The Goose Gazette

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

Volume 92-1 - News of the Winter, 1992

President's Message

by **Bob Lilley**

The activity level continues to be high, as we get ready for Spring, 1992:

Bill Brogdon has taken over as Editor of the Goose Gazette, and Bruce Hensel begins what we hope will be a regular feature column in this issue. Please read and comment on his initial article on the trials and the importance of receiver testing and certification!

After our 100th Board of Directors session at the ION meeting in San Diego in January, there were a few vacant committee chairmanships, most of which have been filled. Jim van Etten will head AWARDS, with Frank Cassidy assisting; Bruce Hensel will handle NOMINATIONS/ELECTIONS, with Jim Culbertson helping. Laura Charron will head up the CONSTITUTION and BYLAWS committee. With Walt Dean on HISTORICAL, John Beukers on JOURNAL and Dave Amos on TECHNOLOGY/APPLICATIONS, we have a full complement, except for MEMBERSHIP.

I will be looking for a volunteer to follow up membership renewals and to do some promotion.

Nominations for AWARDS are sought by Jim van Etten. These awards must be finalized early this year, since our Technical Symposium is in August rather than October.

One of the projects we will undertake this year grew out of a suggestion during the Open Membership meeting at the Williamsburg Technical Symposium. A WGA Membership Directory will be published. I am seeking your suggestions on content. Should we feature members' specialties and business telephones? Corporate information? Please help me to make this Directory as useful to you and to the community as we can.

Again, have a happy Spring, and make early plans to attend the Birmingham Technical Symposium. We will be celebrating our twentieth year!

To reflect the growing international involvement with the terrestrial radionavigation aid, Loran-C, the Wild Goose Association is to hold its first Convention and Technical Symposium outside of the United States. The theme of the Technical Program for the 21st Annual Convention is to be **"Loran-C/GPS Mix - Sharing the Success"** and will underline the need to retain a mix of radionavigation systems to ensure security, signal availability and integrity as satellite systems approach operational status.

The Loran-C/Gps Mix Sharing the Success

WGA 1992 CONVENTION AND TECHINCAL SYMPOSIUM

The Wild Goose Association will hold its annual Convention and Technical Symposium outside of the United States for the first time. The theme of the Technical Program for the 21st Annual Convention is to be **"LORAN-C/GPS MIX - Sharing the Success."** This reflects that the United States now enjoys full coastal and land coverage of Loran-C and that the advantage of combining terrestial and satellite systems is a reality. WGA wants to share the interoperation of these two systems with others who will soon have this capability.

The convention will be preceded by a one day seminar, provided by Navtech Seminars Inc., covering the "Interoperability of Loran-C with Satellite Systems."

The **Copthorne Hotel** in **Birmingham, England** has been selected as the venue for the three-day convention which is to be held from Tuesday, August 25th through Thursday, August 27th, 1992. The seminar will be held at the same hotel on Monday, August 24th, 1992.

For further information please contact
Mike Moroney (U.S.A.)
phone: (617) 494-2026,
FAX: (617) 494-2628

John Beukers (U.K.)
phone: 44-451-870777
FAX: 44-451-870222.

August 23-26, 1992
Birmingham, England

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:
Dr. Robert W. Lilley
Wild Goose Association
150 S. Plains Road
The Plains, Ohio 45780
(614) 592-1282

He also may be reached at:
Ohio University
Avionics Engineering Center
Athens, Ohio 45701
(614) 593-1514
Fax: (614) 593-1604

The WGA encourages readers to submit material for publication. Send information directly to the Editor:
Capt. Bill Brogdon
506 W. Washington Ave
Kinston, NC 28501
919 527-9349

Printer:
Messenger Publication Service
Athens, Ohio 45701

The association's permanent address is:
The Wild Goose Association
P. O. Box 556
Bedford, Massachusetts 01730

New WGA Office

The WGA administrative offices have been moved, and the computer system is being set up as we write. The new administrative telephone number is:

614-797-2081

Until the office is back in full operation, there will be an answering machine on the line. Please leave a message, and we'll get your request handled or call you back ASAP.

