



Loran Lines

May 2001

Newsletter of the International Loran Association

Volume 2001-1

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Panel reports strong Congressional support for Loran

THE 29th ILA Convention in Washington, D.C. afforded attendees an opportunity to hear from Congressional staff members, decision makers who assist in influencing the budgets and programs of the U.S. Coast



Left to right: Larry Barnett, Jeff Grove, Eileen Hattan-Lynch, Steve Kozak, and Langhorne Bond

Guard, and the Federal Aviation Administration (FAA). Larry Barnett, who represents the ILA in Washington, moderated a panel which included: Rich Efford, Senior Staff Assistant for the House Transportation Appropriations Subcommittee, Jeff Grove, Staff Director for the House Science Committee's Technology Subcommittee, Eileen Hattan Lynch, Legislative Assistant to Senator Herb Kohl of Wisconsin, and Steve Kozak, from the office of Senator Kerry of Massachusetts.

The panelists provided an informative perspective of how the U.S. Congress views transportation policy, funding

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NELS GAUSS Initiative Group becomes the ILA GAUSS Standardization Group

HAVING successfully completed the task of providing revised Eurofix-type data communications standards for submission to the ITU, the NELS Steering Committee expressed its appreciation and requested that the group as presently organized be terminated. While working on the revisions to the ITU documents, the working group identified additional standardization requirements associated with integrated radionavigation utilizing Loran-C/Chayka in regions outside the jurisdiction of NELS. It expressed the hope that the effort would continue with a new international host.

The International Loran Association (ILA), having a specific interest in the use of LORAN-C/Chayka on land, sea and in the air throughout the world, has agreed to host the group and endorse an expanded mandate. Reflecting the change in host, the group name was changed to the ILA GAUSS Standardization Group. The change from an inter-governmental host to a professional association would require formal approval from the respective administrations but it was held that in view of the objective of the new group this approval would not be withheld.

The ILA ... has agreed to host the group and endorse an expanded mandate

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**ILA 30 Annual Convention and Technical Symposium
October 8–10, 2001 in Saint-Germain-en-Laye, Paris, France
MARK YOUR CALENDAR – see details on page 10**

ILA Committees

ILA Committee appointments for 2000-2001 as announced by John Beukers are as follows:

Audit Committee: *David Scull*

Awards Committee: *Bill Roland*

Congressional Liaison Committee:
Linn Roth

Constitution Committee: *Bob Lilley*

2001 Convention Committee (St. Germain-en-Laye) collectively: *Terje Jørgensen, Torsten Kruuse, John Beukers, Wolfgang Lechner, Bob Lilley, Ellen Lilley*

Historical Committee: in discussion

Journal Committee: *John Beukers* by default (BOD agenda item)

Loran Technology and Applications Committee: *David Last*

Membership Committee: *Erik Johannessen*

Nominations and Elections Committee: *Jim Doherty* ■

ILA Executive Committee

President: *John Beukers*

Vice President: *Terje Jørgensen*

Secretary: *Bob Lilley*

Treasurer: *Marty Poppe*

Past President: *Linn Roth* ■

News from the OPS Center

Responding to the increasing e-mail traffic associated with member communications and inquiries from the navigation and timing communities, the ILA Operations Center has recently installed a new Gateway computer to support speedier database operations, web-page maintenance and accounting routines. As the work proceeds, members and friends may expect to see on-line membership renewals and registration for meetings, electronic delivery of newsletters and election materials along with a variety of improved informational activities. This won't happen all at once, of course, but we're working hard on it.

We know some ILA members may prefer to retain paper-based delivery of ILA material and services and these options will be retained. As ILA positions itself for growth in the wake of renewed interest in Loran-C we encourage members to make full use of the electronic services as they become available to save both time and expense.

As always your Association's OPS Center can be reached by phone, FAX or e-mail. Please call with questions, comments and suggestions.

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Please note ILA's web site address:
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The ILA encourages readers to submit material for publication. Any and all news related to Loran and ILA members is welcome. Send information (with pictures, if possible) to either of the co-editors:

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Current advertising rates per insertion:

1/2 page: \$100 (4 for \$300)
Business cards \$15 (4 for \$50)
Classified: \$5 for each 50 words or part thereof

Wire transfers received by the ILA Operations Office do not contain information about the sending party. As a consequence, the Center does not know whom to credit with the payment.

