



# Loran Lines

The newsletter of the *International Loran Association* (Formerly the Wild Goose Association's newsletter, *The Goose Gazette*)

Volume 97-2

---

## FAA CONSIDERS LORAN-C FOR GPS BACKUP

Under the direction of FAA top management the options for GPS/WAAS backup are being considered. At a meeting on 5 December it was concluded that the most cost effective and complementary option would be Loran-C. The use of Loran-C as a complement to GPS and GPS/WAAS is to be pursued and will be presented at a briefing to the FAA Joint Resource Council on December 19th.

There was general agreement at the meeting that Loran-C offered the best solution however the decision to reassess the use of Loran-C was not unanimous.

In light of this development the plan for the future of Loran-C being generated by the FAA under Congressional mandate will most likely be revisited and further delayed.

It has been suggested that the RTCA SC-176 is reconvened to finish the work on the integration of Loran-C and GPS.

The FAA change in attitude towards Loran-C is a result of gathering concern regarding total dependence upon a single system for all modes of transportation and communication.

Considerations in the backup debate are:

1. The evidence of a real jamming threat from readily available jammers.
2. Experience of Continental Airlines losing GPS on several occasions - three times to unannounced jamming in France.
3. The recommendations from the Presidents Commission on Critical Infrastructure Protection that the policy of dependence upon a single system with common mode failure should be reconsidered.
4. The denial by the DOD for FAA (civilian) use of the GPS P-Code.
5. DOD suggestion to the civilian community that an architecture based upon a single system is unsound.
6. The ability of Loran-C to communicate both GPS and Loran-C differential corrections.
7. The evidence that new digital Loran-C receiver technology enables cross chain operation and more stations to be received thereby increasing coverage.
8. The use of H-field antennas to get rid of p-static in situations where this is seen to be problem.

*Comment:* This is a great opportunity to do a thorough job of integrating GPS and GPS/WAAS with Loran-C/Loran-C Communications to provide a robust fail safe system for air, land and sea. However it also represents a challenge to recognize the limitations of each system so that the operational architecture gets maximum benefit from these complementary technologies.

- John Beukers

## Loran-C Funding

In addition to the \$4.6 million provided in the 1997 DOT Appropriations Bill, the FY 1998 DOT Appropriations Bill, H.R. 2169 includes a further \$3 million for Loran-C upgrades. The bill was signed by President Clinton into law late October.

+++++

## Europe to Implement Wide Area Differential GNSS

Following the successful trials of transmitting GPS differential corrections using the Loran-C transmitter at Sylt in Germany, the Northwest Europe Loran-C System (NELS) Steering Committee at its October 30th meeting gave the green light to implement the system known as Eurofix on all the NELS transmitters. The minor modification to the transmitters is expected to be completed within a year enabling NELS to provide GPS and GLONASS differential corrections over the whole of Europe. The trials have shown that when using GPS an accuracy of under 7.5 meters 99.9% of the time can be expected with a 2drms value of just under 3 meters. The Loran-C position service is not impaired by the compressed RTCM type-9 message. The Eurofix development was conducted at the Delft University of Technology in The Netherlands under the

direction of Professor Durk van Willigen. Details of the system and results are given in a recent paper by the Eurofix team "Future Eurofix Services" and may be downloaded from <ftp://iu.net/pub/jb/NELS> (case sensitive). The approx. 1 mbyte file is ILA97b.doc.

*Comment:* The availability of a GPS/Loran-C+Eurofix receiver engine will go a long way to satisfying technical and institutional reservations concerning the sole use of GPS. Ten points immediately come to mind.

- (1) A regional alternative positioning service is available in the event of GPS (or GLONASS) unavailability
- (2) Sole reliance on space is avoided
- (3) The concerns of single state control and dual civil/military use are diminished
- (4) Single thread failure mode is circumvented
- (5) Loran-C calibration to GPS differential accuracy becomes a reality
- (6) Problems of satellite masking and signal loss are avoided
- (7) Inherent integrity is provided
- (8) A high degree of immunity to interference is given by the complementary but dissimilar systems
- (9) Loran-C stations effectively add more "satellites" to the constellations
- (10) And most importantly - the scheme is extremely cost effective adding little to capital already invested

This must be a winner for all concerned with radionavigation in Europe. My personal congratulations to the NELS Steering Committee for this decision and to the team at Delft for their excellent development program.

- John Beukers

## NELS EXCITED ABOUT EUROFIX

The Northwest European Loran-C System (NELS) is established by Denmark, Germany, France, Ireland, the Netherlands and Norway to offer a regional, terrestrial radionavigation system for Northwest Europe.

The establishment of NELS has acted as a stimulus to Loran-C research and development at European universities and scientific laboratories. One result of this activity is the development by the Delft University of Technology in the Netherlands of an integrated navigation system called Eurofix - a system which combines Loran-C and DGPS by sending differential satellite corrections to users as time modulated signal information on the Loran-C signal without interfering with the Loran-C radionavigation function.

Eurofix can act as a DGPS system when using a Loran-C standard GPS correction output message fed into a suitably equipped GPS receiver. It does also allow

position calculation using both DGPS and Loran-C and comparison of the two systems. If either system fails, the other can take over thus improving availability and continuity. Finally, Eurofix allows full DGPS/Loran-C integration which in a given situation will make for instance Loran-C act as a satellite source. A user will in this example be able to calculate a three dimensional position with only three satellites available.

