer the night before and as soon as he gets in the aircraft, he inserts the card into his Sat Nav unit and punches the button that sends it to ATM (Air Traffic Management) and waits for the green

light. While he's waiting, he dials in the latest enroute and destination weather. Looks good. Stratus enroute with 600-800 foot ceilings and a little light rain. Podunk is reporting 500 feet and 2 miles and it's forecast to stay that way. The winds aloft display shows a 10-15 knot headwind at his planned altitude (naturally). In a few minutes, he receives the green light. He taxis onto the runway, takes off, flies to Podunk, makes the approach and lands. Will it be that simple? It should be. We think it can be close to that simple. We want to be sure that this is the way we're headed and not toward more control. The task force will be meeting most of this year - the final report to FAA is not due until around October - and, remember, it will merely be an advisory, a recommendation. FAA will not be bound by law to accept it. They may reject it or ignore it or only implement the parts they like. However, once the Genie is out of the bottle, it may be difficult for them to put it back.

Pressure from the user community will be strong for acceptance if the plan is a good one. Your ideas are needed. Public participation is encouraged. You're invited to help. Communicate with us here at EAA, Att: Technical Services, or write your opinions directly to the FAA, Att: Martin T. Pozesky, Associate Administrator for System Engineering, 800 Independence Ave., SW, Washington, DC 20591. ♦

## **AWARD TO MOLT TAYLOR**

The FAA's Seattle flight Standards District Office recently honored Molt Taylor as the 1991 Maintenance Technician of the Year . . . and presented him with this trophy. The award was for Molt's long career of aircraft design, during which he put great emphasis on the maintainability of his airplanes.