When paying by wire transfer, please notify the Operations Center by e-mail or by FAX that a transfer is on the way, along with the amount and what it is for.

Would members with multiple addresses or who are making a move please notify the Ops center by e-mail, fax, or phone when the address change is effective.

Booz-Allen & Hamilton report on Loran released after two-year delay

IN ACCORDANCE with a requirement of the U.S. Coast Guard Authorization Act of 1996, an assessment of the proposed phase-out of the Loran-C Navigation System was prepared by the independent consulting firm of Booz-Allen & Hamilton. This report was submitted July 17, 1998 to the Department of Transportation (DOT). It was generally known at the time that this study favored the continuation of Loran in the U.S. Further, it supported those who argued that the summary closure announcement for the year 2000 in the Federal Radionavigation Plan (FRP) was an inappropriate and unwise policy. While the report had been completed as requested, DOT, and subsequently the Office of Management and Budget (OMB), would not release the document to the public despite repeated requests from ILA, the user community and members of Congress.

Readers of *Loran Lines* in 1999 and 2000 have seen some of the many letters to DOT and OMB expressing anger and frustration at this intransigence shown in refusing to respond to critics of their policies. The reason to delay publication was obvious. Since 1994 it was an established policy of the Administration that the Global Positioning satellite System (GPS) would eventually be the sole source of navigation information, and that all other systems should be discontinued.

There was an outright refusal to enter into any substantive dialog on the merits of this decision or to respond to the many questions which were raised regarding the reliability of GPS and the wisdom of removing all other navigation aids, thereby creating a "sole source" environment. Evidence that reliance on a single system for navigation and timing was an unwise policy was ignored or, as in the case of the BAH report,

"... this study favored the continuation of Loran ... OMB would not release the document to the public."

sequestered behind a barricade of bureaucratic red tape. The BAH report supported the wisdom of retaining Loran. This position was contrary to the decision to support only GPS. Opposing opinions, however well prepared and documented, were not allowed to surface. The BAH report became public in March 2001 only after recourse by David Evans of Phillips Business Information Inc. to the Freedom of Information Act.

Fortunately Congress recognized the wisdom of maintaining a diversity of systems and has been appropriating funds each year for upgrading the Loran-C infrastructure in the United States, permitting service for at least another 15 years.

DOT still states only that Loran-C will continue in operation for the "short term" without defining this expression. Clearly every effort must now be made by all those concerned with establishing Loran as a complement to GPS to persuade DOT to provide in the next FRP a definitive statement supporting Loran as part of a coordinated mix of terrestrial and satellite-based navigation aids. ■

GPS Vulnerability Study withheld by DOT from public release

A Presidential Directive issued in May 1998 required the Department of Transportation (DOT) to undertake a thorough evaluation of the vulnerability of the national transportation infrastructure that relies on the Global Positioning System (GPS). DOT selected the Volpe National Transportation Systems Center (VNTSC) in Cambridge, Mass. to conduct the study which was completed last year. After review it was promised that the report would be released in time for the findings to be presented by VNTSC staff at the January 2001 meeting of the Institute of Navigation (ION) in Long Beach, California.

The report was not released in January and the paper which was to be presented was cancelled. This is the third conference at which a paper related to this study has been scheduled and then withdrawn. The reasons for the delay are attributed to the demands of a lengthy review process. Possibly the findings are sensitive, and might be considered classified and not to be released to the public.

In view of the past action by DOT in withholding the Booz-Allen & Hamilton study on Loran for over two years as reported in another article on this page of *Loran Lines*, one can only wonder if this report on the vulnerability of GPS may well suffer a similar fate. ■

Statement of Radionavigation Policy

THE International Loran Association (ILA) consists of organizations and individuals who advocate the continued implementation and use of the LORAN radio Navigation system (Loran-C)¹ throughout the world.

Since its inception in 1972 as the Wild Goose Association (renamed the International Loran Association in 1994), the Association has followed the charter that states:

"The International Loran Association was 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 its members."