The coverage of Eurofix is estimated to be at least 1000 km from each Eurofix equipped Loran-C transmitter. Fully implemented, an absolute accuracy of better than 5 meters and an availability of better than 99.9996% per month is achievable.

The NELS Eurofix programme is fully in line with the EU's policy on radionavigation system developments in Europe for the year 2000 and beyond.

Point of contact: Northwest European Loran-C System (NELS)

Co-ordinating Agency Office (CAO) Langkaia1  
N-1050 Oslo - Norway

Phone: +47 23 09 24 76  
Fax: +47 23 09 23 91

\*\*\*\*\*

## EUROFIX DEMONSTRATION AT DELFT

By John Beukers

Coinciding with the IAIN Congress in Amsterdam (see article later), representatives of the US Coast Guard and industry visited with the Eurofix team at Delft University in The Netherlands to witness a live demonstration of GPS differential corrections being communicated using the Sylt, Germany, Loran-C transmitter. The demonstration, including a real-time plot of position, confirmed for those attending the results reported in a number of recent papers presented by Durk van Willigen and his team. The demonstration was described as impressive both for the performance of the differential GPS accuracy provided and for the simplicity of the transmitter modifications and receiving equipment. When fully implemented the Delft team claim that Eurofix will provide 2-5 meter DGNSS accuracy throughout Europe.

A US Coast Guard representative was careful to point out that while Eurofix will offer a DGPS service in Europe, the United States was already committed to alternative methods of communicating GPS corrections using MF beacons for mariners and geosynchronous satellites (WAAS) for aviators. Further, the decision had been made to extend the radiobeacon DGPS service using the GWEN sites to provide DGPS service for land users. DOT still plans to phase out

Loran-C by the year 2000 as stated in the 1994 and 1996 FRP's. However, Delft University and Megapulse (US Loran-C transmitter manufacturer) have been requested by the US Coast Guard to assist in conducting DGPS tests using the Loran-C transmitter located at the USCG Engineering Center in Wildwood, New Jersey. It is hoped (but reported as unlikely) to have preliminary results of these tests performed on US soil by the December 15th deadline for the Congressional mandated plan for Loran-C operation beyond the year 2000 being provided by Booz Allen and Hamilton for the DOT.

*Comment:* The point is often missed that US GPS augmentations are just that and are dependent upon the availability of the GPS constellation to provide a DGPS service. Besides being able to provide differential corrections Loran-C is an independent positioning and time dissemination system which can enhance the GPS service and vice versa. In view of the increasing reports of GPS interference and the concerns relating to GPS vulnerability expressed in the recent report (see \*<http://www.pccip.gov/whatsne.html>) of the President's Commission on Critical Infrastructure Protection, perhaps it is time to take a step back and revisit DOT radionavigation policy that mandates GPS to be the only federally provided radionavigation system.

\*\*\*\*\*

## IAIN MEETS IN AMSTERDAM

Representatives from 21 countries, many representing national Institutions of Navigation, met in Amsterdam, The Netherlands during the week of November 17th. for the 9th World Congress of the International Association of Institutes of Navigation (IAIN). The opening sessions on matters of navigation policy were chaired by the IAIN President Jack Spaans, US ION President Ben Peterson and UK RIN President "Pinky" Growcott and hailed GNSS as the future of navigation with cautionary notes of single system dependency. Presentations given by representatives from international organizations, ICAO, IMO, EU, IALA and IHO essentially restated current adopted policies.

Formal papers covered a broad spectrum of subject matter and indicated a strong interest in the development of innovative and effective navigation services. Although much of the material was forward-looking, the full schedule did not permit periods for questions and there was no time allotted for discussions which disappointed some participants but was made up by lively discussions during the breaks.

The General Assembly elected the next President, Keith McDonald (US ION) and San Diego was selected as the site for the next

Congress in 1999, coincident with the US ION Annual Meeting.

Participants were treated to an evening tour of the Amsterdam canals with a welcoming reception by the Amsterdam Harbor Superintendent, representing the Mayor.

## BAH MEETING HIGHLIGHTS BROAD LORAN-C USER BASE

ILA members were prominently in attendance and participation at the September user meeting held by Booz-Allen and Hamilton, contractor to U. S. DOT for the congressionally-directed Loran-C continuation report. There was good attendance by weather and timing interests in addition to the various transportation principals; many were impressed to learn of the critical timing needed for cellular phones, etc., and how Loran-C is working there on behalf of millions of users daily. Support for continued Loran operation was expressed either in person or by letter from some previously untapped sources - Boat US, Motorola, the King Mackerel Tournament, Texas Shrimp Association, National Party Boat Operators and others. The study has not yet reached the commercial fishermen; efforts continue.

###

## AWARD WINNERS AT ILA CONVENTION

*The International  
Loran Association  
1997 Awards Presentations*

*Medal of Merit:* Professor J. David Last, University of Wales

In his position as Head of the Radio-Navigation Group at the University of Wales, Bangor, United Kingdom, Professor David Last has been instrumental in stimulating life into Loran research in Europe. Acting in the capacity of both technical consultant and expert witness he has provided technical support and guidance on Loran issues to many organizations including the General Lighthouse Authorities, the International Association of Lighthouse Authorities, the European Union, the European Group of Institutes of Navigation and to the Northwest Europe Loran-C System Coordinating Office. In his academic achievements Professor Last has guided students in pursuit of their Doctorates in the radionavigation discipline resulting in improved propagation models for Loran and other low frequency systems. His published work on Loran is extensive gaining him numerous awards and international acclaim. These accomplishments, together with his unique presentation skills, have earned Professor Last an international reputation for integrity and clarity in influencing future global radionavigation policy.

