



The Goose Gazette

The newsletter of the *Wild Goose Association*,
the international Loran radionavigation forum.

Volume 92-4 - News of the Fall, 1992

President's Message

Happy New Year! And sincere wishes for a healthy and prosperous 1993 for us all. Ellen and I came through the family/guests/parties/gifts season in good shape; our only regret is that we did not get nearly enough work done on the Christmas Cards. I'll take advantage of this space to wish every reader a Happy Holidays from the Lilleys!

Your Association is already planning for our October 19-21, '93 Technical Symposium in Santa Barbara, California. John Illgen, our General Chairman, reports that plans are well in hand. Don't wait for the Call for Papers; plan to submit your abstracts (or even the fully-written paper!) soon.

Manufacturers! We'll attract the U. S. people, but we can expect added attendance from the European countries after our successful Birmingham, England meeting last fall. Plan now to exhibit or to support a hospitality suite.

You'll see elsewhere in this issue that Loran-C is indeed an integral part of the future navigation mix in the U. S. Loran-C has received strong backing from its providers at the Coast Guard and from the various RTCA working groups putting together the Minimum Operational Performance Standards (MOPS). We're in the new Federal Radionavigation Plan as active until the year 2015.

You'll also read about the death of John B. Galipault, who contributed to the very first meeting of the FAA/NASAO Loran-C Planning Work-Group, in Columbus, Ohio, in February, 1985. This Group was the first of its kind, bringing together FAA, users, Coast Guard, and independent scientists and engineers, to accelerate the implementation of Loran-C in the National Airspace System. John helped us then, and remained a strong supporter of Loran-C throughout his career. We will all miss him.

Again, welcome to 1993 and to the 21st year of the Wild Goose Association.

Bob Lilley

Wild Goose Association Technical Symposium

Santa Barbara, CA. October 19-21, 1993

The War Between The Systems

Loran-C has been taking the brunt of a persistent effort to discredit it by people in the GPS community, many of whom know better. GPS product claims often:

- Ignore selective availability.
- Specify receiver accuracy in CEP or RMS, apparently to get smaller numbers.
- Compare GPS repeatable accuracy, without S/A and in CEP, "15 meters" with Loran-C "1/4 mile accuracy."
- Confuse survey techniques with navigation techniques.
- Exaggerate speed and course accuracy.
- Ignore chart and coordinate system errors.

This effort has been so effective that it is misleading boat owners with Loran-C receivers to install GPS as a replacement, rather than as an additon. This ignores one of the basic rules of navigation: use more than one method of fixing positions. Navigational texts emphasize this, and most GPS manufacturers do, too:

Bowditch: "It is good practice to use *all* available information, and not rely solely upon a single aid. ... The navigator should keep in mind the possibility of failure of some item of equipment."

GPS manual: "Never rely solely on one device for navigating."

GPS manual: "The prudent navigator should never rely solely on one device, to the extent of endangering life or property"

GPS manual: "When in actual use, carefully compare indications from the (rcvr.) to all available navigation sources including the information from other NAVAIDs, visual sightings, charts, etc."

GPS manual: (no similar precautions)

IALA Policy: "...there will be a requirement for a terrestrial radionavigation system, to complement global satellite navigation systems for the foreseeable future;"

Question: If navigators remove Loran-C when they install GPS, what system should serve as the alternate to GPS?

The Goose Gazette is an official publication of The Wild Goose Association (WGA). The Gazette is published quarterly, with cutoff dates of 1 March for the Winter issue, 1 June for the Spring issue, 1 September for the Summer issue and 1 December for the Fall issue.

Address correspondence for the WGA to the new Operations Office:

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Wild Goose Association
150 S. Plains Road
The Plains, Ohio 45780
(614) 797-2081 voice and Fax

Dr. Lilley also may be reached at:

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Athens, Ohio 45701
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WGA Charter

"The Wild Goose 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 Wild Geese.

"The Association is 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."

Illgen Simulation Technologies, Inc. Reorganizes

Illgen Simulation Technologies (ISTI) has appointed Mark Mandrell as Director, Finance and Contracts. Mr. Mandrell has also been appointed Chief Financial Officer and Treasurer.

David Geldhill has been appointed Vice President of the Santa Barbara Technical Operations. He was previously director of ISTI's Advanced Development Laboratory.

John Dewey has been selected to manage ISTI's Eglin AFB, Florida, operations. Dr. Philip Feldman has been promoted to Senior Engineer responsible for communication system simulation and system engineering.

The reorganization positions ISTI for further growth in 1993, following approximately a 28% growth in 1992. ISTI sees significant growth in 1993 due to the emphasis being placed on modelling and simulation both in government and in commercial sectors. For further information, contact Mr. John D. Illgen, President/CEO, Ph. 805 968-8661

Membership

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

Individual

Two classes of individual membership are available: annual and life. The annual membership is \$25.00 for the first year and \$20.00 annually after the first year. Life membership is \$200.00.

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 WGA activities. Class 1 permits nomination of ten regular members from the corporate member; Class 2 permits five. Dues for Class 1 are \$435.00 for the first year and \$400.00 afterwards. For Class 2, dues are \$220.00 and \$200.00.

Associate membership is provided for organizations which desire only to receive WGA publications. Associate membership is \$105.00 for the first year and \$100.00 annually thereafter, and does not carry the privilege of voting or holding WGA office.

