Loran Lines

The newsletter of the *International Loran Association*; the international **loran** radionavigation Forum. (Formerly the Wild Goose Association's newsletter, *The Goose Gazette*)

Volume 96-3 - News of the Summer, 1996

President's Message

As I prepare to prepare to hand the reins of the ILA over to our next President, Capt. Bill Brogdon, USCG, retired, I would like to take a quick look back on the events of the past three years. Within a few weeks of the day I took office as President of the Wild Goose Association in late 1993, the U.S. Coast Guard announced a plan to take the funding of Loran-C out of its budget, possibly as early as 1996.

Loran users and members of our association found it difficult to understand why the Federal Government would terminate the navigation system with the largest user base in the world (about 1.3 million) on such short notice. Soon, virtually all of the aviation and user organizations were joined by many thousands of users in an outcry to keep Loran in service for at least a 10 to 15 year phase-out period. This phase-out period had been promised in all of the previous versions of the U.S. Federal Radionavigation Plan.

During this time period, Loran and its Russian equivalent, Chayka, have been improved and expanded in Europe, Russia, and the Far East, as a result of international cooperative consortiums such as the Northwest European Loran System (NELS) and the Far East Radionavigation Service (FERNS). Other nations are considering Loran as a low cost component of their navigation infrastructure.

In the passing of time, it has become clear that the decision to take the domestic U.S. Loran system out of service was a political decision that made no technical sense at all. In 1995 a plan was announced to phase out Loran by the turn of the century. Space based positioning systems, with all of their promise for the future, were not mature then and are not mature now. Even when satellite positioning becomes a worldwide standard, and I am sure it will, it makes good sense to offer a mix of systems that have no common limitations. These systems should serve as partners offering maximum safety, so no single failure can leave a user without service.

After a year-long process on Capitol Hill, the House and Senate have now agreed on legislation to assure a meaningful transition plan for Loran-C. This legislation requires the Department of Transportation to prepare a plan in consultation with users to define the future use and funding for Loran. The legislation requires the assurance of a useful economic life for Loran equipment purchased before the turn of the century.

It has been a busy three years for the International Loran Association, and I want to take this opportunity to thank all of our members for your support in the very important work that we have been engaged in. I also want to give special thanks to Dr. Bob Lilley, our Past President, for the endless hours he has spent on behalf of the Loran user community and the ILA. A special thank you to all of the Directors of the Association who have served over the past three years and contributed so much time and effort to carry on the work at hand.

I also want to recognize the leadership of the Aircraft Owners and Pilots Association, BoatUS, the Experimental Aircraft Association, the National Association of State Aviation Officials, the National Business Aircraft Association, and others who have given strong support for keeping the domestic U.S. Loran system in service.

This year we will hold the Association's 25th Annual Convention and Technical Symposium in San Diego, California, on November 3-7. We are working hard to assemble all of the people who have been involved in Loran-C development and operation since its beginning more than a quarter century ago. I hope you will join us for the celebration.

Dale E. Johnson, President

Congress Requires Report Defining Future Use of Loran

The Coast Guard Authorization Legislation for fiscal year 1997 was signed on 30 September 1996. It includes the following language:

"Sec. 308. REPORT ON LORAN-C REQUIREMENTS

"Not later than 6 months after the date of enactment of this Act, the Secretary of Transportation, in cooperation with the Secretary of Commerce, shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a plan prepared in consultation with the users of the LORAN-C radionavigation system defining the future use of and funding for operations, maintenance, and upgrades of the LORAN-C radionavigation system. The plan shall provide for--

"(1) mechanisms to make full use of compatible satellite and LORAN-C technology by all modes of transportation, the telecommunications industry, and the National Weather Service.

"(2) an appropriate timetable for transition from ground-based radionavigation technology after it is determined that satellite-based technology is available as a sole means of safe and efficient navigation taking into consideration the need to ensure that LORAN-C technology purchased by the public before the year 2000 has a useful economic life; and

"(3) agencies in the Department of Transportation and other relevant Federal agencies to share the Federal government's costs related to LORAN-C technology."

Congress also has directed the DOT to upgrade Loran and has provided significant funding for the purpose. See page 3.