*President's Award:* Megapulse, Incorporated

The 1997 President's award is made to the Directors, Officers and Employees of Megapulse, Incorporated in recognition of their long term, continuous and dedicated support of Loran and for the outstanding technical contributions made to the worldwide Loran-C system.

*Outstanding Service Awards:*  
Ellen G. Lilley, Executive Director of the International Loran Association

This is to certify that by virtue of her contributions well beyond her duties as Executive Director of the International Loran Association, through her dependable and careful work at the Operations Office, and through her valuable assistance at the Annual Conventions, Ellen has significantly fostered the Aims and Purposes of the International Loran Association

### 1996 Technical Symposium

*Best Paper Award:*  
"Integration of GPS and Loran-C/Chayka," Dr. Dirk Kugler  
Avionik Zentrum Braunschweig, Germany

*Best Student Paper Award:*  
"GNSS and the New Loran: Global Partners for the Next Century," Wen-Jye Huang  
Avionics Engineering Center  
Ohio University, USA

+++++

## RIN MEETS IN LONDON

*Summary Report on RIN NAV97, London, November 11-12, 1997*

Delegates to the conferences on Global Radionavigation bring with them formal papers together with considered commercial and political positions. They also carry knowledge of behind the scenes activities within their own organizations and other information gleaned from interfacing with a multitude of State government agencies. This was no exception at The Royal Institute of Navigation's Global Radionavigation "NAV97" on the European Radionavigation Plan and Commercial Applications of Satellites in Positioning, Navigation and Tracking.

While there was little that was new in the paper presentations, discussions over coffee and lunch revealed significant movement in Europe towards an independent regional satellite system. Formal indications of this were given by Dr. Boucke, President of the European Group of the Institutes of Navigation (EUGIN) which has been funded by the European Union to provide technical assistance to the Commission. Configuration options are being studied by the University of Nottingham under contract to the European Union as reported by Dr. Ashkenazi. It appears that the preferred European Navigation Satellite System (ENSS) will consist of inclined orbit

geosynchronous satellites providing a "bow tie" footprint over Europe. It is understood, but unconfirmed, that funding for such a project has been committed by France, Germany and Italy. An operation date of 2002 is being discussed.

Failure to resolve the institutional difficulty over single state control over GPS and the thrust for market share in the global radionavigation market appear to be driving the European independence although the priority of these two issues is difficult to ascertain. Of concern to this writer is the developing policy in Europe towards total dependence on space with the proposed termination of terrestrial navigation assets.

Generation, implementation and impact of the European Radionavigation Plan based upon the work done by Booz Allen and Hamilton in 1996-7 was addressed in several papers but since a definitive document has yet to be approved by the European Council and Parliament there was little of substance on which to base future actions.

Some fresh air was provided in the marketing presentation by ex-Apple Boesenberg and now CEO of Ashtech. The wild GPS market projections of the early 90s by the GPS Industry Council have been replaced by a rational assessment of the market by segment. That the market is developing niches for specific manufacturers was repeated by

several presenters. Perhaps the most surprising market development to the manufactures and sales organizations was the lead taken in agricultural applications.

Particularly worrisome and relevant to issues previously provided on this distribution was mentioned by a representative of the UK National Air Traffic Services of the failure on three consecutive days of Continental Airlines triple GPS units on board DC10s flying over France. In one incident, backup VOR was not available leaving the aircraft void of a navigation capability. There was an unconfirmed suggestion that the failures were due to GPS jamming tests being conducted in France. It is understood that formal reports of the incidents have been made.

Protection of the GPS radio spectrum held the attention of the conference and the issue received considerable discussion with technical disagreements as to the impact of MSS service intrusion into the band. Delegates to the conference responded to the issue by generating a resolution expressing concern and recommending that any decision to allow spectrum coexistence be put off until the next World Radio Conference.

There were many excellent papers but deserving of mention was the presentation by Dr. Sally Basker who provided a comprehensive status report of GLONASS and a technical appraisal of the system

design which she described as "elegant". The advantages of using both GPS and GLONASS to increase the number of available satellites was expressed many times during the conference. It was noted with disappointment that the Russians have not been able to maintain a full constellation following end-of-life of several of the space vehicles.

The conference was again held in the historic and pleasant surround of Church House adjacent to Westminster Abbey where the Clergy and lay of the Church of England meet to debate and vote. Although the individually microphoned round auditorium is conducive to discussion, this writer has yet to detect any divine intervention or contribution to the global radionavigation debate!

---

#### *In Memoriam*

Bernard Ambroseno  
(1917 - 1997)

Bernard (Barney) Ambroseno, past president of the Wild Goose Association and editor of the WGA Radio Navigation Journal, died on August 19, 1997, shortly after his 80<sup>th</sup> birthday. He is survived by three brothers and three sisters; four sons, Ronald, Bernard, Jr., Barry and John; four grandchildren and two great grandchildren.