As a stand-alone system, Loran has served the international radionavigation community for more than half a century, first as Loran-A and subsequently as Loran-C. Other Loran systems such as the military Loran-D and commercial versions, Pulse8² and Accufix², have been effective in serving local communities throughout the world.

In accordance with its charter, the ILA encourages the ongoing development and use of Loran by providing a forum at its annual Convention and Technical Symposium for the interchange of ideas and discussion of technical and administrative matters.

More recently, the ILA has identified the complementary and supportive use of Loran-C and associated data communications technologies as necessary and critical components of the future mix of radionavigation and precise time distribution systems. The ILA's focus has thus broadened to address integrated systems that employ

Loran-C in a mix of satellite and terrestrial technologies, recognizing the benefits that accrue when these systems are used in concert.

The ILA also recognizes the pervasive use of satellite technology for positioning and precise time distribution, and is totally supportive of satellite-based systems when they are employed within their technical and operational limitations and in conjunction with complementary terrestrial systems. The Association strongly advocates the concept of diverse and dissimilar systems for critical applications that involve safety of life or protection of national infrastructures. The ILA advocates an orderly progression towards a diverse and dissimilar mix of satellite and terrestrial systems in all countries to provide a dependable service under adverse conditions.

The ILA is a professional technical organization that represents the service provider, manufacturers and users. In support of manufacturers and users, the Association advocates that all radionavigation and time distribution systems for use by the civil sector have transmitted signal specifications and signal availability formally published in appropriate international and/or national instruments and that the longevity of the service provided is clearly defined. Further, the ILA advocates that dynamic notice of signal condition and availability are broadcast to users in a timely manner.

The ILA supports the doctrine of the prudent navigator, which requires the availability of more than one system for navigating with safety and integrity. The ILA also supports precise time users, who require more than one source of precise time to maintain the integrity of the services they provide.

The ILA actively participates in national and international radionavigation and time distribution planning and practice by providing comments and suggestions for the generation of international and national plans, through the

encouragement of its members to contribute to committees and associations, and by offering a professional forum for the interchange and discussion of ideas and data.

The ILA recognizes that there is a substantial amount of development work to be completed with Loran-C and associated technologies as the system spreads to worldwide use, and campaigns for the continued political, technical, and financial support of these activities.

1 In the context of this policy statement "Loran-C" is used generically to include the Russian equivalent system "Chayka."

2 Pulse8 and Accufix are trademarks assigned to Megapulse, Inc.

Congressional support (Continued from page 1)

priorities and in particular navigation policy and spending related to Loran. They highlighted many of the steps and funding actions favorable to Loran that have been supported by the U.S. Congress and focused on the political and policy view about ground-based navigation systems relative to satellite navigation and, in particular, the positive role of Loran seen from their vantage point.

The panelists made it clear that there are significant cost and technical uncertainties about satellite navigation and that GPS as a sole means technology is not in the cards for the U.S. Ground-based systems like Loran will continue far into the future because of ongoing user requirements.

The panel conveyed an unequivocal message about the bipartisan support for Loran that exists in the U.S. Congress, saying that members of Congress view Loran as a proven technology that complements satellite navigation and offers multimodal transportation safety and other benefits that make it very cost-effective. ■

On the status of Loran-C in Europe and the USA

A view of changing perspectives

John Beukers

OVER the past six months a number of study reports concerning positioning, navigating and the distribution of precise time using radio transmissions has been released to the public both in Europe and in the United States.¹ Over the same period several professional conferences have been held on the same subject. The radio transmissions in question come from satellites in space (the U.S. Global Positioning System – GPS) and from transmitters on land (Loran-C) to provide the very foundation upon which national transportation and communication infrastructures are being built. The dependability of the radio transmissions is critical to the safety of life, vital for the health of a nation's economy and essential to safeguard national security. It is for these reasons that so much time has been dedicated to studying and debating the issue of continuity of service under adverse conditions.