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Formerly The Goose Gazette

Loran Lines is an official publication of the International Loran Association (ILA). This newsletter is published quarterly, with cutoff dates of 1 February for the Winter issue, 1 May for the Spring issue, 1 August for the Summer issue and 1 November for the Fall issue.

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Articles for Loran Lines

We welcome articles from our members. Every issue the editor is scratching together articles from news clippings, papers, and lengthy letters. Send us short summaries of your work and we'll try not to mess it up in our editing. Short articles 20 to 25 lines long are excellent.

Type text in any standard word processing format, and tell us which word processor you use. It's a good idea to include an ASCII file, too. Send the article by e-mail to the editor, or send an IBM compatible disk, either size. If you use a MacIntosh, save the file in a Rich Text Format (xxxxx.RTF).

Leave ONE space between each period and the next sentence. Don't hyphenate; the desktop publishing program does that.

A full column is 50-51 lines, 40 characters wide, depending on the headline. It's a good idea to leave blank lines between paragraphs in a full column to keep it from looking so grey.

Do send photos and illustrations; we can print them easily. A half page size works well (about 7¼" wide by 4" high).

We would like to have letters to the editor, providing that they are short. We can print letters across two columns, 76 characters wide.

We also can print summaries of technical papers, when space is available.

Copyright Information

We'd like to know when you use *Loran Lines* articles or quote them in other publications; it helps us to serve your needs. When you quote or copy, please send a clipping to the ILA Secretary at the Operations Office or to the Editor. Thank you. -ED

ILA Charter

"The International Loran Association is formed to provide an organization for individuals who have a common interest in Loran and who wish to foster and preserve the art of Loran, to promote the exchange of ideas and information in the field of Loran, to recognize the advances and contributions to Loran, to document the history of Loran, and to commemorate fittingly the memory of fellow members.

"The Association was originally named after the majestic bird that navigates thousands of miles with unerring accuracy. Its membership represents many interests including those of planners, promoters, designers and users of loran equipment throughout the world."

Membership

Any individual or organization with an interest in loran is eligible for membership. There are several classes of membership:

Individual

Annual membership is $25.00, with an initiation fee of $5.00 for the first year. Life membership is $250.00.

Members in countries other than the U. S., Canada and Mexico are assessed an additional $10.00 per year to defray international mailing costs.

Organizational

Corporate Class 1 and 2 memberships provide options for organizations that wish to be involved directly in ILA activities. Class 1 permits nomination of ten regular members from the corporate member; Class 2 permits five. Dues for Class 1 are $400.00, or $500.00 for overseas corporations. For Class 2, dues are $200.00 and $250.00.

Associate membership is provided for organizations which desire only to receive ILA publications. Associate membership is $120.00 per year, with a $5.00 initiation fee. Associate membership does not carry the privilege of voting or holding ILA office.

Payment for all ILA matters may be by check, Visa, or Mastercard.

Satellite Availability First Half of 1996

The Air Force provides this information to the U.S. Coast Guard NAVCEN. It is available on the NAVCEN bulletin board at 703 313-5910, or INTERNET http:/www.navcen.uscg.mil/

	outage hours	satellite availability
Jan 1996	120.05	.9933
Feb	396.80	.9762
Mar	52.97	.997
Apr	156.40	.9913
May	553.35	.9703
June	770.60	.9572
six months	2050.17	98.044%

This is the average GPS satellite availability, comparable to one loran transmitting station's percentage of usable time (typically 99.9%) It does not state GPS system availability, which the Air Force calls Service Availablity and estimates to be 99.72% on a global average or 98.85% on a single point average basis.

We have compiled a list of usable time, based on performance or estimates:

Availabilities:

GPS	99.72 % planned
Loran-C	99.7 %
DGPS	98.7 to 99.4 % est.
GPS/WAAS	99.4 to 99.6 % est.
GPS/Loran	99.9992 %

It is increasingly obvious that the satellite system alone falls short of meeting the requirements of safe navigation.

NAVSAC Recommends Keeping Loran-C On-Air.