Barney was born in Dorchester, MA, the oldest son in a family of eight children. He grew up on the family farm and attended Boston

schools. He tried to enlist in the service during World War II but was turned down because he had a silver plate in his leg, the result of being stepped on by a horse at a young age.

Instead, he went to work at Harvard University where he was engaged in the research and development of radar countermeasure equipment and design of ionospheric propagation equipment. He remained at Harvard for nine years. Later he served as Chief Engineer of a Boston based network radio station and directed the research and design department of a nationally advertised hearing aid company.

At Pickard & Burns, Inc., he directed the field engineering forces of the company and participated in special engineering studies and equipment development. These included navigation studies of Loran and Omega. In addition, he directed and carried out the "proof of performance tests" for the newly constructed VLF station in Cutler, Maine.

Barney's last position was with the Epsco-Lucas Company. Again, he was involved with Loran-C. He retired from there several years ago due to failing health.

His long time friend,  
Lois W. Campbell

++++++

*Obituary*

ILA member Masahiro Katayama brought to the Ottawa conference the sad news that Mr. Tatsujiro Shimasue, Chairman of the SENA company, Chairman of the Japan Aids to Navigation Association (JANA), and the Honourable Chairman of the Japan Lifeboat Association, died October 4, 1997. The International Loran Association extends its sympathy to his family and friends.



## ILA MEETS WITH COAST GUARD

submitted by  
Bill Brogdon

On July 21, Bob Lilley, Bill Roland and I met with RADM Hull, CAPT Inhat, CAPT Rutkovski, Capt Doherty, and LCDR D'Agnese for an hour in an informative setting concerning Loran, particularly as a GPS enhancement. RADM Hull showed great interest, asked numerous questions, and took many notes. I believe that this was a most valuable meeting for ILA's purposes, fostering a balanced mix of radio aids to navigation.

We stressed the rapidly growing technical capability of Loran, mentioned transmitter and control advances, and gave particular

attention to receiver advances. Bill Roland gave a presentation on Eurofix and Bob Lilley talked about the international situation. I discussed navigator requirements, stressing the changing use of radio aids to navigation and the need for cross-checking with ECDIS and using RNA in narrow waters on large ships.

We talked about public perception, including recent magazine articles (Soundings, Boat-US, and P&MY). The P&MY FAX poll is significant (see next article). We didn't steer this one; in fact we had no idea what the response would be. To the magazine's surprise, they got about 1000 responses, more than double the return on any previous poll. P&MY goes to the owner of every boat over 26' long. Support for Loran was quite strong, among GPS owners as well as Loran owners. We'll get the data out, probably in LL.

We suggested that the CG use a similar polling technique through the Local Notice to Mariners and press releases, plus direct mailing to key people in the maritime industry. We also discussed the previous responses that have languished in Mr. Wiggers' office, and have yet to get to the CG. Phil D'Agnese was going to recover them.

We had a good discussion of costing, focusing on mariner costs and the costs of reduced safety. We mentioned the problem of converting Loran-C TDs to latitude and longitude, and the value of

underwater positions.

RADM Hull plans to take the initiative to meet with the Commandant to discuss Loran. The focus on new Loran technology and particularly its synergistic effect with GPS may well be the key to this. We hope to get a Eurofix test in this country.

## POWER & MOTORYACHT POLL SHOWS OVERWHELMING SUPPORT FOR LORAN-C

Power & Motoryacht FAX poll,  
1000 responses, July 1997  
(Number under each answer refers  
to the fraction of responses.)

Question	Ans:	A	B	C	D	E
1 Boat length:	24-32'	33-48'	49-60'	over 60'		
		.414	.514	.08	.018	
2 Boat age:	new	1-3 yr	3-5 yr	5-10 yr	over 10	
	38	.074	.126	.452	.308	
3 Boat use:	w/e crs	long cr	fishing	diving		
		.502	.37	.484	.104	
4 Own equip:	GPS	L/C				
	.23	.856				
5 Rely on more:	GPS	L/C				
	.178	.798				
6 Other elect:	autopilot	depthfin	elec ch	radar		
		.518	.72	.328	.538	
7 Interfaces:	autopilot	depthfin	elec ch	radar		
		.364	.202	.246	.266	
8 L/C repeat:	except	v good	good	poor	N/A	
		.554	.362	.04	.026	.022
9 GPS repeat:	except	v good	good	poor	N/A	
		.08	.19	.238	.102	.298

10 L/C reliab: except	v good	good	poor	N/A
	.342	.522	.092	.042 .018
11 GPS reliab: except	v good	good	poor	N/A
	.124	.268	.182	.042 .296
12 Impact:	heavy	moder	slight	none
	.546	.288	.054	.114
13 Shutdown?	support	oppose		
	.076	.924		

For information contact  
Monica Maldonado  
P&MY 212- 462-3638

### **LOCUS ANNOUNCES ADVANCED LORAN MODULE FOR USE WITH COMBINED LORAN/GPS RECEIVERS**

Madison, WI, December 18, 1997  
- At its headquarters today, Locus, Incorporated announced the launch of a new version of its Loran receiver to offer as a module for avionics manufacturers. The advanced technology will provide manufacturers and users with a module to incorporate into a combined Loran and Global Positioning System (GPS) receiver for the worldwide transportation market utilizing satellite signals and signals from ground-based Loran transmitters.