It is temporarily inconvenient, but we think that the longer- term service will be excellent, due to this move.

Many thanks to Dave Scull and Zeke Jackson, the former operations director and host, respectively.

ION names Scull as Executive Director

The Institute of Navigation has named David C. Scull, WGA Vice-President, as its new Executive Director. Dave was President of ION from 1985 to 1988. Prior to retiring from federal service, he was Program Manager for Communications and Radionavigation for the Department of Transportation and chairman of the DOT Navigation Working Group. He also was responsible for the National Plan for Navigation. He has 36 years of experience in geophysics, navigation science, and radio wave propogation.

The ION selected Dave from a field of 16 applicants, and we are happy to see someone with wide experience in various navigation systems named to the post.

He works with NavCom Systems, Inc., as manager of the FAA Loran Site Evaluation Project.

Personal to **Jim Culbertson:** We're very thankful that you have come through your coronary bypass surgery in good shape. Our thoughts and prayers are with you and Jo Anne. WJB.

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."

WILD GOOSE ASSOCIATION

Member and Non-Member 1992 Price List

	Member	Non Member
Proceedings: 1972-1990		
Bound volumes of papers presented at past Conventions, each volume	$30.00	$45.00
(When not available, individual paper charge will apply)		
Bibliography		
List of titles and listing of all Authors for papers presented at all Conventions	$7.50	$10.00
Papers		
Individual papers presented at Conventions, each	$5.00	$10.00
Journals		
Back Issues of the Radionavigation Journal, each	$10.00	$15.00
Videos		
Loran - A Quick Refresher Course	$15.00	$20.00
Loran-C and GPS as a Navigation Mix for the United States Airspace *(Federal Aviation Administration)*	$15.00	$20.00
Loran-C - A Navigator's Approach *(Capt. Henry Marx, Landfall Navigation)*	$35.00	$39.50
How to use Loran-C and GPS (Azure)	$20.00	$25.00
Payment and Shipping		
Shipping and handling on all orders	$5.00	

Items are shipped UPS ground. Overseas shipments are sent surface mail. Please remit payment with order in **U.S. funds, drawn on a U.S. bank,** to:

WGA Operations
Ellen G. Lilley
150 S. Plains Road
The Plains, OH 45780
614-797-2081

WGA Membership

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

Regular

Two classes of individual membership are available: annual and life. The life membership fee is $200.00, except for "rule of 80" members. The annual membership is $25.00 for the first year and $20.00 annually after the first. Members in countries other that the U. S., Canada and Mexico are assessed an additional $10.00 per year to defray international mailing costs.

Organizational

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

Corporate Classes 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. Class 1 dues are $335 the first year and $300 per subsequent year. For Class 2, first-year dues are $170 and subsequent years, 150.

For overseas members, dues for Class 1 are $435.00 first year and $400.00 after. For Class 2, dues are $220.00 and $200.00.

Loran-C Approaches

In the past few months, three aviation magazines have taken positions concerning Loran-C approaches. An editorial in Flying by J. Mac McClellan (2/92) is titled **"Let's Slow Down."** He has long experience with Loran-C, and is concerned about signal loss, electronic noise from thunderstorms and P-static, and approaches that are as easy, or easier, to fly than VOR/DME approaches. He concludes:

"But for now, I want to use my loran to fly directly to the terminal area where I intercept approach course guidance radiating from a transimtter firmly bolted to the ground on or near the airport. I may screw up an approach, but I never even want to think that an approach proceedure can do the same to me."