At its meeting in San Francisco, California, 27-29 April 1996, the Navigational Safety Advisory Council passed the following resolution [96-10]

"NAVSAC concurs with the Coast Guard plan to contiue the Loran-C service through the year 2000 for maritime use and that the resolution be forwarded to the Department of Transportation's Policy and Planning Office, which is coordinating the development of the 1996 Federal Radionavigation Plan. NAVSAC recommends that the Federal Government revise the Federal Radionavigation Plan to include Loran-C or its equivalent until such time that GPS is determined to be 100% fail-safe."

Congress Adds Money for LORAN Improvements

The House-Senate conference agreement on H.R. 3675 included $4.65 million in Loran funding to implement aviation blink and begin work on Loran upgrades. This language was included in the bill now signed into law. This is another encoraging sign that Congress considers Loran necessary to ensure a safe and cost-effective navigation systems mix. ILA has long worked to support these navigation requirements.

ILA 1996 Election Results

William J. Brogdon, Jr. was elected President of ILA for 1997! John Beukers, Ed McGann, Mike Moroney and Robert Wenzel were elected to the Board of Directors for three-year terms. Bill Polhemus was elected for a one-year term, filling the slot vacated by Bill Brogdon's becoming President.

For 1997, the complete Board of Elected Directors is:

President: Bill Brogdon

Past President: Dale Johnson

Board of Directors:

Jim Alexander
John Beukers
Walt Dean
David Last
Bob Lilley
Ed McGann
Mike Moroney
Dave Olsen
Bill Polhemus
Bill Roland
Durk van Willigen
Bob Wenzel

The incoming President can appoint three Directors.

Many thanks to the highly qualified people who have offered to serve the ILA in various capacities. Your continued support is vital to our organization.

International Loran Association
Silver Anniversary Convention and Technical Symposium
at the
Catamaran Resort Hotel, San Diego, California, U.S.A.
November 3-7, 1996

GPS RAIM Availability for Non-Precision Approach

Jay Weitzen, James V. Carroll, and H. James Rome have published a paper in *Navigation*, the Journal of the Institute of Navigation, giving the availability of GPS Receiver Autonomous Integrity Monitoring (RAIM). A receiver using RAIM compares fixes from different combinations of more than the four required satellites, much as a ship navigator shoots more than two visual bearings or a celestial navigator shoots more than two stars.

In a quite similar way, a GPS receiver needs at least five satellites for fault detection, and six to determine which satellite is in error. Fault detection indicates that the fix is unusable, while fault detection and exclusion (FDE) or fault detection and identification (FDI) allows the receiver to reject the bad satellite to produce an acceptable fix.

The Wide Area Augmentation System is designed to identify and exclude satellites with unacceptable errors, but will be an external system dependent on additional satellites. Today many planes are flying with receivers dependent on RAIM to determine when the GPS constellation is suffering from unannounced errors.

Adding input from a barometric altimeter or a Loran-C receiver improves the RAIM availability dramatically.

For Fault Detection and Exclusion (to achieve a usable fix), a GPS receiver with a 5 degree antenna mask angle gives the following RAIM availability:

# of satellites	24	23
GPS	46.2%	31.4
GPS + baro alt	80.6	64.5
GPS + Loran-C	97.9	93.7
GPS + baro + LC	99.62	98.9

For Fault Detection (to determine that the system is unreliable), a GPS receiver with a 5 degree antenna mask angle gives the following RAIM availability:

# of satellites	24	23	22
GPS	99.3%	87.4	77.9
GPS + baro alt	99.79	98.7	90.0
GPS + Loran-C	99.98	99.51	98.8
GPS +baro+LC	99.9995	99.797	99.86

This account is abbreviated. Please refer to the article in Spring 1996 *Navigation* for full information.

Navigation Authorities: Use Dual Systems

Wherever we search, we find that authorotative sources agree remarkably well with the requirement to use dual and independent sources of position informanion. Here are some typical examples:

Bowditch, 1995:

page 1: "In practice, a navigator synthesizes different methodologies into a single integrated system. He should never feel comfortable utilizing only one method when others are available..."

page 373: "Use all available fix information. With the advent of accurate satellite navigation systems, it is especially tempting to disregard this maxim. However, the experienced navigator never feels comfortable relying solely on one particular system. Supplement the satellite position with positions from Loran, celestial sights, radar lines of position, and visual observations. Evaluate the accuracy of the various fix methods against the satellite position...