"Locus decided to embark on this important Loran/GPS receiver development program because of the substantial new interest in Loran in the United States and a growing market for the

technology internationally", said President Dr. Linn Roth. "Because of its compatibility with GPS, there is a clear recognition that Loran is the most suitable, and necessary, complement to satellite technology in numerous transportation, telecommunications, government, and military applications. The Loran signal will provide an alternate or backup to the GPS signal in the event the GPS signal is jammed, turned off, or lost in any other way."

The Avionics Engineering Center at Ohio University in Athens, Ohio has performed extensive tests to validate the advanced Loran receiver technology and will continue to participate in the validation program.

The new Loran/GPS receiver will offer substantially improved performance over conventional Loran receivers in use today. These improvements will include:

- Automatic acquisition and tracking of up to 40 Loran transmitters simultaneously
- New antenna technologies that virtually eliminate P-static interference
- Provision for differential Loran
- Provision of DGPS through Eurofix
- Increased geographic range, including transoceanic coverage

The performance improvements provided by this new technology are also expected to address problems encountered in previous attempts to certify Loran receivers for certain non-precision aviation applications.

The new receiver technology will provide users with a single, combined GPS/Loran receiver that promises redundant, yet completely independent radionavigation capabilities, as well as differential Loran and differential GPS. Prototype systems are expected to be available to avionics manufacturers for integration and certification in approximately 10 months.

This announcement by Locus comes on the heels of a just-released report in Washington, DC of the President's Commission on Critical Infrastructure Protection. That report identified sole-means national dependence on GPS as a deep concern and recommended use of backup means to eliminate future national vulnerabilities due to excessive reliance on satellite technology. Investment in Loran research and development programs was stymied in recent years when the US Department of Transportation radically altered long-standing radionavigation policy, threatening termination of Loran in the year 2000.

Locus has also launched the Loran/GPS receiver in response to recent worldwide developments of the Future Air Navigation System. Most recently, several European nations including Germany, France, The Netherlands, Ireland, Denmark, and Norway have decided to implement a Loran capability called Eurofix to distribute differential GPS (DGPS) corrections because the

technology is a most reliable, cost-effective complement to GPS.

Internationally, there is recognition that satellite signals are "single thread" systems, vulnerable to disruption by naturally occurring events, as well as intentional and non-intentional man-made interference. An alternate ground-based signal is needed. Loran provides such a system with proven performance, accuracy, and reliability. It is anticipated the European Loran transmitter modifications permitting the DGPS corrections utilizing Loran will be implemented in about two years at a cost of approximately \$3,000,000, and the system can be harmonized worldwide.

More information can be obtained by contacting Dr. Linn Roth at 608/244-0500 or email: roth@locusinc.com.

---

### *President's message*

The prospects for long-term LORAN-C continuation in the United States are improving. There is agreement on a fundamental issue: no single aid to navigation is reliable enough, or possesses the necessary integrity, to stand alone. This is where Loran-C shines, augmenting GPS. Its independent operation, its vastly different frequency, its dedication to civilian needs, and its proven

reliability are highly valuable characteristics in their own right. As a GPS supplement, Loran-C removes many of the safety limitations of that excellent satellite system.

The following factors are important in supporting the need for LORAN-C:

- The Congress has directed the Administration to continue it in operation.
- The Presidential Commission on Critical Infrastructure Protection has identified sole reliance on GPS as a weak link in communication and navigation.
- The NTSB Report on the Royal Majesty grounding directs the U.S. Coast Guard to submit a proposal to IMO that requires separate independent position inputs to Integrated Bridge Systems.
- The new IMO standards have incorporated that requirement, prior to any USCG input.
- Classification Societies are making similar requirements for Integrated Bridge Systems.
- The National Airspace Architecture exhibits a critical weakness with only GPS-based systems.

There has been an outpouring of support to the DOT study that Booz Allen and Hamilton is carrying out. People are citing the safety requirement, the sunk cost of investment by users, the high repeatability of LORAN-C, the inability to convert TD readings to accurate latitude and longitude, and the protection against simultaneous interference.

Loran-C modified by Eurofix

continues to provide high-accuracy differential GPS corrections over long distances. NELS has announced that they will install Eurofix in all nine transmitting stations, and the U.S. Coast Guard is planning to conduct tests here.

Locus, Inc. has announced a new LORAN-C/GPS/differential receiver module, based on their highly successful LAD-LORAN receiver. At least three other organizations are also working on advanced combined receivers.

The U.S. Department of Transportation has sent the 4.65 million dollars for Loran-C improvements that Congress in this year's appropriations to the Coast Guard, and the Coast Guard also is working to use the 3.0 million from next year's appropriation to ensure that LORAN-C can continue in operation beyond the current termination date.

The ILA e-mail system is quite strong and growing stronger. More members are getting on line and discovering how easily and quickly they can communicate with the Board of Directors and other members. Check out our Internet Website for the latest information, as well.

We had an excellent 26th Annual Convention and Technical Symposium, in Ottawa, Ontario, Canada, 6-9 October 1997. Ottawa is a delightful and convenient location. We owe many thanks to General Chairman John Butler, and Conference

Manager David Waters, who have worked hard to make this convention an outstanding one.