AOPA Pilot, 24 March 92, has an editorial by Mark R. Twombly. It cites the clear benefits of Loran-C approaches, such as "issuing published approaches to hundreds of airports that are now VFR-only or have difficult or marginally useful nonprecision approaches because of the location of approach navaids." He mentions the problems raised by Bendix-King and FAA's four-pronged approach: First, research into momentary interruptionss. Second, reducing such outages. Third, examine the specifications for possible upgrade. Fourth, develop training programs to pilots and FAA personnel. While acknowledging that there are valid issues, the editorial cautions against letting the effort stop.

Business & Commercial Aviation, in January 92, has an artilce by Richard N. Aarons entitled "Loran-C Approaches? Not Just Yet." It reports the problems stated by Bendix/King last October.

Bendix/King White Paper On Loran-C Approaches

Since so much controversy has followed B/K's presentation at the 16 Oct. meeting concerning Loran-C approaches, we decided to let the company speak for itself. Doug Henkel sent me a copy of the "white paper" STATUS OF KLN 88 NON- PRECISION APPROACH CERTIFICATION. The papper adresses problems with Signal Avaialbility, Approach Charts, and Pilot Workload.

The paper states that "pilots will find a Loran meeting the minimum approach requirements of TSO C60b unacceptable for unrestricted approach operations because of the increased probability (compared to currently available approach navaids) that during the execution of a Loran approach they will lose radionavigation and have to dead reckon."

If you are interested in this paper, please get in touch with Doug at 913-782-0400. We cannot print it in the newsletter due to its length.

Doug said in a letter, "Bendix/King has not pulled out of the Loran approach certification effort. We did close out the project on approach certification because it was combined with out NOCUS-SOCUS certification effort for out KLN 88. The FAA only allows us to have one project open on the KLN 88 STC at a time. This STC is presently open for our ongoing certification efforts for IFR approval of the KLN 88 in Alaska and Canada."

For further Information, call

Doug Henkel
Allied-Signal Aerospace Company
Bendix/King
400 N. Rogers Rd.
Olathe, KS 66062-0400
913 782-0400

1992 Wild Goose Association Convention and Technical Symposium
August 25 through 27, 1992, in Birmingham, England!
Contact: Mike Moroney (US) (617) 494-2026
John Beukers (UK) 44-451-870777

Mr. Eugene Brusin, Megapulse, has provided The Goose Gazette with a copy of the following letter:

DEPARTMENT OF THE ARMY
United States Army Forces Central Command
APO New York 04772

To: Dr. Fayez Bin Ibrhim Badr, Minister of State, President of Seaport Authority, Saudi Arabia

Peace Be Upon You

Please accept my sincere admiration and the appreciation of the Coalition Forces for the outstanding contributions to the combined efforts in the defense of the Kingdom of Saudi Arabia.

Your understanding of the importance of the LORAN-C System played a major role in the success of Operation Desert Storm. Thanks to your assistance in relocating and increasing the output of critical equipment, precise land navigation in the desert was possible.

More than 8,000 LORAN-C receivers were used by Coalition Forces during the campaign. They provided Coalition Forces with the ability to navigate in the desert, identify enemy positions, and pinpoint the locations of wounded soldiers for medical evacuation.

The United States Army concurs with your recommendation to cnacel conversion projects and return the Saudi Arabian LORAN-C System to its previous configuration.

Please accept my continued respect and highest esteem.

Peace Be Upon You

Sincerely

John J. Yeosock
Lieutenant General, U.S.

(retyped from FAX. some spelling uncertain)

Send stuff in!

We hope to make the Goose Gazette more interesting to a wider group of readers. This means getting ideas, short articles, questions, and opinion from our readers. We need short pieces, a column or less in length. It is best to send articles on disk or by modem, to avoid retyping. We can convert from most popular word processing formats, provided you keep it simple.
To make text fit, first set your column width at 40. A column is 53 lines, but remember that we use headlines which take up more space. So 50 or 51 lines is about right. The editor is struggling to get everything in as he learns the software. We would particularly like news items and how-to-do-it pieces. Remember, not everyone is an engineer. We would like to include some simpler ideas to keep the navigators interested. Check with the editor if you can add to our newsletter.
919 527-9349

Loran-C Waypoint and Map Software

The editor has been using a handy computer program for Loran-C waypoints for the last few months. It accepts waypoints for any chain in either TD's or latitude and longitude, and makes conversions between the two. The user can insert corrections similar to ASF to eliminate conversion errors. It will show the range and bearing to waypoints from any selected position. In addition, it can make graphs of waypoints, at various scales, showing TD lines and latitude and longitude grid. The user can add shoreline features or landmarks.