Loran-C Information On-Line

The Coast Guard has added Loran-C and Omega status information to its Global Positioning System Information Center (GPSIC) electronic bulletin board at the Omega Navigation System Center in Alexandria, Virginia. The bulletin board now carries information on all Coast Guard provided radionavigation systems. Modem settings: 8 data bits, 1 stop bit, no parity, full duplex, 300-14,000 baud.

New numbers: BBS: 703 313-5910
Voice recording: 703 313-5907
Phone: 703 313-5900 (24 hours)

LORAN-C: Not yet an Endangered Species

Coast Guard Clarifies Loran Policy With Strong Support

During his speech at a U. S. Coast Guard - industry conference in Long Beach, California, Admiral Kime, Commandant of the Coast Guard, was quoted by an attendee as saying that Loran-C would be turned off except for the midwest stations, and replaced by differential GPS. The implication was that this would be happening sooner than specified in the Federal Radionavigation Plan. Reliable Sources within the USCG state that Admiral Kime was probably misquoted and did not make such a rash statement during his speech -- the USCG position is still in accordance with the FRP. USCG Eleventh District officials notified Headquarters of this matter and the possible confusion that may have arisen.

As a result of this and other concerns, Capt. J. F. Weseman, Chief of the CGHQ Radionavigation Division, had his Radionavigation Information Officer prepare a position paper on Loran-C, including excerpts taken from 1992 draft of the Federal Radionavigation Plan. Due to the importance of this paper, we are printing it and his letter in full in this issue.

(letter retyped for publication)

16562
Ser: 93/10049
DEC - 9 1992

Wild Goose Association
Attn: Bob Lilley, Pres.
150 S. Plains Rd.
The Plains, OH 45780

Dear Dr. Lilley:

My division is responsible for managing Coast Guard-operated Loran-C stations worldwide. I am concerned that there is growing public confusion about the future of the Loran-C system (i.e., how long is Loran-C expected to be around?) due to the emengence of the Global Positioning system (GPS). I have enclosed a paper on current plans for Loran-C for your consideration as a future article for "the Journal of Loran Navigation" or "The Goose Gazette." If you chose to print it, or have any questions about the paper, please contact the author, Ensign John Thompson, at 202-267-0295. Thank you.

Sincerely,

/s/
J. F. Weseman
Captain, U. S. Coast Guard
Chief, Radionavigation Division
By direction of the Commandant

by ENS John A. Thompson, USCG
Radionavigation Information Officer
USCG Radionavigation Division
(G-NRN) 18 Nov 1992

With the advent of the new satellite based Global Positioning System (GPS), there is a growing concern among Loran-C users that their time-tested navigation system will be eliminated in the very near future. The closure or turnover of several overseas Loran-C stations is adding to the controversy. Rumors of the demise of the Loran-C system couldn't be further from the truth. Although the Coast Guard is withdrawing from overseas Loran-C operations by the end of 1994 as mandated by public law, most nations will continue to operate these stations for their own needs.

In many cases, they will actually expand the coverage areas. The U.S. Coast Guard continues to fully support, improve, and expand Loran-C facilities in the continental U.S. and Alaska. In 1991, two new Loran-C chains began transmitting to complete the coverage over the continental U.S. In addition, modernization of older facilities continues.

The number of Loran-C users has increased thanks to its use by the aviation community and to new applications by terrestrial users. This trend is expected to continue despite the arrival of GPS. Due to the very large size of the Loran-C user community, continued reliance on Loran by foreign governments, and new non-navigation applications, Loran-C is expected to be around until at least 2015.

Presently, Loran-C is one of the most widely used radio-navigation systems available. The Loran-C community consists of over 600,000 users worldwide including maritime, aviation, and terrestrial users. Many of these are recreational boaters and small commercial
(continued on page 4)

Loran-C: Not Yet an Endangered Species. (cont. from page 3)

vessel operators who take advantage of Loran-C's very low cost and excellent repeatable accuracy. Loran-C remains as the designated federally-provided radionavigation system for civil marine use in the U.S. coastal waters. The Federal Aviation Administration (FAA) has also designated Loran-C as a supplemental system for use in the National Airspace System.

In the Pacific, Loran-C coverage will remain largely unchanged. The only exception is the recently closed *Central Pacific* chain, located in Hawaii, that was originally intended to provide coverage for a DOD missile test range. Its loss is not expected to significantly affect civil users.

The Republic of Korea (ROK) has taken over the operation of the former *Commando Lion* chain (now called the *East Asian* chain) and will relieve the U.S. Coast Guard of control and monitor duties by the end of 1992. In addition, the ROK is actually in the process of upgrading the two stations located in Korea. Japan will soon assume operations and upgrade the equipment of four of the five stations that form the *Northwest Pacific* chain. These two chains provide coverage for both Korean and Japanese waters. A new chain (the *Russian-American* chain) is being completed jointly by the United States and Russia and should be operational by the end of 1993. This chain was formed by dual-rating an existing Coast Guard station at Attu, Alaska and two Russian stations, one at Petropavlovsk on the Kamchatka Peninsula and one at Alexandrovsk.

In the Atlantic and in Europe, Loran-C coverage will continue as before with only a few minor changes. Several Northern European nations have signed an agreement to assume control of four of the five stations in the North Atlantic and Northern Europe that presently form the *Norwegian Sea* chain. Their plans include not only upgrading these facilities, but adding three additional stations and eventually reconfiguring

the chain. Canada is building a new station at Comfort Cove, Newfoundland. This station will replace some of the Loran-C coverage of the Labrador Sea which would otherwise be lost due to the potential closure of the station in Angissoq, Greenland.