Running in the background, and common to the debate, is the issue of total dependency upon space as the basis for a nation's critical infrastructure. Soon after the United States election of the Clinton Administration in 1992, an edict was issued to U.S. government agencies that GPS would become the only radio positioning system to be provided by the federal government and that all terrestrial services would be terminated over a period of time. The 1994 U.S. Federal Radionavigation Plan changed the standing policy that stated Loran-C would continue to be provided until 2015 and called for the service termination in the year 2000. During the next six years the vulnerability of signals from space became recognized as a potential threat to continuity of

service. Initially the vulnerability was identified as intentional (jamming) and unintentional interference with the very weak transmissions. More recently the vulnerability of space assets themselves to disruption and/or destruction by unfriendly forces has become a major defense issue within the new U.S. Administration. Interference and the threat to space assets has resulted in abandoning the policy of sole dependency on space in preference to a complementary mix of satellite and terrestrial components. Loran-C, that was to be terminated in the year 2000, is now in the process of a comprehensive upgrade of all transmitting facilities with funds appropriated by a supportive Congress.

The consensus in the United States on the sole-dependency issue has not yet been reached in Europe. The policy being developed by the European Commission, while recognizing the growing reliance upon GPS, is being built upon the future, yet uncertain, availability of Galileo, the European equivalent to GPS. It is believed that the two constellations will provide diversity, thereby avoiding total dependency upon any one service. The policy does not accept the necessity for a terrestrial complement. That GPS and Galileo are space born and are exposed to the same threats is not currently taken into consideration.

Europe is fortunate in having a new operational Loran-C service that is supported by an International Treaty Organization not tied to the European Union. It is significant that Norway, who is not a member of the European Union, has played a key role in the establishment of the Treaty and the system. The nation hosts the organization's Coordinating Agency, provides four of the eight transmitting facilities and looks to provide a control station at Bø to offer Eurofix control and

redundancy in the provision of European Loran-C services.

Without the consensus now enjoyed in the United States, neither the Loran-C consortium nor the European Union can reap the full benefits² of the diversity of satellite and terrestrial services. It is believed that this is a temporary situation that will exist until it becomes recognized in Europe that total dependency on space assets creates an unacceptable risk.

The Loran-C treaty must be revisited in 2004 at which time additional nations are expected to join the organization, but the future will be determined by the overall regional policy towards sole dependency on space. The history and example of the United States experience is relevant and a model that could be followed.

Longborough
Moreton-in-Marsh
Gloucestershire, UK
February 28, 2001

1 A comprehensive list of references is included in the author's invited plenary address at the Institute of Navigation's National Technical Meeting held in Long Beach, California during January 2001.

2 Both Loran-C and GPS provide a source of precise time. Loran-C in Europe provides corrections to GPS using the Eurofix data link in addition to position.

ILA GAUSS Group (Continued from Page 1)

While the initial thrust of the GAUSS group addressed the marine community, it has been recognized that the essentially multi-modal nature of Loran-C/Chayka and the systems used for the provision of precise time require that future participation in GAUSS include representation from land, sea, air and disciplines other than navigation.

The next meeting of the ILA GAUSS Standardization Group will be on October 11 and 12, 2001 following the ILA Annual Convention and Technical Symposium in Saint-Germain-en-Laye, Paris France. ■

ILA Conference Proceedings now available on CD

The CD for ILA29 in Washington DC, November 2000, is scheduled to be available about the end of April 2001

Those who attended this conference will automatically receive a copy of this CD.

ILA29 was a most successful meeting with a broad spectrum of participants from government, industry and user groups from Europe, North America and Asia. A significant highlight was a bipartisan panel discussion by staff members of the U.S. Congress during which continuing support by the Congress for Loran revitalization and continuation was unanimously endorsed.

Papers presented at the Technical Sessions included reports on important activities in Europe and China, the progress of Loran modernization in the U.S., new receiver and antenna developments, telecommunication and timing applications and the use of the data communication capabilities of Loran to complement GPS. A complete set of all papers will be included in the conference CD.

For ILA members who did not attend the cost is \$45.00 plus \$5.00 shipping and handling. For non members the cost is \$75.00 plus \$5.00 shipping and handling.

A CD containing the proceedings of the NAV99/ILA 28 conference is now available.

The complementary employment of Loran-C to support satellite navigation services was an important theme of this meeting held under the joint sponsorship of the Royal Institute of Navigation and the International Loran Association at Church House, Westminster, London in November 1999. The need for an alternative to GPS for the provision of position information and precise time is a critical subject in current radionavigation debates and many papers presented were sharply focused on this topic. While all delegates received a binder containing the complete set of presented papers the CD contains additional material formatted for easy, rapid retrieval through a linked menu system.