It has a trip planning feature which displays (and prints) range and bearing to successive waypoints. It is also handy for arranging waypoints by TD, for eliminating duplicates, and for saving waypoints for seldom-visited areas. The TD to latitude longitude conversion, with appropriate corrections, is an excellent way to find GPS waypoints from Loran-C data. While a receiver can do some of these things, the program is quick, maintains disk files of waypoints and charts, and provides paper copies using a dot matrix or laser printer.

It is available for IBM and MacIntosh computers from :
Andren Software Co.
P.O. Box 33117
Indialantic, FL 32903
407 725-4115 evenings

This software is written by Carl F. Andren, not to be confused with Carl S. Andren, long active in WGA. The cost is $60 for either version.

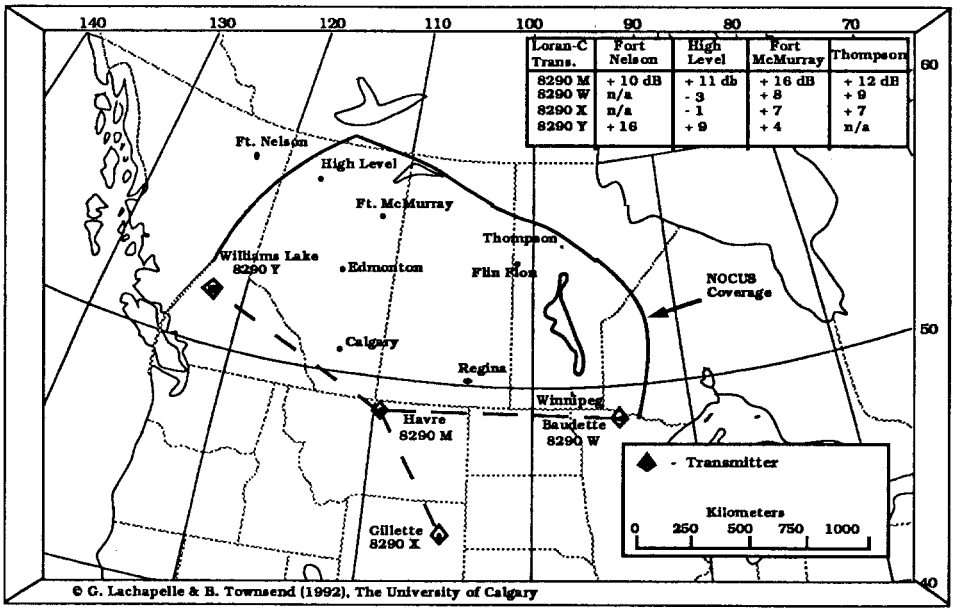
CARRIER WAVE INTERFERENCE

There has been some interest among members in obtaining copies of Martin Beckmann's thesis, "Carrier Wave Interference with Loran- C." Martin may be reached at Trimble Navigation, 408-730-2900d. WGA has only a file copy of this paper.