Bill Brogdon  
President



## **Announcement and Call for Papers for the ILA 1998 Convention**

The International Loran Association announces the 1998 Convention and Symposium. The symposium will be held from 12 to 16 October 1998 at the Ferncroft Conference Resort in Danvers, Massachusetts, USA (just North of Boston). This event will be notable in the resurgence of Loran-C as a complement to GPS. There will be technical papers on new and exciting developments in Loran and its interaction with GPS. Noted speakers are being invited to present their prognostications, and manufacturers will display their newest technology.

Authors are invited to submit abstracts for review and selection for presentation. Submissions must be received by 1 March 1998 and may be sent by mail, fax or snail mail to either of the Technical Co-chairmen:

*Europe:*

Prof. David Last

SEECs,  
University of Wales, Bangor  
Gwynedd LL57 1UT, UK  
Fax: +44-1248-681031  
email: jdl@navaid.demon.co.uk

*North America and Asia:*

Robert Lilley  
Illgen Simulation, Inc.  
130 Robin Hill Road, Suite 200  
Goleta, CA 93117, USA  
Fax: +1-805-692-2334  
email: rlilley@illgen.com

Manufacturers and organizations desiring to do so will be afforded the opportunity to have table displays at the convention, and are asked to support the icebreaker and international receptions. The cost of table space is yet to be established, but manufacturers should contact the Display Coordination Chairman, Gene Brusin, at Megapulse, Inc. by 1 March to assure that space will be available. We will establish the cost by that time. Voluntary contributions in support of the two receptions will be recognized by signage at the receptions.

Contact by email:  
gbrusin@megapulse.com

Questions and requests for registration and general information should be directed to the General Chairman:

Bill Roland  
Megapulse, Inc.  
8 Preston Court  
Bedford, MA, USA  
Tel: +1-781-275-2010  
Fax: +1-781-275-4149  
email: broland@megapulse.com



## **MOSCOW97 CONFERENCE**

The following are the Conclusion and Resolution coordinated by Peter Kent and adopted at the Moscow 97 Conference held in Moscow at the end of June. The Conference was well attended and was considered by participants as a useful contribution to Global Radionavigation Planning. Its success prompted the decision to hold a third Conference in Moscow during June of 1999. Those attending and those that missed this conference might want to make a note of the date.

- John Beukers

## **THE SECOND INTERNATIONAL RADIONAVIGATION CONFERENCE**

**on**

### **"PLANNING FOR GLOBAL RADIONAVIGATION"**

(Moscow, June 1997)

#### **Conclusions of the Conference**

Taking account of the documents presented during the technical sessions and the associated discussions the following Conclusions of the Conference were agreed:

1. Although developments since the 1995 Conference had been made at ICAO and IMO, aimed at future radionavigation services for the aeronautical and marine services respectively, it was agreed that further and closer co-ordination would certainly assist in avoiding duplication of efforts while identifying possible gaps. Having noted significant progress in the ITU studies on the land mobile service it was considered that better co-ordination between all the organizations and services concerned is also needed.

2. The international coordination on the provision of radionavigation services taking place in some regions of the world was noted with appreciation. However, it was regretted that little or no progress had yet been made on a global basis.

3. The development by the European Community of a multi-modal European Radionavigation Plan was noted. However, it was recognized that in global terms the area to be covered by the plan was limited.

4. The co-ordination between some Western, Central and Eastern European countries on radionavigation matters was considered to be a significant development toward a future radionavigation plan covering a larger area of the world and should be encouraged further.

5. The recognition of GPS and GLONASS by IMO and ICAO for general purpose navigation by marine and aeronautical traffic was noted. The further development and introduction of systems to augment GPS and GLONASS and enhance the accuracy, availability and integrity of GPS and GLONASS, as well as the integration of satellite data with information from autonomous navigation systems of dynamic objects, is expected to make the systems more suitable for multi-modal world-wide civil use.

6. At present various users apply different co-ordinate systems for global navigation. In this regard it was noted that ICAO has already made the adoption of WGS-84 mandatory as the common geodetic reference datum, for civil aviation use in its 185 Contracting States with effect from 12 January, 1998 and IMO is studying the possibility of using WGS-84 and PE-90 systems as basic geodetic datums for maritime users.

It was considered that successful and safe global navigation needs the application of a single/unified co-ordinate system. To achieve this, international co-operation in the field of definition of the appropriate coefficients of the main co-ordinate systems (WGS-84, PE-90 and INRT-94) should to be undertaken.

7. There would be operational, technical and financial advantages if radionavigation services were planned on a multi-modal global basis. Such planning should cover the civil requirements of all present and potential aeronautical, marine, land and other users of radionavigation services and should take due account of the relevant requirements developed by appropriate organizations. Co-ordinated arrangements should be made through appropriate international organizations for inter-active consultation with users on the status, characteristics and performance of systems provided.

8 The Conference should adopt a Resolution addressed to appropriate organizations supporting active efforts to co-ordinate the various activities being undertaken in the world on radionavigation systems and services.

9. There would be benefit in the adoption of an International Convention for the creation and operation of a global radionavigation system to meet the requirements of maritime, aviation, land and other users. It was considered that this possibility should be further developed at the next Conference.

In view of the success of the Conference it was agreed that a third International Radionavigation Conference on "Planning for Global Radionavigation" should be held in 1999.