Spain, Italy, and Turkey have also expressed an initial desire to assume operations of facilities within their borders. This would ensure continuing operation of the *Mediterranean Sea* chain following the December 1994 closure date.

Several other nations have been operating their own Loran-C chains for years. Russia operates at least two chains independently. These are the *Western USSR* chain and the *Eastern USSR* chain (presumably, the names will soon be changed). There are two chains operated by the Saudi Arabians that are, again, independent of U.S. control. There has been no indication of potential closure of any of these systems. In fact many other countries including China and India are actively developing new Loran-C systems for their own use.

Loran-C will also better serve the aviation community in the future. The FAA has already designated this system as an approved enroute navigation system. The Coast Guard and FAA are working towards approval of Loran-C as an approach navigation system. To date, the FAA has approved Loran-C for non-precision approaches at over twenty airports. This number is increasing with the newly expanded coverage over the central U.S.

There are many non-navigational uses of the Loran-C system with more being developed every day. One of the most important of these is the accurate time synchronization that Loran-C provides. This invaluable service is used by telephone and utility companies, television and radio services, and satellite communication companies, among others. Another use is for monitoring the location of vehicles such as ambulances, police cruisers, and vehicles carrying dangerous or precious cargos. The weather service uses Loran-C to monitor weather balloons. There

are new auto alarm systems being marketed that use Loran-C to locate stolen cars. The railroad industry is developing a Loran-based system to keep track of their trains. Another interesting use of Loran-C is for tracking animals, especially migratory species.

The Loran-C system may someday be replaced, but this is still years away. Once the decision is made to terminate the Loran-C program, a ten to fifteen year phase-out period will help protect the users' investment. For the immediate future, the Loran-C system will continue to grow and be upgraded. Loran-C users can be assured that this system will remain an accurate and affordable radionavigational aid well into the next century.

Commandant (G-NRN-1), U.S. Coast Guard, 2100 2nd St. SW, Washington, DC, 20593 Ph. 202-267-0295.

NAVY SHIPS WITH LORAN-C RECEIVERS

The U. S. Navy has selected the Megapulse Accufix (r) 500 precision monitoring and survey grade Loran-C receiver for the new Avenger class MCM (mine countermeasure) ships, the even newer Osprey class MHC (mine hunter coastal), the remaining MSO (mine sweeper, ocean) ships, and for the COOP (craft of opportunity) minesweepers. There will be 95 Loran-C receivers on these ships.

During the Gulf war, three Navy ships were damaged by mines: Princeton (CG-59), Tripoli (LPH-10), and Leader (MSO-490). The navy sent Avenger (MCM-1) and three MSO's to the Persian Gulf to counter the mine threat. Some of the Accufix (r) 500 receivers provided 24-hour per day precision navigation to minesweeping and other forces during and after the conflict.

The Navy is also using an advanced model 500N on the TAGS oceanographic ships and other vessels. The Royal Navy has purchased 19 of the 500N Loran-C receivers for use aboard major ships.

Cape Race Tower Falls on 2 February 1993

Station expected to be off air until mid-March

The 1350 foot tower at the Cape Race Loran-C station in Newfoundland fell on 2 February, damaging the transmitter building and partially damaging the new building. Fortunately the failure occurred just after working hours, and there were no injuries.

Cape Race is expected to remain off-air until approximately 16 March. The Canadian Coast Guard had planned an off-air period for approximately 25 days, starting 18 July 1993, as part of a major refurbishment project now under way. Portions of the press release for the planned off-air apply to the outage:

“The Cape Race Loran-C Station is the Whiskey secondary of the Labrador Sea Chain (rate 7930) and the Yankee secondary of the Canadian East Coast Chain (rate 5930)... The effect on the Loran-C users during this off-air period is that coverage from the two Loran-C chains will be substantially reduced.

“For users of the Canadian East Coast Chain, rate 5930, there will be no

normal Latitude/Longitude position-fixing coverage from a point approximately due east of St. Johns, Newfoundland and extending north along the coast. Loran-C coverage around the remaining waters off Newfoundland will still be available through use of the rate 5930 M-X-Z (Caribou-Nantucket-Fox Harbour) triad.

“For the users of the Labrador Sea Chain, rate 7930, there will be no *normal* position fixing coverage available. However, some degree of position fixing will still exist through the use of cross chain fixing.