NORTHERN EXTENT OF NOCUS

In December 1991, the Department of Surveying Engineering of The University of Calgary completed some 5,000 km of land road measurements in Western Canada to determine the northern extent of NOCUS. The LORCAL^2 calibration and coverage verification system developed by Bryan Townsend, MSc. candidate, and described in a paper presented at the WGA91 Technical Symposium was used. Two Jet 7201 multi-chain receivers replaced however the units used previously in LORCAL^2. The most northerly points reached during the field tests, namely Fort Nelson, High Level, Fort McMurray, and Thompson, are shown on the map below, together with a listing of the SNRs measured at these sites from each of the NOCUS transmitters. Fort Nelson is outside the NOCUS coverage since only M and Y could be received. At the other sites, however, at least three transmitters were received with an SNR $\geq$ -3 dB. The Winter coverage of NOCUS thus extends well beyond these points. However, the winter atmospheric noise predicted by CCIR (ITU) is lower than the summer noise by some 10 to 15 dB, on the average, in the area concerned. Multi-season experiments conducted by The University of Calgary in the coverage area of the West Coast Chain Canada did not, however, result in any seasonal variation when analysing daytime data. The seasonal variation between night-time data, however, did reach some 4 to 8 dB. If one assumes that seasonal variations in the Prairies have the same order of magnitude, the year-around northern extent of NOCUS (SNR $\geq$ -10 dB) shown on this map can therefore be considered fairly realistic.

Measurements taken simultaneously on the Canadian West Coast Chain (GRI 5990) with the Jet 7201 units indicate reception from three transmitters eastwards beyond Fort McMurray. The Fort Nelson area is therefore under Loran-C coverage when a multi-chain receiver is used. A paper describing these results was presented by G. Lachapelle, B. Townsend and D. Halayko at the National Technical Meeting, Institute of Navigation, San Diego, 27-29 January 1992.



G. Lachapelle, Department of Surveying Engineering, The University of Calgary

International Radionavigation Forum

Wild Goose Association 1992 Convention and Technical Symposium

Loran-C/GPS Interoperability "Sharing The Success"

in cooperation with

International Association of Lighthouse Authorities
Aircraft Owners and Pilots Association
National Association of State Aviation Officials
United States Coast Guard
Volpe National Transportation Systems Center
Navtech Seminars, Inc.
Birmingham Convention & Visitors Bureau

Preceded with a Loran-C/GPS Interoperability Seminar by Navtech Seminars, Inc.

August 23 - 26, 1992
Birmingham, England

The 21st Annual Wild Goose Association Convention & Technical Symposium

"THE LORAN-C/GPS MIX - Sharing the Success"

SESSIONS

SESSION A
Policy and Management
(Focusing on Economics and Transportation)

SESSION B
Policy and Management

SESSION C
Panel Discussion
Why Loran-C In Europe?

SESSION D
Loran-C Users

SESSION E, Tutorial
Loran-C Overview and Transmittiers, Antennas, and Equipment Control Monitors

SESSION F, Tutorial
Loran-C Pulse Definition, Receiver Technology, Processing, and Displays

SESSION G, Tutorial
Coverage, GDOP, EM Propagation, and Antenna Considerations

SESSION H, Tutorial
Atmospheric Noise, EMC/EMI, Skywaves, and Compensation Techniques to Minimize Interference

SESSION I
Loran-C Receiver Technology

SESSION J
Loran-C/GPS Simulation

SESSION K
Loran-C Applications

SESSION L
Loran-C /GPS Receiver Status

ABOUT THE SYMPOSIUM

The deliberations of the Northwest Europe Loran-C Policy Group were concluded on December 3, 1991, with a decision to adopt Loran-C as the terrestrial radionavigation aid for N.W. Europe. While this agreement must be ratified by the governments involved, it is generally accepted that this will occur early spring 1992. On December 17, 1991, the Council of the European Communities on radionavigation systems for Europe adopted a resolution to support regional Loran-C chains as a component of a mix of radionavigation systems. In the Far East, under the umbrella of the International Association of Lighthouse Authorities, China, Korea, Japan, and the Commonwealth of Independent States have also agreed to cooperate to obtain contiguous coverage of Loran-C in the coastal waters of their countries.