Those who attended the conference may purchase a CD for \$25.00 plus \$5.00 shipping and handling

For ILA members who did not attend the cost is \$45.00 plus \$5.00 shipping and handling. For non members the cost is \$75.00 plus \$5.00 shipping and handling.

Orders for all CDs and hard copies of other proceedings should be sent to:

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ILA 30th Annual Convention and Technical Symposium

October 8–10, 2001

Saint-Germain-en-Laye, Paris, France

THE Convention will be held over a three-day period, Monday to Wednesday. A half day on Tuesday will be followed by the traditional Banquet and Award Ceremony in the evening.

This year's venue, Saint-Germain-en-Laye, a suburb of Paris, is the headquarters of the International Association of Lighthouse Authorities (IALA). The chosen hotel is Henri Quatre where a block of rooms has been set aside for Convention attendees.

The theme of ILA 30 is "The Provision and Use of Loran-C/Chayka Services." While services are being upgraded with new technology, the user community is

experiencing a shortage of modern receiver technology and the absence of satellite/Loran integrated receivers. The Symposium will focus on this issue by addressing the technical, manufacturing and marketing infrastructure required to overcome these deficiencies.

All providers of Loran-C services are asked to contribute a review of their services and plans for the future to provide current and potential manufacturers with confidence of the longevity of the provided services. Those with an interest in combining satellite and terrestrial technologies are encouraged to submit papers on technical innovation, product manufacture and market assessment of integrated receiving equipment.

On the last day a panel discussion and workshop is planned designed specifically to examine the role of Loran-C/Chayka in the future mix of

radionavigation systems throughout the world.

Following the Convention there will be a two-day meeting of the ILA Gauss Standardisation Group. The Group will be working on standardisation of integrated receivers for submission to WMO and will address multimodal issues by establishing aviation workgroups.

Saint-Germain-en-Laye has a web site with maps and train directions from Paris. The journey is about 20 minutes.

The URL is www.ville-st-germain-en-laye.fr/english/indexe.htm

Watch the ILA web site (www.loran.org) for registration details as they become available.

■

We hear that — — — —

From Alaska:

Loran-C lines of position (LOP) are used by Alaskan officials to define the boundaries of fishing areas in Bristol Bay according to Walt Dean, long time ILA member. GPS is not suitable since Loran LOPs establish lines that can be readily confirmed by a receiver in an enforcement vehicle. Walt recently served as an expert witness on the reliability of Loran-C and the tolerances on line position as evidence beyond reasonable doubt that in the case in question the fisherman was "over the line."

From the Netherlands:

As a result of a joint effort by Locus (USA) and Reelelektronika (NL), a SATMATE 1000 receiver has been located in Reeuwijk, the Netherlands. With the cooperation of Dr. Durk Van Willigen of Reelelektronika a dedicated phone line at the receiver site makes it possible for Locus engineers to have direct access to receiver operations and provide software updates. Using recent software (with improved notch filtering), Jim Schliem, Applications Engineer at Locus, reports excellent Loran position performance within 10 to 15 meters, significantly better than other data reported at the recent meeting in Bonn. Loran users can obtain added information or direct questions to Jim at his Locus, e-mail address: Schliem@locus.com. ■

ITU approves NELS Gauss
Group revised standard for
Data communications using
Loran-C

WITH the support of the Northwest European Loran-C System (NELS), a group was organized to establish standards for the use of Loran-C/Chayka integrated with GNSS. Designated the NELS GAUSS Initiative Group, its formation was in support of the Global Augmentation of Satellite Systems, a concept of integrated navigation involving core satellite and

augmentation systems which are or can be available world wide.

Their efforts were directed to generate revisions to International Telecommunications Union (ITU) document ITU-R M.589-2 *Technical Characteristics of Methods of Data Transmission and Interference Protection for Radionavigation Services in the Frequency Band Between 70 and 130 kHz* in order to include specific data transmission schemes using Loran-C/Chayka type transmitters.