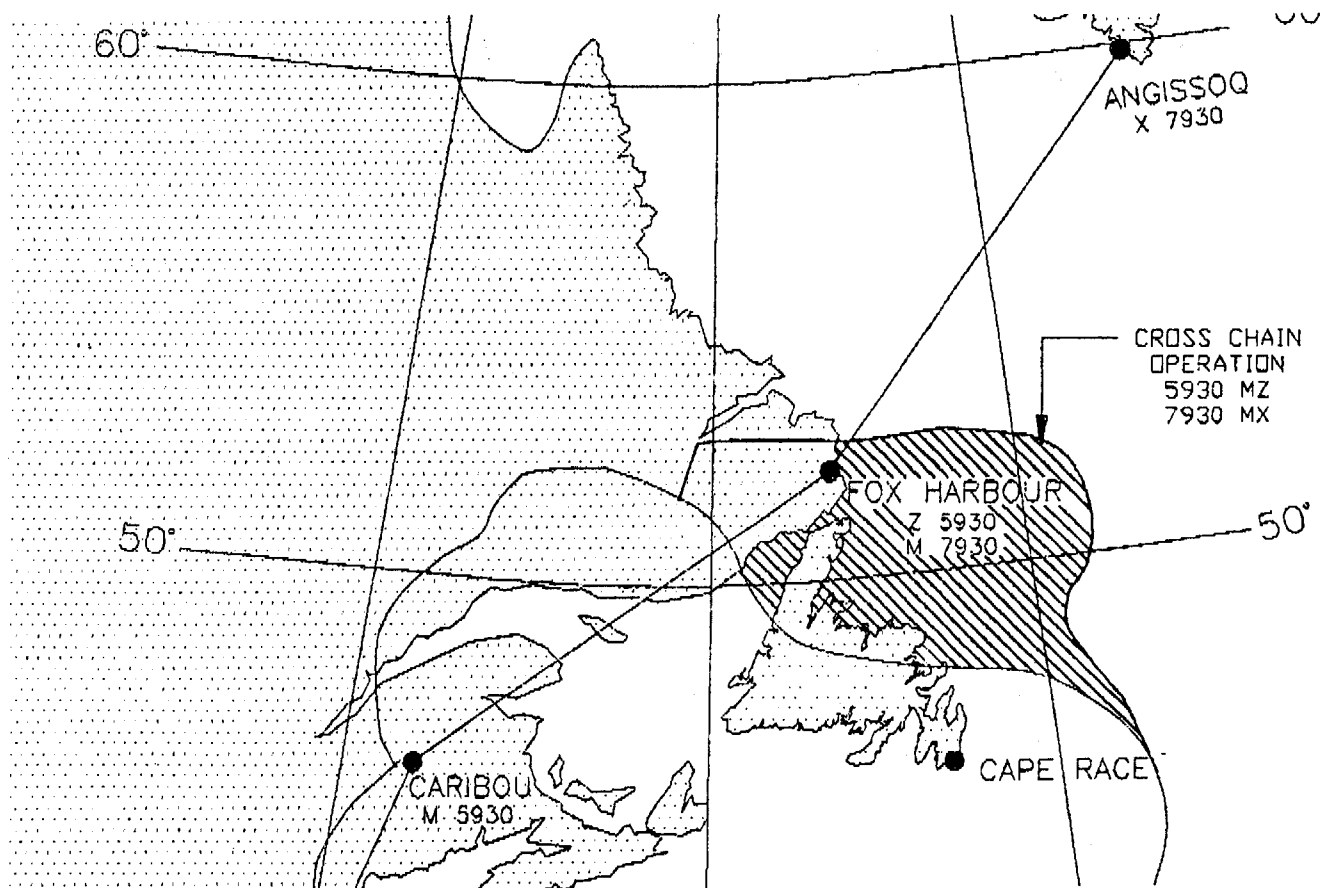
“In order to provide a Loran-C signal to the user well into the next century, the Canadian Coast Guard is constructing a new building, and purchasing new transmitting equipment. ... Substantial alterations (were) scheduled to be made to the existing 412 metre (1350 ft) transmitting antenna ... to ensure the tower meets current Canadian Standards Association (CSA) standards for

the severe ice and wind loads typically experienced at Cape Race.”

By mid-March, the station is expected to be on air using a 400' temporary antenna. Cape Race will operate at reduced power until a new tower can be erected, probably in July or August. The replacement 412 metre (1350') tower must be significantly stronger than those used in milder climates. There will be another off-air period to place the new tower in service. We expect to provide more information in the next issue of the Goose Gazette.

Transport Canada has provided instructions for using 5930 Z and 7930 W lines of position to give fixes for a significant area north and east of Newfoundland. These, and the chart of the affected area, were provided by:

Edward B. Goudie, Chain Coord.
Canadian Coast Guard,
P. O. Box 693, St. Anthony,
Newfoundland, Canada
Ph. 709 454-2392



Birmingham Convention Keynote Speech Excerpts:

Mr. Jacques de Dieu, representing the European Community Director General for Transport, gave the keynote speech to the Wild Goose Convention, Birmingham, England, on 25 August 1992. We are pleased to print excerpts from this speech, which is of great interest to WGA members.

"I am very glad and proud to be invited to give on behalf of the Directorate-General of Transport of the EC-Commission the keynote address to your twenty-first annual Convention, in particular, when it is the first time that the WILD GOOSE ASSOCIATION comes to Europe.

"I owe our American friends a very short explanation of the role of the Commission on the European scene. Together with the Council, consisting of the Ministers of the twelve EC-countries, the directly elected European Parliament and the Court of Justice, the Commission is one of the four institutions forming the European Economic Community, which is a political and economic organization, ruled by the EEC-Treaty.

"The task of the Community is to establish a common internal market and through the development of common policies, to promote throughout the Community an harmonious development of economic activities, expansion, an increase in stability, a high standard of living and closer relations between the states belonging to it. With the objective of ensuring the safety of navigation in Europe and neighboring areas, the development and improvement of aids to navigation is one of the actions which the Community is currently concerned with. This concern dictates the role of the Commission.

"The principle of subsidiarity requires that the Community should only exercise its powers where EC action is essential for the effective attainment of the Treaty objectives, and where measures by the Member States individually are insufficient to that end.

Fresh tasks are only to be taken on by the Community when they prove essential at that level, in order to protect its citizens and all those who travel through the European area without borders.