In anticipation of this international activity to adopt Loran-C as the primary terrestrial radionavigation aid, the Wild Goose Association is conducting its first Convention and Technical Symposium outside of the United States. The venue is to be in the heart of England, close to many of the most historic and beautiful sections of the country.

Because the WGA firmly believes in and supports a mix of aids to radionavigation, and because of the immense interest in global satellite navigation, the theme for the Technical Symposium is "LORAN-C/GPS MIX - Sharing the Success". This is to reflect that the United States now enjoys full coastal and land coverage of Loran-C and that the advantages of combining terrestrial and satellite systems is now a reality. The WGA wants to share the success of interoperation of these two systems with others who will soon have this capability.

Having the 1992 Convention in Europe will afford the opportunity to disseminate information. To this end, several tutorials covering Loran-C basics are to be held. In addition, Navtech Seminars Inc., well known for their excellent GPS tutorials, will be holding a full, one-day Loran-C/GPS seminar on the first day of the program.

The fact that in 1992 the countries of Europe will be moving closer to a cooperative union was not overlooked either. Loran-C in Western Europe will surely move eastward to couple with Chayka in the emerging Commonwealth of Independent States.

With these broad horizons you are invited to submit an abstract for a paper that falls within the subject matter of the various sessions. These are exciting and challenging times for global radionavigation; we would, therefore, like to see a high percentage of papers from the international community.

CONFERENCE COORDINATORS

General Chairman, John Beukers
Co-Chairman, Mike Moroney
Technical Program Chairman, John D. Illgen
Technical Co-Chairman, North America, Frank Cassidy
Technical Co-Chairman, Europe, Dr. David Last
Technical Session Coordinator, Carolyn McDonald

Awards Committee Seeks Nominations

by Jim Van Etten

Each year the WGA gives awards to those who have made contributions to loran or furthered the use of the system. We make every effort to seek out deserving individuals. Many make their contributions in a quiet way, and are not always known to the Committee.

We need to recruit additional committee members to help in the awards process; we also need to hear from the membership of individuals who should be considered for the various awards as listed in Article XI of the WGA By-Laws. You can help us to recognize those who "foster and preserve" the art and science of loran.

It is not too early to consider awards nominations for this year. Awards will be presented at the 1992 Convention and Technical Symposium in August, but the Committee needs time to review the nominations. Please submit these by 1 July, 1992, for the following awards:

Medal of Merit: A medallion and a framed citation for contributions of outstanding value to the development and fostering of loran.

Paper Award: A trophy with the Wild Goose in flight, for the outstanding paper published prior to 1 July, 1991, with emphasis placed on papers published in the year preceding that date.

Student Paper Award: To be awarded to a student for the best paper published on any aspect of loran.

President's Award: A plaque for significant achievements, selected by the President with input from the membership.

Service Award: An inscribed plaque for outstanding service to the WGA.

Honorary Membership: A framed certificate with citation for outstanding contributions to loran. Usually restricted, informally, to those whose present activity is not in the loran area.

Send nominations with supporting data to:

James P. Van Etten
Chairman, Awards Committee
230 Rutgers Place
Nutley, NJ 07110
201 661-0876

PARALLEL OPERATION

Marine navigators in the U. S. at last have access to two continuous, accurate radionavigation systems with receivers which give distance and direction to waypoints. With 17 satellites in service, the gaps in GPS 2-D coverage have nearly disappeared. Navigators now use Loran-C and GPS common waypoints to check the two systems.

Yes, there was a period in the 1970's when both Loran-C and Loran-A were operating, but receivers were primitive. We had to plot LOP's on a chart, and back then Loran-C receivers were too expensive for many ship and boat owners (including the Coast Guard).

When the Loran-C reciver and the GPS receiver indicate nearly identical distances and bearings to a common waypoint, we are nearly sure that both systems are correct. Although most Loran-C and GPS receivers continue to display "old" data after they lose the signals, data shown by the two receivers soon diverges. Loran-C waypoints are entered in TD's, and GPS in latitude and longitude; it is unlikely to enter errors which cancel each other.