The initial specification contained in Annex 1 covers "Tri-State Pulse Position Modulation," the method known as Eurofix used

by NELS transmitters. Other methods of data transmission were not excluded and alternative schemes being presently pursued by the U.S. Coast Guard can subsequently be incorporated into the specifications in additional Annexes. The approval of this document is significant in that it provides a world wide standard for data communication using Loran-C/Chayka transmitters.

The success of securing the approval of this specification in little more than a year is due entirely to the efforts of the dedicated team who comprised the NELS GAUSS group. ■

Board of Directors 2000-2001

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A detailed directory of the members of the Board of Directors and of the various Committee Chairs can be found on the ILA web site: www.loran.org

From The President

IN JANUARY of this year I had the privilege of being invited to address the opening session of the U.S. Institute of Navigation's National Technical Meeting held in Long Beach, California with the subject "Status of Worldwide Radionavigation." In the few weeks prior to the meeting a rash of reports on the subjects of space vulnerability and national security were delivered to the United States Congress who also received briefings from the U.S. National Security agencies. It was natural, therefore, to select the subject of space asset vulnerability in the context of radionavigation and precise time distribution for the basis of my address.

In my presentation I likened the apathy towards risk management of space assets to that of the British government's denial and dismissal of the risk to human life of Bovine Spongiform Encephalopathy (BSE or Mad Cow disease). That the address was controversial was quite evident from the numerous informal discussions I had with participants during the three-day meeting following the presentation. People were strongly polarized as to whether or not there was a threat to the GPS constellation and whether there was any risk to United States national security. For every one with whom I spoke that dismissed the risk, there were nine that took the subject matter seriously. (However, with that said, we are much more likely to discuss matters upon which we agree rather than to argue fundamental differences of opinion, so to extrapolate this observation may be misleading.)

To think through the vulnerability issue there are a number of indisputable facts to help us.

1. Satellite Constellations: Dual use GPS (military and civil)

is the only constellation in operation and will be for the foreseeable future. Repopulation of the GLONASS constellation is uncertain, as is the operational date of 2008 for the European Galileo system.

2. GPS Use:

For the next several years GPS use will continue to permeate national infrastructures, both critical and non-critical, for positioning and for precise time distribution. Given the utility of GPS, and, in the absence of other constellations this is a certainty. Our uncontrolled dependence upon GPS will grow.

3. United States Military Dependence: By all accounts GPS is already the backbone of the United States defense, national security and protection of its global interests. GPS use will be fundamental to any future military conflict in which the United States is involved.

4. Access to Space: As each year passes access to outer space is being demonstrated by an increasing number of nations, not all friendly to the United States or its allies.

5. Technology: Weapon and space technology is for sale worldwide. Attempts to curtail weapon and space technology proliferation have not been effective. Major breaches of United States national security have compromised the nation's nuclear and space technology secrets.

6. Weapons in Space: The United States is not alone in planning defensive and offensive weapons in space. Devices to disrupt or destroy satellites will be in orbit in a few years if not

there already. Protection of space is at the top of the United States Department of Defense priority list.

7. War Game Simulations:

Satellites are the eyes, ears and operational tools for winning future military conflicts. War game simulations have shown conclusively that the destruction of a nation's satellite capability is a prerequisite to prevail over an adversary.

These are the facts that are available to those responsible for risk management in the civil sector but to quote the Rumsfeld

Commission's report on the management of space, "We have been put on notice but we have not noticed."

Today we know the consequences of the British government's initial suppression of the threat to human life of BSE, but we have yet to convince the civil users of space assets of the potential risks of becoming too dependent, if not totally reliant upon space for a wide range of critical services.

The Supportive Role of Loran: Loran-C is the only regional positioning and precise time distribution system that comes anywhere close to providing the service of GPS. Loran-C is terrestrially based, totally dissimilar in frequency and propagation to GPS and relatively inexpensive. The system should be adopted as a critical complement to GPS and become one of the components in the future mix of radionavigation/time distribution systems and for future integrated systems.

John Beukers
President, ILA
March 25, 2001 ■



John Beukers

International Loran Association 2000

Awards Presentation

Medal Of Merit

Benjamin B. Peterson

Captain Benjamin B. Peterson has devoted himself to the analysis and improvement of radio navigation services during his distinguished career in the United States Coast Guard. As Chief of the Electrical Engineering Section, Director of the Center for Advanced Studies and then Head of the Engineering Department at the United States Coast Guard Academy he developed and nurtured navigation concepts which demonstrate the potential of Loran as a key element in the world's positioning and timing services.