"The Commission was present at Trinity House in London, in March 1987, where the International Association of Lighthouse Authorities called a radionavigation Conference after the announcement by the United States Coast Guard to cease funding and manning all its Loran-C stations outside of the US at the end of 1994, offering at the same time to transfer all or part of Loran-C station equipment to interested host nations, when these would not be needed further by the US.

"The Commission took note of one of the main conclusions agreed by the Conference: the need to maintain, after the introduction of new satellite navigation systems, terrestrial radionavigation systems for the foreseeable future in appropriate national and regional areas.

"The Commission stressed that given on the one hand the North-European developments and the interest shown by France, Italy and Spain for a similar Loran-C system in the Mediterranean area, it was very interested in the generalization of terrestrial radionavigation system in Europe and made an offer to develop an initiative in this field.

"At the request of IALA the Commission has participated since 1990, in an IALA working group which was set up to examine the technical, operational and organizational aspects of maintaining Loran-C in the Mediterranean area. The Commission was also invited, as an observer to attend the meetings of the Northwest European Loran-C Policy Group.

"In September, 1990, the Directorate General of Transport evaluated the situation and decided that the time had come for European action. This was based upon the following determinants:

- the technical merits of Loran-C for marine, air and land navigation were demonstrated.

- the possibility to extend the system, at low costs, to the entire European area and to link it with other chains in the west and the east.

- international developments and the IALA policy with regard to aids to marine navigation and, may be the most important one in our policy-building process.

- the fact that combined satellite/Loran-C coverage will offer the highest degree of system verification and continuity of radionavigation coverage, for the benefit of safety and environmental protection.

"Without wishing to blame the US authorities, whose role was not to defend the Loran technology, it must be said that their decision to abandon Loran-C in Europe for GPS created the impression that, in the area of satellites, an obsolete technology was offered to Europe. This forum does certainly not need to be convinced that this was totally wrong.

"Recent investments in Loran technology in the continental US, and in France, international developments and of course the merits of the system itself, were laid on the table as evidence. Objections against the system were overruled.

"European action with regard to Loran-C was entirely justified due to:

- the risk of dismantlement of the basic infrastructure by the US Coast Guard, in the absence of a positive answer to their offer to the host nations.

- the intention of some Member States of the EC to withdraw from the Northwest European Policy Group.

- the lack of progress in the Mediterranean talks.

Keynote Speech from Birmingham, by Mr. Jacques de Dieu (continued)

"These elements may have seriously jeopardized the development of a European network. Therefore, anticipating the outline of its general policy with regard to aids to navigation, the Commission decided in January 1991, present a formal proposal for a Council decision on Loran-C. The proposal was fully supported by the Economic and Social Committee, an advisory body in which the industry and the social partners are represented. Taking note of a change in the policy in the UK and endorsing constructive amendments of the European Parliament, the Commission, in November 1991, amended and widened its proposal into a proposal on radionavigation systems for Europe.

"With the formal adoption of the decision on radionavigation systems for Europe on the 25th of February, of this year, by the Council of Ministers of the European Communities, the first decisive step into the establishment of the radionavigation policy in the European Community was taken.

"The European Community, recognizing the need for a terrestrial radionavigation system, states that the establishment of regional Loran-C systems must ensure coherent and complete coverage of the European maritime area.

"To this end, the Member States and the Commission are obliged to support efforts to set up a worldwide radionavigation system, including European regional Loran-C chains, with the purpose of enlarging worldwide Loran-C coverage in order to improve the safety of navigation and the protection of the marine environment.

"Member States are not required to abandon radionavigation systems such as Decca and Omega, either they are obliged, at this stage, to join regional Loran-C chains. Nevertheless, they have to strive and do the utmost for the realization of regional Loran-C chains in Europe.

"Respectful of the subsidiarity principle the Commission hopes that all Member States will, in due time, take

the necessary steps to set up or to join regional agreements on Loran-C. Those who decide to participate in such agreements are bound to seek to achieve the configurations which cover the widest possible geographical area in Europe and in neighboring waters.

"The most important outcome of the Council decision for the Commission is the recognition at the European community level of the need to set up a European radionavigation plan of the Member States. Taking into account the US plan and the intentions of the Commonwealth of Independent States, it is obvious that Loran-C will also play an important role in the European system.

"With regard to satellite systems the Commission already has the responsibility to reflect on the development of civil and internationally controlled radionavigation system that will meet the requirements of transport in the 21st century. Appropriate contacts with EAS, the European space agency and INMARSAT are envisaged.

"The Commission supports also the idea of the establishment of a joint IMO-ICAO planning group, to which it intends to participate actively. At this stage the Commission Services are of the opinion that the provision of appropriate radionavigation aids, with suitable requirements, mandatory if necessary, on a European level, will be of the benefit to:

- control and monitor the safe, timely and efficient carriage of people and cargo by sea, air and inland transport modes.
- offshore exploitation, marine surveys, fishing and recreational crafts.
- fleet management and emergency rescue.
- protection of the environment in areas with high density traffic and marginal weather conditions.
- cost optimization for the countries providing radionavigation aids.
- reduction of user's costs by the development of suitable low cost receivers.

"The Commission Services will discuss the policy objectives and relevant aspects with the governments of the Member states and the third countries and will try to identify the real users' requirements. Interests of the involved radiocommunication industry will not be neglected. All these commitments and intentions represent a lot of work and money.