"Use an inertial navigator if one is available. The inertial navigator may produce estimated positions more accurate than fix positions.

"Always check a position determined by a fix, inertial navigator, or DR by comparing the charted sounding with the fathometer reading. If the soundings do not correlate, investigate the discrepancy."

Magellan:

"This product (GPS NAV DLX-10 receiver) is an excellent navigation aid, but it does not replace the need for careful orienteering and good judgment. Never rely solely on one device for navigating."

Lloyd's Register of Shipping:

"Accurate and reliable positioning and heading input are critical for such a system (IBS) and the rules cater for this in the following ways. Two gyro compasses, either of which can be selected as the primary source of heading information by the navigator, are required. The non-selected compass is automatically used as the reference to an off-course monitoring system, completely independent of the steering system, and the headings from the two gyros are continually cross-checked. With respect to position fixing the required GPS gives an accuracy of 100 meters which is considered sufficiently accurate while at sea. In coastal waters the system is to have the capability to receive and utilize differential corrections, where these are available, and should also be able to estimate a position by dead reckoning based upon speed over the ground provided by the ship's log. It is also a basic requirement for NAV1 notation that a LORAN-C receiver be fitted on the vessel to enable cross-checking of the GPS position."

Visit the ILA Internet Home Page

ILA has its own internet home page; it has been updated and this work is continuing, thanks to Bob Lilley and a student. The link to "meetings" provides details of the ILA Convention. Note that links to this page are being introduced at other sites. Its URL is:

Http://www.ent.ohiou.edu/avn/Loran

John Beukers maintains an FTP site at FTP://iu.net A full listing of papers, names and contact information for the upcoming convention is available at:

FTP://iu.net/pub/jb/lilley with the file name ILApaper.doc

This is a WORD7 document in tableform and can be downloaded directly into WORD6 or WORD7 with formatting retained. Check other files in this and other subdirectories for the latest on Loran and other radionavigation subjects.

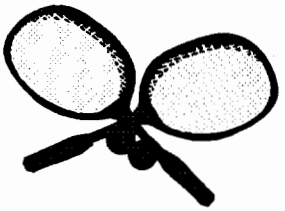
Keep the meeting in mind!

OUR BANQUET SPEAKER IS
...OUR VERY OWN DAVID LAST!

OF COURSE, THERE'S THE SERIOUS SIDE. THE NAVIGATION COMMUNITY FACES THE CHALLENGES WHICH COME WITH CHANGE, AND YOUR ASSOCIATION NOW EMPHASIZES MORE THAN EVER ITS ADVOCACY OF A MULTIPLE-SYSTEM FUTURE, TO INSURE SAFETY AND AVAILABILITY FOR THE NAVIGATOR.

BUT...

IT'S ALSO THE SILVER ANNIVERSARY CONVENTION AND TECHNICAL SYMPOSIUM, AND WE HAVE 25 YEARS OF HISTORY TO CELEBRATE AND THE ENTIRE FUTURE TO CONTEMPLATE!



TUESDAY EVENING:
CHECK WITH
JOYCE MALKMES

TUESDAY AFTERNOON:
CHECK WITH
JIM CULBERTSON

AFTER THE BANQUET ON
WEDNESDAY EVENING.
LIVE MUSIC!

Got the picture? See you in San Diego!

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E-MAIL: OCENTER1@OHIOU.EDU
HOME PAGE http://www.ent.ohiou.edu/avn/Loran

International Loran Association
Silver Anniversary Convention and Technical Symposium
San Diego, California, November 3-7, 1996
At the Catamran Resort Hotel

General Information

Theme: From Silver to Gold: 25 Years of Support - Past and Future

Program: Focused on Loran-C new deveopments, service providers and users, and the international commitment to the future use of Loran-C in a terrestrial and satellite mix of radionavigation systems. Golf, tennis, local activities, receptions, a banquet and evening hospitality round out the convention events.

Plenary and Keynote Address
International Radionavigation Plans and Policies
Issues Arising from U.S. Radionavigation Policy
History and Future of Loran
New Developments in Receiver and Antenna Technology
Propagation, Natural Disruptions and Interference
Providing and Using Worldwide Loran-C Services
Complementary Systems and System Mix for the 21st. Century.