His research efforts have contributed to the development of methods to measure and integrate Loran, GPS and DGPS signals using common clock and receiver architecture. He has authored and co-authored over forty articles and publications for technical journals, conference reports and books. As a teacher, Capt. Peterson has guided students at the Academy who have become the next generation of Loran and navigation engineers.

Terje Jørgensen

Terje Jørgensen has made significant and lasting contributions to the implementation of Loran-C and Eurofix as Deputy Head and as

Head of the Northwest Europe Loran-C System (NELS) Coordinating Agency. He has coordinated the financial and administrative matters of a multinational intergovernmental treaty organization with consummate diplomacy. His dedication and organizational skill have resulted in an operational Loran-C/Eurofix system in Europe. Terje Jørgensen's technical knowledge of the Loran-C system and political acumen are recognized by the European Commission and other bodies where he is respected and welcomed as a contributor to future radio navigation systems.

Outstanding Service Awards

John M. Beukers

For his contribution to Loran and the Association as General Co-Chair of NAV99/ILA28

Group Captain David W. Broughton MBE

For his contribution to Loran and the Association as Facilities Chair of NAV99/ILA28

Terje H. Jorgensen

For his contribution to Loran and the Association as General Co-Chair of Nav99/ILA28

William H. Sandford

For his contribution to Loran and The Association as Technical Co-Chair of NAV99/ILA28

LCDR Charles Schue USCG

For his dedication to the development, improvement and operation of the U.S. Coast Guard's Loran-C service

Nicholas Ward

For his contribution to Loran and the Association as Technical Co-Chair of NAV99/ILA28

2000 Technical Symposium

Best Paper Award

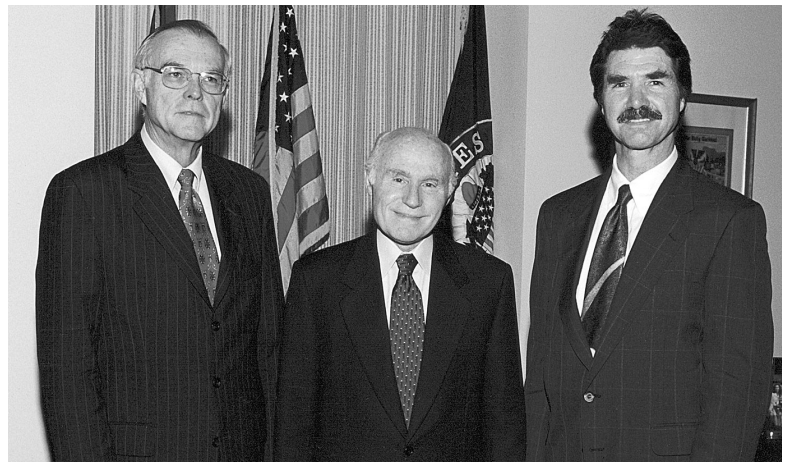
Langhorne Bond

Pitfalls on the Road to the Golden Age of Radionavigation
Presented at Royal Institute of Navigation and International Loran Association jointly held Conference NAV99/ILA28

President's Award

Senator Herb Kohl; Wisconsin

For outstanding and continuing Leadership in the United States Senate in support of the modernization and continuation of Loran-C as a national asset.



Senator Herb Kohl of Wisconsin, winner of 2000 ILA President's Award. Larry Barnett (left) of AB Management Associates and Linn Roth (right), Past President of the ILA, are shown with Senator Herb Kohl in his Washington office. Senator Kohl has lead the ongoing, bipartisan Congressional support for Loran that has resulted in \$53 million for Loran modernization in recent years. He received the ILA President's Award at ILA 29 in Washington, DC.

Affinity City

What is Affinity City?

A web-based collaboration space allowing groups of individuals to share data, products, processes, services, and other resources in a controlled and secure way.

Who uses Affinity City?