"With regard to the financial aspects, it is worthwhile to refer to the Maastricht Treaty. A specific chapter of this Treaty is of particular interest in assessing Community contribution to infrastructure for transport and telecommunication in the field of Transeuropean networks under which conditions a future coherent European radionavigation system could be incorporated.

"Within the Transeuropean network, projects identified of common interest and financed by the Member states, could receive some specific financial support from the Community, and in addition, some financial support from the, to be set up, Cohesion Fund, which applies to Spain, Portugal, Greece and Ireland.

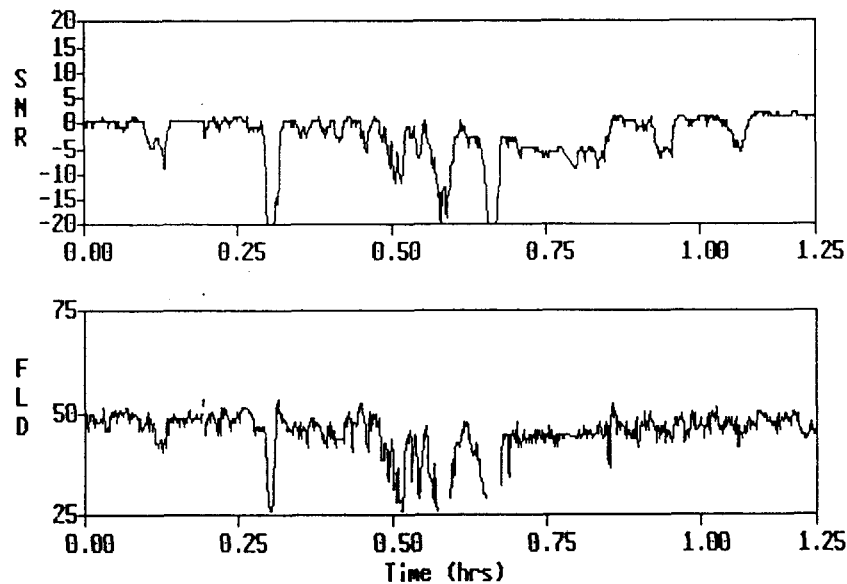
"About the recovery of investment costs for aids to navigation, the Commission Services believe that the EC dimension is appropriate, in terms of both a coherent geographical area and an institutional framework for the application of the "user pays" principle. Investigation in this field will start soon. The first step will be the gathering of information from the Member States on the cost of providing marine navigation aids.

"At the end of this review of our prospects for the future, I want to stress that I am confident about the future of Loran-C, taking account of the international developments and the very interesting and important contributions that were made to the Loran-C/GPS tutorial and, last but not least, more especially as the WILD GOOSE ASSOCIATION will continue to foster and promote the art of Loran.

LORAN-C AND GPS SIGNAL AVAILABILITY FOR URBAN NAVIGATION A CASE STUDY

A test was recently conducted within the city of Calgary to assess the availability of Loran-C and GPS signals for vehicular navigation. A course of some 70 km comprising two segments, namely a city core segment and a suburban segment, was selected. The city core segment comprised buildings with 20 to 40 stories. The suburban segment comprised one to two story residences, along tree-lined streets in some areas. The vehicle was moving at normal cruising speeds of 30 to 70 km h⁻¹. Loran-C measurements were made simultaneously on NOCUS (GRI #8290) and WCC (GRI # 5990) with a Jet 7201 multi-chain receiver and GPS measurements with a Magnavox MX4200D receiver. The theoretical GPS geometry (Elevation > 10°) was excellent with six satellites available simultaneously and a HDOP of 1.5.

Loran-C performed well in the suburban segment, except in a few locations due to the proximity of PLCs. In the city core, excessive signal attenuation occurred. The figure below shows the SNR and Field Strength of Y (Williams Lake), GRI #8290, in dB. The period between 0.5 and 0.75 hour coincides with city core measurements.



The percentages of time during which Loran-C and GPS signals were suitable for 2-D positioning for each of the city core and suburban segments are shown in the Table below. While Loran-C is decidedly more continuous than GPS, its availability is still too low for unaided navigation in the city core. A possibility being currently investigated is the integration of both systems. This option will also be studied for vehicular navigation along the mountain roads of British Columbia; an earlier study has showed the limitations of both systems in this case [Lachapelle et al, Analysis of GPS and Loran-C Performance for Land Vehicle Navigation in the Canadian Rockies, Proceedings of PLANS92, IEEE, New York].

System	City Core	Residential
Loran-C	~50 to 60 %	~90 to 100 %
GPS	~40 %	~70 %

**NEW GRI's: THE PROBLEM,
THE PURPOSE, AND THE
PROMISE**

International Loran-C after 1994

Many nations are planning to continue Loran-C operations after the USCG withdraws from overseas Loran-C operations by 31 December 1994. Most overseas chains will be reconfigured, several may be terminated, and new chains will go on air. All of these changes will require new Group Repetition Interval (GRI) assignments to ensure safety of navigation, proper positioning, and receiver operation overseas. This paper addresses the problem, describing the scope, impact, and expected dates of change. Further, this paper describes the GRI selection process and the difficulties in assigning international Loran-C chains new GRI's. In conclusion, the paper addresses the opportunities available because of the need to change and coordinate GRI selection. 11/25/92

Abstract of paper by CDR Bill Thrall

**John B. Galipault, Sr.
Nov. 4, 1930 - Jan. 3, 1993**

WORTHINGTON, OHIO -- Aviation Safety Institute President John B. Galipault, Sr. died on January 3, 1993, after suffering the effects of a massive heart attack at the age of 62. Mr. Galipault is survived by his wife, Pam; and sons David, Peter, Gerry, and John Jr; and daughters Ann, Margaret, and Abigail.