### Conference Resolution

In accordance with Conclusion No. 8 of the Conference the following resolution concerning a world-wide radionavigation plan was prepared and adopted during the concluding session:

Resolution of the Second International Conference on "Planning for Global Radionavigation" (Moscow, June, 1997)

#### The Conference

RECOGNIZING the studies presently being carried out by ICAO, IMO and the European tripartite group (European Community, European Space Agency and Eurocontrol) into civil satellite radionavigation systems,

RECOGNIZING ALSO that:

a) the Governments of the United States of America and the Russian Federation, respectively, has made the GPS and the GLONASS satellite radionavigation systems available to civil users. The offer of these systems by both Governments to ICAO and IMO has been accepted by the organizations;

b) the European Community and United States agencies are planning to use the radionavigation facilities in the third generation of Inmarsat satellites, and in other satellite systems, to enhance the performance of the GPS and GLONASS systems,

RECOGNIZING FURTHER that the ITU is responsible for the allocation and protection of frequency spectra for radionavigation and satellite-radionavigation services and in particular for those related to safety;

NOTING the development of regional radionavigation services in Western, Central and Eastern Europe and the Far East, based on the terrestrial Loran-C and Chayka systems,

NOTING ALSO the development by the United States of America, the Commonwealth of Independent States and the European Community of Radionavigation Plans for their respective areas of interest,

NOTING FURTHER the Conclusions of the Second International Conference on "Planning for Global Radionavigation", Moscow, June 1997 (Annexed to this Resolution),

CONSIDERING that co-ordination of the various activities related to radionavigation could result in a multi-modal service for use world wide and enhance safety of travel, promote efficient transportation services and improve environmental protection,

CONSIDERING FURTHER the advantages for all aeronautical, marine, land and other users of radionavigation facilities if an efficient multi-modal integrated service was to be provided in a cost-effective manner:

**RESOLVES**

A. that the United Nations be invited to:

1. consider the economic and operational advantages to all countries of a possible integrated multi-modal global radionavigation service; and,
2. request its appropriate Specialized Agencies and other relevant international organizations to make efforts to co-ordinate their activities in the field of radionavigation with the objective of establishing an integrated multi-modal global service.

B. that this Resolution be submitted to the United Nations for its consideration and to ICAO, IMO, ITU, Inmarsat, WMO, IHO, the European Commission, IALA and other interested Organizations for information.

###

**Loran Lines  
Formerly  
the Goose Gazette**

*Loran Lines* is an official publication of the International Loran Association (ILA).

**ILA 1997 Election Results**

The Nominations and Election Committee reports that President William Brogdon was re-elected for a second term. Elected to three-year terms as Director were: Robert Lilley, William Roland, Walter Dean

and Durk van Willigen. Carl Andren was elected to a one-year term, filling in for the third year of Bill Brogdon's directorship.

Therefore: For 1998, your ILA Officers and Board are:

William J. Brogdon, President  
Robert Wenzel, Vice President  
(Booz-Allen and Hamilton)  
Walter Dean, Secretary  
(Waldean Engineering)  
Carl Andren, Treasurer  
(Institute of Navigation)  
Dale Johnson, Past President  
(Morrow Aircraft Corp.)

Elected Directors:

James Alexander  
(Alexander Marine  
Transportation)  
John Beukers  
(Beukers Technologies)  
David Last  
(Univ. South Wales)  
Robert Lilley  
(Illgen Simulation)  
Edward McGann  
(Megapulse)  
Mike Moroney  
(DOT Volpe Center)  
Martin Poppe  
(Cambridge Engineering)  
William Roland  
(Megapulse)  
Durk van Willigen  
(TU Delft)

## Appointed Directors:

John Butler  
(Canadian Coast Guard)  
Linn Roth  
(Locus, Inc.)  
William Polhemus  
(Polhemus & Associates)

New officers and directors took office at the 1997 Convention and Technical Symposium.

Check the ILA home page for addresses, telephone numbers and e-mail for your officers and directors.  
<http://www.ent.ohiou.edu/avn/loran/>

## Printer:

Messenger Publication Service  
Athens, Ohio 45701

-----

## LETTER TO THE EDITOR:

### KEEP LORAN TO BACKUP GPS!

I am in favor of keeping the LORAN system in operation indefinitely, and certainly well beyond the proposed year 2000 phase-out. I'm an instrument rated private pilot and an occasional coastal and off-shore recreational sailor. In the last four years, I've had the privilege and good fortune to safely navigate thousands of miles with GPS and LORAN, almost always using both at the same time. Both systems are excellent, accurate and reliable, and their navigational outputs are practically indistinguishable. In my experience, LORAN is at least

as reliable and accurate as GPS, and both are superior to the older VOR and NDB radio nav aids.

The proposed shutdown of LORAN is extremely unwise. The projected cost savings is insignificant if not illusory. Eliminating LORAN will compromise navigational safety by requiring universal dependence on a single radio nav aid - GPS; this concept runs directly contrary to accepted principles of safe navigation: Never Rely on a Single Nav aid.

Those wanting to terminate the system callously ignore the vast number of LORANs already installed in private aircraft and vessels, as well as the tremendous additional financial burden imposed on their owners by having to replace them with GPS receivers. These existing LORANs represent large individual investments made in reliance on the government, not to mention the huge prior commitment of taxpayers' money to the LORAN system.