A Background Essay: For the Silver Anniversary of the Wild Goose Association, Renamed the International Loran Association in 1994

Why this is a Conference that should not be missed.

The Wild Goose Association (WGA) was organized at a meeting held at the United States Coast Guard Officer's Club on Governors Island, New York on May 16, 1972. Its formation resulted from an initiative by Lloyd Higginbotham of the Air Force Loran Program Office to give the Loran community a focal point to recognize the work of individuals in the field of Loran. Following the formalities of setting up the Association, the first Technical Symposium was held in Boston, Massachusetts during October of the same year. Now, 25 years later and with a name change to reflect the worldwide use of Loran-C, the International Loran Association is celebrating its Silver Anniversary.

Shortly after its inception, and wholly unanticipated, the members of the WGA were to find out that their Association was not just an organization for socializing and back-slapping but had serious work to do. Loran-C was put forward as a candidate along with Decca, Omega and other systems to satisfy the United States Coast Guard's requirements for navigation in the Coastal Confluence Zone (CCZ). Bringing a system used solely by the Department of Defense into civil use and in competition with other systems was an immense challenge. The debate raged for more than a year and resulted in 383 pages of Congressional testimony, much of which was contributed by WGA members, and is now entombed in the Coast Guard Authorization Bill for fiscal year 1975. The result, as we well know, was a signature by the Secretary of Transportation in 1974 declaring that Loran-C

was the system of choice and would be installed to serve the maritime community throughout the United States CCZ.

Thinking that their task in Washington was done, the Association members turned their energies to endorsing the Secretary's decision by helping to generate a Loran-C industry and providing support and encouragement to the Coast Guard. But no sooner had the ink dried on the Secretary's signature than the General Accounting Office (GAO) in reports to Congress were calling for the termination of all Loran-C development and for phasing out the system, replacing it with the Global Positioning System (GPS). Had Congress taken the GAO's advice then there would have been no Loran-C at a time when there was no GPS either since GPS was not declared operational for another 10 years!

For 25 years the Association has enjoyed a cooperative and mutually beneficial relationship with the Department of Transportation, in particular the many individuals who have seen loran service in the Coast Guard and more recently in the Federal Aviation Administration.. But once again members of the Association find themselves in Washington assisting in resolving national radionavigation policy issues that affect public safety national security, and the public's interest.

Today satellite technology, in the form of GPS and GLONASS, is an operational reality to be joined with GNSS in the future. Not only does the Association recognize this but endorses and is totally supportive of the use of satellites for positioning and time dissemination as defined in its formally adopted Radionavigation Policy document. In this respect the Association's views are consistent with those of the current Administration and the Department of Transportation. It is with the next step, namely to rely upon GPS alone for all positioning and timing requirements and calling for the phase-out of all terrestrial systems of the nation, with which the Association and users have difficulty. They are opposed to the ideology, take issue with the proposed termination dates, and are concerned with the lack of rigorous transition planning.

Matters are strikingly different internationally. Loran-C is being incorporated as a complementary system to satellite systems and is destined to become one component of the system mix well into the next century.

On this, our Silver Anniversary, we look back over 25 years of cooperative service with the U.S. Government and the public, and we look forward to the next 25 years of similar cooperation internationally, in which it is our objective to ensure that the United States is a leading participant. While the Conference will look back at past accomplishments of the Association and its members it will emphasize new Loran-C technology as it complements the use of satellites for positioning and timing.

It is important that you, member or non member, attend to pay tribute to those that have contributed to Loran-C and to support the work of our Association in its important on-going international role.