The Aviation Safety Institute and the aviation world have lost a great leader in the movement to improve aviation safety. The community of Worthington has lost a devoted civic leader, teacher, and friend.

Mr. Galipault founded the Aviation Safety Institute and has been President since 1973. He logged 8600 flight hours, and has received many notable awards. He was a strong advocate of Loran-C's contribution to aviation safety.

1993 WGA Elections

The Nominations and Elections Committee is seeking members who would like to serve on the committee and, more importantly, nominations for the offices of President and Director for 1993.

Our by-laws require nominations to be accompanied by a short biographical sketch of the nominee and a concise justification for nomination. The committee will help round up the bios for nominated candidates.

We encourage all members to consider current developments in LORAN-C and corresponding appropriate representation on the WGA's board. Beginning this year, the Board of Directors is conducting a greater percentage of their business by telephone and fax. (Two pulse communications was deemed to have too slow a data rate.)

This will facilitate greater participation by directors with travel restrictions. Nominations should be submitted to one of the following committee members:

Bruce Hensel (Chairman)
Godfrey Engineering
129 Fairfield St.
Oldsmar, FL 34677
(813) 855-4428
FAX: 855-5572

Capt. Ben Peterson
USCG Academy (dee)
15 Mohegan Ave.
New London, CT 06320-4195
(203) 444-8541
FAX: 444-8546

Complementary Systems

GPS reduces Loran-C ASF bias
Loran-C reduces GPS S/A noise
Loran-C plus GPS is far better than either system alone.



**1992 Federal
Radionavigation Plan**

Mr. Heywood Shirer, DOT Research and Special Projects Administration, reports that the 92 Federal Radionavigation Plan was signed in the last week of 1992, and will be printed and distributed early in 1993. Mr. Shirer deserves special credit for clearing up last-minute details and getting the necessary approvals before the change of administration, to avoid the inevitable delays for review by new people. The Wild Goose Association provided important input to the Plan. Mr. Shirer hopes to publish the policy portion of the FRP in the Federal Register yearly, to give wider distribution and to allow comments prior to making changes.

The 1992 FRP Individual System Plan for Loran-C:

"Loran-C is the federally provided radionavigation system for the U.S. Coastal Confluence Zone (CCZ). It provides navigation, location, and timing services for both civil and military air, land, and marine users. Loran-C is approved as a supplemental air navigation system. It is also approved for nonprecision approaches at certain airports. The Loran-C system now serves the 48 conterminous States, their coastal areas, and certain parts of Alaska. It is expected to remain part of the radionavigation mix through the year 2015.

"The DOD requirement for the Loran-C system will end December 31, 1994. Operations conducted by the U.S. Coast Guard at overseas stations will be phased out by the end of 1994. In the case of stations located outside the U.S., discussions continue between the U.S. and the respective foreign governments concerning the continuation of service after the DOD requirement terminates."

The FRP is published every two years, and serves to coordinate navigation system plans for all government Agencies.

User's Corner

Quick & Practical Integrity Checks

A couple of decades ago there was a great deal of discussion of dual chain Loran-C receivers, and the benefits which they would bring. Long before any dual chain receivers appeared on the market, commercial fishermen had devised a simple solution. They just bought a second Loran-C receiver, and set it up for the other chain. In the Gulf of Maine, for example, they set one receiver to 5930 and the other to 9960. This gave another LOP at good crossing angles, in addition to the ability to save waypoints for one position in both chains. It protected against some transmitter problems--not all, since the chains use dual-rated transmitters. It also guarded against receiver failure, which was usually longer lasting and thus a more serious problem to the fishermen. They simply couldn't afford to lose a day's fishing due to not having a backup receiver.

Now the same situation has occurred with GPS. Research proliferates into RIAM, integrity channels, integrated systems, and other schemes of checking integrity. Fishermen once again have applied the technology available to them in a way which accomplishes the desired results, for their uses. They add a GPS receiver to the existing Loran-C receiver (or pair of Loran-C receivers). They save waypoints simultaneously with Loran-C and GPS.

When they set the radionavigation receivers to show distance and bearing to the waypoints for the same position,

the distance is usually within 0.02 or 0.03 miles and the bearing within a degree. They thus have a high degree of confidence that both systems are working properly. Their procure guards against:

- Out of tolerance transmitters or satellites
- Transmitter outages in either system
- Many types of interference
- Loran-C cycle slip
- Loran-C shift to other pair or chain
- Undetected GPS out of tolerance
- Failure of either receiver
- Mis-entered waypoints

This last is perhaps the most common radionavigation system problem. It is only too easy to mis-read the chart when picking off a waypoint, to mis-copy data from a book or list, or to hit the wrong key by accident. While some of these errors are large enough to show up immediately, some are not. Using the two systems together, entering TD's in Loran-C and latitude and longitude in GPS, makes it nearly impossible to enter offsetting errors.