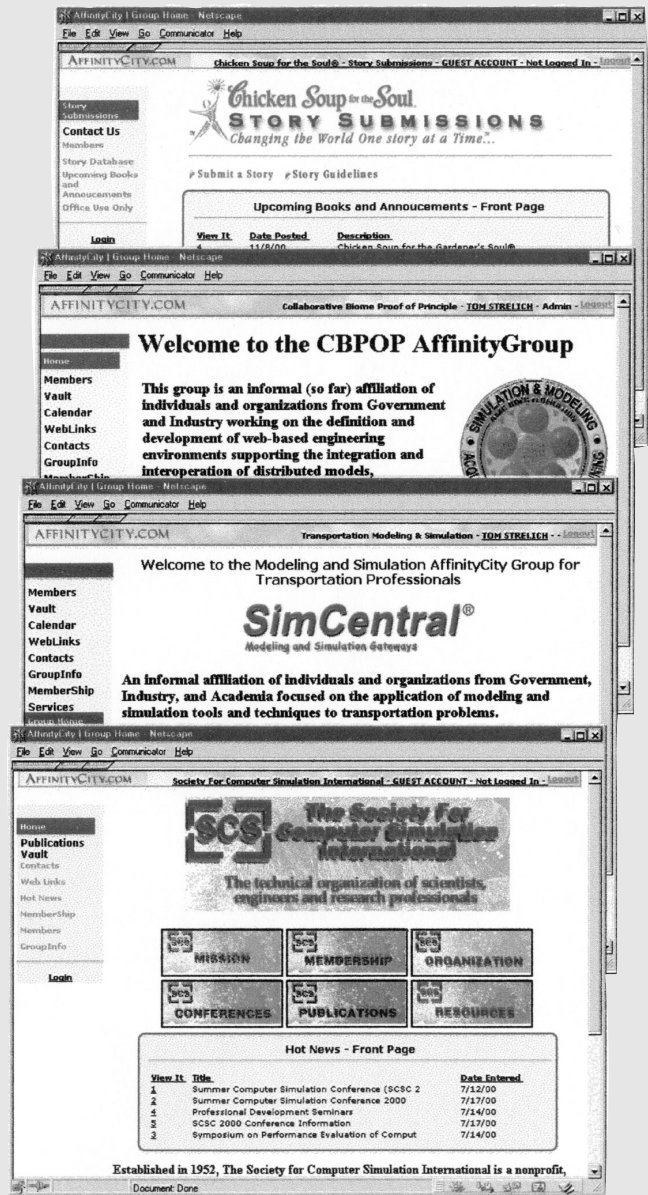
Teams, groups, organizations, institutions, enterprises — any formal or informal affiliation of individuals working toward a common goal.

How is it used?

An unlimited set of customizable functions to create an open-ended variety of web-accessible collaboration capabilities.

What's Unique about Affinity City?

Not just file sharing, but a web-database supporting three enterprise collaboration levels: User-User, User-Tool, and Tool-Tool via Si3.



For Additional Information contact:

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LORAN Technology for the 21st Century

New Linear Averaging Digital (LAD) – Loran-C Timing and Navigation Receivers

Linear Averaging Digital (LAD) LORAN LRS IIID

- Incorporates digital signaling processing (DSP) technology in a monitoring/control receiver.
- Provides complete PC interface/control to support remote operations and diagnostics.
- Accepts Cs clock input.
- Provides Time of Arrival and Time Difference data.
- Includes local phase code interval (LPCI) resolution.
- Used by USCG to monitor/control US Loran-C systems.



Cs Sync Timing Applications



- Offers true Stratum 1 timing performance indefinitely, including UTC generation, and operates in deep urban canyons or areas where line of sight blockage prevents GPS penetration.
- Requires minimum installation, so cellular base stations can be located where they are needed.
- Offers indefinite system redundancy and reliability wherever GPS blockage, interference or jamming might occur.
- Minimizes installation profile with short E-field and small H-field antenna options.

SatMate Navigation Applications



- An ideal complement to GPS in all marine, aviation and terrestrial applications eliminating the vulnerabilities of a sole-means system.
- Can be integrated with a GPS receiver and controlled by a single user interface, making operation cost effective and transparent to the user.
- Built-in Eurofix capability means DGPS corrections can be continuously supplied, whatever and wherever the need.

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