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http://www.ent.ohiou.edu/avn/Loran

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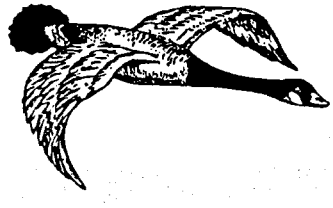

REGISTRATION FORM
INTERNATIONAL LORAN ASSOCIATION
25TH ANNUAL CONVENTION AND TECHNICAL SYMPOSIUM
From Silver to Gold
25 Years of Support -- Past and Future
NOVEMBER 3-7, 1996
SAN DIEGO, CALIFORNIA
AT THE CATAMARAN RESORT HOTEL

INTERNATIONAL LORAN ASSOCIATION
OPERATIONS CENTER
150 S. PLAINS ROAD
THE PLAINS, OHIO 45780-1315

RETURN THIS FORM BY MAIL OR BY FAX: (614) 797-2081, WITH PAYMENT OR CREDIT CARD DATA

Name_____ Member _____ Yes _____ No
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Address _____
City_____ State/Province _____
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Facsimile _____ e-mail _____
Spouse/Guest Name _____

1. **Complete Symposium Registration** (includes all technical sessions, luncheons, banquet, proceedings, icebreaker reception, coffee breaks, reception and evening hospitality)

Registration ..... $425 _____
Please indicate banquet choice: _____ Prime Rib _____ Broiled Fresh Salmon

2. **Spouse/Guest Registration** (includes icebreaker reception, banquet and reception)

Registration ..... Number of guests ____ x $75.00 = _____
Extra luncheon ticket ..... Number of guests ____ x $25.00 = _____
Extra banquet ticket: prime rib ____ salmon ____ Number of guests ____ x $45.00 = _____

3. **Proceedings** (included in full meeting registration)

Members ..... Number of copies ____ x $55.00 = _____
Non-Members ..... Number of copies ____ x $70.00 = _____

Total ..... USD _____

Payment: _____ Check enclosed (US dollars) _____ VISA/Mastercard

Card/Account # _____ Expiration Date ____/____ Signature_____

Notes: U. S. Citizens should remember to **vote** by absentee ballot; election day is November 5!

For **accommodations**, contact the **Catamaran Resort Hotel** directly at (619) 488-1081 or (800) 288-0770 or by fax at (619) 488-1387 and ask for the ILA Symposium rate of $95.00 single or double. To get the ILA rate, call by October 6. Rates are good three days before or after the November 3-7 Symposium dates, if you extend your stay!

Spouses/Guests Coffee Hour: A spouses/guests coffee hour will be held on Monday. November 4, at 9:30 AM in the Hospitality Suite. The hotel concierge will present information on local attractions and activities, costs and transportation available in the San Diego area. The coffee hour provides meeting and re-acquaintance opportunities for everyone!

Cancellation/Refund policy: All cancellations or substitutions must be received in writing. Fees for written cancellations received on or prior to October 12, 1996 are fully refundable. Cancellations received between October 12 and October 19 are refundable less a $50 cancellation fee. The fee is to cover obligations incurred by the ILA in making symposium arrangements, and does not entitle the registrant to any symposium materials. Refunds will not be given for "no shows" or for cancellations received after October 19; however, full attendee substitutions for persons paid can be made through November 3 at on-site registration.

Omega Shutdown Ramifications

By John Beukers

A remarkable memorandum dated July 12, 1996 from the Federal Coordinator for Meteorological Services, Julian Wright, to the Assistant Secretary for Transportation Policy, Frank Kruesi, relating to the termination of the Omega Radionavigation System, draws the conclusion that the meteorological community no longer has need for the Omega System. Surprised by this conclusion, a check with the international meteorological community revealed that the content of the memorandum, while perhaps applicable to the United States, certainly did not reflect the dependency of the World Weather Watch on the Omega System particularly in the southern hemisphere. It is the belief of the writer that the POS/NAV Committee, which is apparently responsible for setting radionavigation policy, has been misled and should be provided with the facts rather than information to satisfy an already established policy.

The meteorological community has been criticized for not making a clear case for a requirement to continue operation of Omega and for not "stepping up" with funding. In fact the need for continued Omega operation was identified in written and verbal communications to the DOT during the Federal Radionavigation Plan (FRP) conferences for the 1994 and 1996 editions of the FRP. In addition, the writer provided a detailed statement of Omega worldwide use by the World Weather Watch, and the World Meteorological Organization submitted a collaborating statement. As to funding, the meteorological community provides a service to agriculture, aviation, the general public, etc., and it is the user that benefits. Why should the service provider pay? Using the same logic, why should the United States pick up the $5 million share of the $8 million annual bill for Omega? But we have to be careful that we analyze the benefits based upon facts and not wishful thinking.