This simple system works fine aboard fishing boats, at their speeds, and with their owners' ability to add any item of navigation equipment which seems to give an advantage. It is an off the shelf precursor of integrated systems, with the advantage that one receiver can fail without keeping you from using the other system.

from BOATING (c) 1991 Bill Brogdon

Deccalink DGPS Expands

There is a new Deccalink Differential GPS transmitter at Mizen Head, Ireland. This, along with the other three Deccalink DGPS transmitters, two in Great Britain and one in Norway, provides differential GPS corrections surrounding the British Isles and southern Norway. Deccalink began in 1991, and gives high accuracy to suitably

equipped users. Deccalink carries differential corrections as modulations on the 100 kHz Pulse/8 (mini-Loran with different phase coding from Loran-C) network. The modulation on the Pulse/8 signals is identical with "Loran-Comm," previously suggested as a method of delivering useful messages to Loran-C users.

Meetings

ION 49th Annual Meeting

The Institute of Navigation will hold its 49th Annual Meeting at the Sonesta Hotel, Cambridge, MA, 21-23 June 1993. Its theme is "Future Global Navigation and Guidance." The meeting is jointly sponsored by ION and the C. S. Draper Laboratory, and is divided into two segments. Abstracts are due by 22 February; send those for the ION Session to Mr. Duncan Cox, DBC Communications, Inc., 15 Ocean St., Manchester, MA 01944; Phone and FAX 508-526-8654.

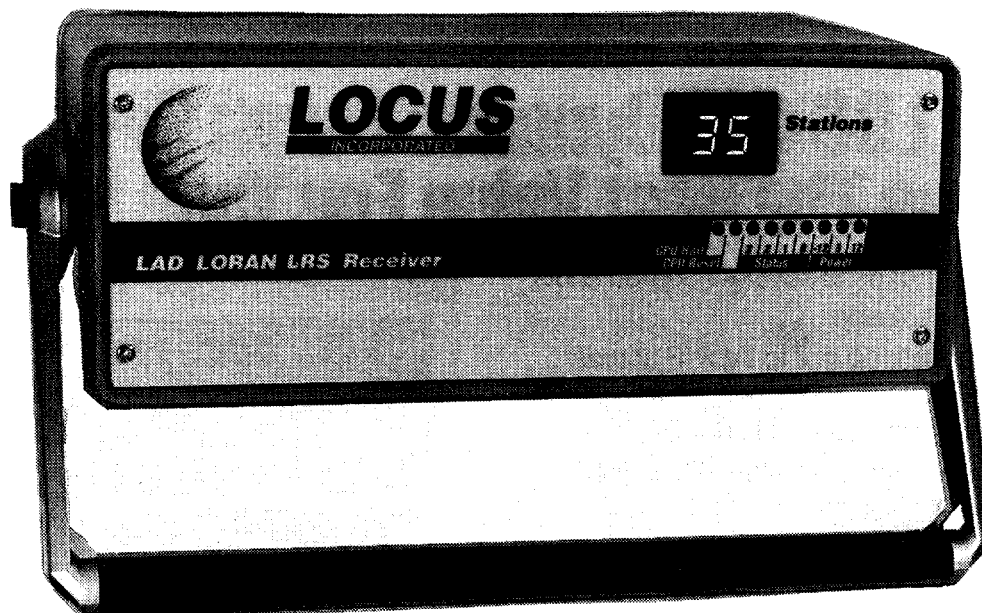
Send abstracts for the C. S. Draper Session to Mr. Davis R. Bates, C. S. Draper Laboratory, 555 Technology Square, Mail Stop 25, Cambridge, MA 02139; Phone 617 258-1878; FAX 617 258-3737. Contact either of the above Program Chairmen or ION (703 683-7101) for further information.

ECDIS '93

The second annual conference devoted to the subject of Electronic Chart Display and Information Systems has been scheduled for March 8-9, 1993 at the Marriott Inner Harbor Hotel in Baltimore, MD. The EDCIS '93 Conference and Exposition will inform the industry about recent advances in technology, standards, applications, user reactions, and the future of ECDIS. For more information contact:

ECDIS '93
P. O. Box 265
Buckeystown, MD, 21717
Phone/FAX 301 874-2668

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GPS/Loran-C Sole-Means MOPS Working Group is looking for a few good men (or women)

RTCA SC-159 Working Group-3 (GPS and other Navigation Systems) is beginning to develop a Minimum Operational Performance Standard (MOPS) that will use a hybrid GPS/Loran-C solution. This will be one of the first sole-means navigation systems to be based on wide area fixes, and

provides an excellent opportunity to further expand the utility of Loran-C.

Working Group-3 is beginning to focus on testing the hybrid system, methods to maximize the Loran-C lines of position, and total system availability. Many other issues are expected to arise and will be included in the course of the study. The

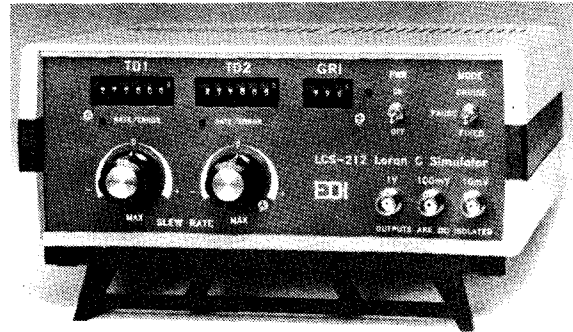
working group could benefit greatly from participants with knowledge and experience in Loran-C. If you would like to provide assistance or have questions, please contact:

Mr. Robert Anoll
Systems Control Technology
Ph. 202 646-4830 FAX 202 646-4790

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