The only apparent justification for the shutdown is cost savings in annual maintenance, based on the mistaken assumption that LORAN is obsolete, redundant and unnecessary in light of the advent of GPS. However, the purported savings is relatively minuscule: only \$17 million annually according to Congressional reports, and this in a trillion dollar budget. Compare the \$50 million/yr cost of maintaining the truly obsolete, less accurate and less reliable VOR/DME nav aids, or the billions for the GPS system itself. LORAN is overwhelmingly the most cost effective system. If

savings is the issue, then I suggest that the operation and maintenance of LORAN might be contracted out to private industry for a lot less than even the tiny amount the government now spends for its own people to run it.

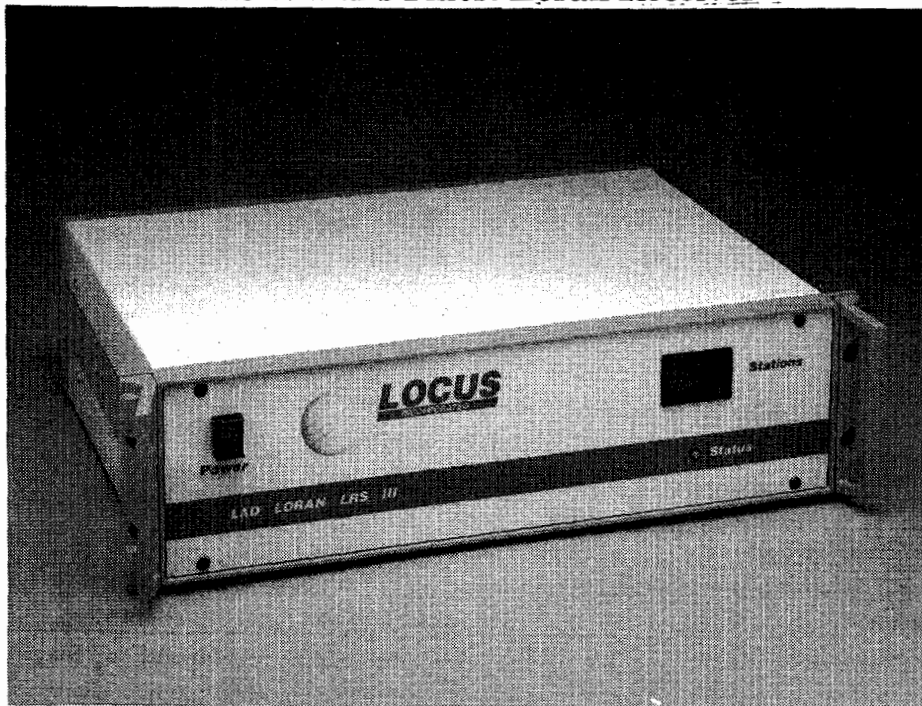
Diminished safety is the worst thing about the proposed shutdown. Having multiple, redundant, independent systems increases reliability, and is therefore essential for safe navigation. Neither GPS nor LORAN is completely reliable all the time, and probably no single radionav system can ever be. But using the two independent systems together, and crossing checking them against each other, provides a level of accuracy, reliability and confidence in navigation that no single system can ever match. I've experienced several instances of poor GPS geometry while the LORAN was working fine, but I've never seen both systems down at the same time.

Accordingly, continuing LORAN as a backup or alternate to GPS is vital to navigational safety, and it gives the taxpayers the best return on their dollars. So please keep LORAN going. Thank you.

Tim Carroll  
10 Dec 97  
Email:  
[tillmanc@sprynet.com](mailto:tillmanc@sprynet.com)  
Memphis, TN

\*\*\*\*\*

**The World's Finest Loran Receiver**



**LOCUS' LAD-LORAN LRS III**

*Monitoring/Control, Timing, and Other Applications*

- Autonomous operation
- Simultaneous, 9-chain (40 station) monitoring
- Quantified signal parameters
- Complete PC interface/control
- 12 processor controlled filters
- Software selectable clock and monitoring outputs
- Special 1, 5, 10 MHz Cesium input
- 46 cm antenna
- Custom versions available

LOCUS, Incorporated

1842 Hoffman Street, Madison, Wisconsin 53704 USA

Tel: 608/244-0500 FAX: 608/244-0528 Email: locus@locusinc.com Web: <http://www.locusinc.com>

## EDI's LCS-212 Dynamic Loran Simulator Offers The Best Value For Your Money.

- Variable speeds to several hundred knots
- .1  $\mu$ sec resolution
- Output levels: 10 mV to 1V, P-P across 50 ohms.
- Three separate isolated outputs
- Pulse envelope calibrated to less than 1.5% rms distortion
- ECD error less than .1  $\mu$ sec
- RS-232 option allows for full control of GRI/TD's from your PC

The LCS-212 is an excellent tool for production, training, and service applications. Alignment of loran driven auto-pilots, loran interfaced plotters and other integrated navigation systems becomes a snap instead of a major chore. And all EDI products are fully guaranteed for 1 year and come



## Period.

with a 30-day money back trial period. Call 1-800-421-2968 today to find out just how far your money can go.

**Electronic Devices, Inc. EDI**  
P.O. Box 15037  
Chesapeake, VA 23320 Phone/Fax 1-800-421-2968

**Loran Lines**  
**International Loran Association**  
150 South Plains Rd.  
The Plains, Ohio 45780

Bulk Rate  
U.S. Postage  
**PAID**  
Permit No. 9  
Athens, Ohio  
45701