It is interesting to note the change in policy of the United States at the Geneva conference held this summer on Global Warming. At the Rio de Janeiro meeting four years ago the United States did not want to have anything to do with signing up to restricting emissions because of the strong fossil fuel lobby. Now there is recognition of the economic impact of global warming on agriculture and low-lying ground. Even the insurance industry was represented at the Geneva Conference recognizing the impact of severe weather and a rise in ocean levels. Now is NOT the time to disturb or dilute our ability to provide accurate forecasts, model the atmosphere, or disrupt the continuity of historic records upon which the extremely small values of change determine a trend. We are addressing tens of billions of dollars of impact.

The writer's association with the weather discipline led to a recognition of the painstaking work that went into creating the World Weather Watch and the extreme care that is required in the development of meteorological probes (radiosondes) to provide an acceptable, certified, precision instrument *at rock bottom price*. This experience also brought home the lessons of economics and schedules for equipping the world with an upper air capability on very limited funds.

The writer was one of a handful of people responsible for providing Omega weather equipment to third world countries for upper air soundings, and it is a matter of record that those stations using Omega today will reduce data output or go off the air unless funding becomes available to supply these stations with replacement equipment, free-of-charge and the funds to subsidize radiosonde purchases if new designs are more expensive. It must be remembered that many of these stations were provided by governments on aid programs or were established using equipment that became available after global weather experiments conducted in the 1970-80's.

Unfortunately we are caught up in politically motivated decisions that are based upon information provided by those that are not willing to pay rather than a rigorous and independent analysis of the requirements. Our only hope is to make those in authority aware of the impact of their actions on the World Weather Watch performance. Perhaps this has been done, but, if the Federal Coordinator's memorandum is an example of the communications, then obviously the wrong message is being sent. As a result we all lose.

The justification for Omega termination is that GPS-based equipment is a viable alternative for upper-air wind determination and that these systems can be substituted. GPS radiosondes and ground processing equipment have been developed and demonstrated by at least three manufacturers with promising results. VIZ Mfg. Co., AIR Corp., and Vaisala, Oy have such systems, but at the present time there is not a single manufacturer that can provide GPS production equipment and radiosondes at an acceptable price and in less than a year to those stations that will have to be re-equipped. This was confirmed at the recent International Navigation Association's meeting in Helsinki, Finland in August of this year which was attended by the two leading manufacturers of radiosondes. These manufacturers indicated that it will be 1-2 years before production equipment and sondes become available to support a transition that will take at least a further year or two. (It must be appreciated that radiosonde design is extremely difficult because of the required precision of the instrument that must be achieved at very low cost followed by extensive international flight comparison trials.)

At present the distribution of operating Omega equipment supplying data to the World Weather Watch is as follows:

Africa - 80%; South America - 50%; Europe - 30%; North America - (Caribbean and Mexico mostly) - 20%; Pacific and Asia - 25%. Overall, Omega is used in 30% of the world's upper-air network.

It will NOT be possible to re-equip these station with GPS equipment by September 1997, even if there were money to do so. The time from appropriation of funds to declaring a station operationally acceptable for data transmission (cont.)

Omega Shutdown Ramifications

(continued from page 9) By John Beukers

is 2-5 years and that is if the equipment and sondes are available. (Note that there is an interim scramble to reprogram equipment to use the Navy VLF communication stations, the Russian Alpha system and any other frequency/phase stable VLF transmitter sources that can be found around the world. While this may be a partial solution, it has its drawbacks in that some of these stations cannot be relied upon to be transmitting during the fixed synoptic hours of 0600, 1200, 1800 and 2400.)

The study that led to the Federal Coordinator's memorandum makes reference to a reduction in accuracy of ½ meter per second in wind determination with the loss of Omega. This is deceiving. If Omega is the only system used to determine winds, as much of the equipment in the field is designed to do, then loss of Omega means a total loss of wind data.

The loss of Omega will also impact national and allied military forces. For example, the writer was responsible for supplying South Korean military forces with Omega equipment that is operational on the DMZ for determining meteorological conditions for artillery ballistic corrections. In addition, the United States Forward Field Army took decades to take delivery of Loran-C/Omega/VLF systems for determining winds for ballistic corrections. A GPS solution for these users is economically justifiable; however, having been involved in the development of the original equipment, it would be remarkable if these forces and other military organizations can re-equip by September of 1997. Omega was used extensively in Bosnia during the height of the conflict in that region by more than one nation.

There are other uses of Omega of which we hear little. Earthquake prediction, tracking mammals and life in the ocean, tracking and positioning in places that have no clear access to the sky - on land and under ice, for example.

None of this is to say that we should not move forward and accept new technologies as they become available, but what is not being recognized is the time and cost for making the transition. Omega is an international system. The comment in the Federal Coordinator's memorandum that because the United States has determined that it has no more use for the system "the international meteorological communities will be directed at finding alternative wind-finding solutions to Omega, such as the Global Positioning System" suggests that there is a lack of sensitivity and understanding of the problem.

Shouldn't we make sure that replacement technologies are up and running BEFORE turning off what exists? What do we do if GPS becomes unavailable?

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NAS Architecture

The NAS Architecture Newsletter from last summer contains the following paragraph:

Quote "As an example, one issue relates to the 'need' for the FAA to certify one navigation system as the 'sole' means for navigation to allow decomissioning of older navigation aids (NAVAIDS). It may be necessary to allow a recent acquisition (augmented Global Positioning System (GPS), also known as the Wide Area Augmentation System (WAAS)) to be implemented and have its operational benefits proven before such a decision can be made. In addition to conducting theoretical analyses, the FAA may also need to collect actual performance data, to serve as a solid basis for making an informed decision regarding GPS navigation."

Why is "need" in quotes? Is someone questioning the fact of this need? Can it be true that someone believes that some measurements should be taken and that the benefits should be proven? Is this the advance warning that FAA will have to fund parallel operation of terrestrial and satellite systems for an evaluation period?

Obituary

It is with deep regret that we report that John T. Adams, a relatively new member of ILA and also active in AOPA, died on May 23, 1996.

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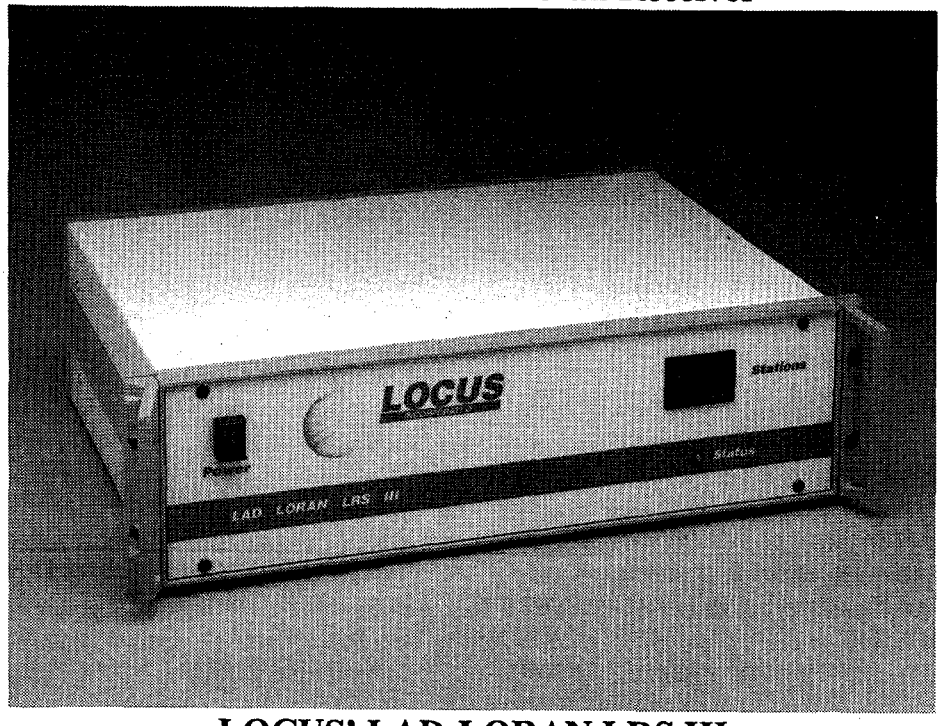

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