GPS's higher absolute accuracy is handy when cruising to new areas; Loran- C's higher repeatability is better when returning to a previously-saved waypoint. At sea, the two systems complement each other extremely well.

Awards to loran and Omega pioneers

The Executive Committee of the IEEE 1992 Position Location and Navigation Symposium (PLANS) presented the fourth Kershner award for outstanding achievement to John Alvin Pierce, who is credited with inventing both loran and Omega, and to Eric R. Swanson, who developed the phase prediction model which is a key to accurate navigation with the Omega system.

Mr. Pierce is not only a long time supporter of loran, he is regarded as the father of the system. The incredible success of bringing a new system on line within a year of his report stating that is was feasible is due to the work of many people, but Jack's work was critical. For example, he recommended dropping a proposed 30 MHZ system and operating in the 2 MHZ band to increase range; he developed the "amplitude balance" control for the receiver- indicator; conceived of the idea of homing on one LOP, giving rise to high repeatable accuracy using TD's, and wrote manuals which were understandable and clear.

He also developed long range skywave synchronized SS loran (A), started work on low frequency loran, and investigated the idea of cycle matching. By war's end, there were about 70 stations and 75,000 receivers in use. Mr. Pierce went on to develop Omega, working on the system for many years. We all in the Loran-C community owe Jack a great debt for his pioneering work.

Eric Swanson worked at the Naval Oceanic Systems Center in San Diego for over 30 years; the Swanson phase prediction model accounts for the many factors which affect VLF signal propogation. He has written over 100 technical papers, and holds seven patents, including a basic patent on differential correction systems.

WGA Birmingham, England Aug 25-27

On LORAN-C Non-Precision Approaches By Bruce Hensel

Certification of LORAN-C receivers for non-precision approaches (NPAs) is one of the hottest topics today in both the LORAN-C and general aviation worlds. Many people have worked long and hard to make LORAN-C NPAs a reality and are frankly frustrated with the recent delays in receiver certification. This was clearly evident with the level of emotion in much of the discussion during the October 16, 1991 FAA conference on LORAN-C NPAs. Unfortunately, some of the pertinent technical issues are not clearly understood by all interested parties. The intent of this article is to address some of these technical issues with the support of both technical requirements and data.

A navigation system must provide acceptable levels of accuracy, availability, and integrity. Some aviators have used LORAN-C receivers, certified under TSO-C60a, for non-precision approaches with reported acceptable accuracy and availability. The obvious question they ask is, 'Why is it so difficult for the present generation of receivers to provide the same performance?' The answer to this is that the present generation of receivers, subject to certification under TSO-C60b, have significantly more demanding performance requirements than those certified under TSO-C60a, particularly with respect to system integrity.

Some of the TSO-C60b integrity requirements include the detection of blink, lost signal, or cycle slips under a set of specified test conditions. Each of these conditions must be detected within 10 seconds for non-precision approach certification. At Advanced Navigation, Inc., we tested our Model 7000 LORAN-C Receiver (certified under TSO-C60a) to the TSO-C60b requirements in 1989. A limited number of test cases were run, because it was apparent that the receiver didn't come close to meeting C60b requirements. It took 20 seconds to detect blink in each of two trials; 10 seconds in one trial and 8 seconds in another trial to detect lost signal; and 978 seconds (378 seconds after selection of dedicated triad) to detect cycle slip.

Obviously, receivers designed to meet TSO-C60b need to be more sensitive with respect to detection of blink, lost signal, and cycle slips than receivers certified to TSO-C60a. What impacts do these design constraints of TSO-C60b have on receiver performance? The obvious benefit is that the pilot will be warned within ten seconds if any of the aforementioned signal abnormalities are detected. We found the performance trade-offs required to meet the ten second detection requirements to be insignificant during the development of our J.E.T. Model 720X family of LORAN-C receivers. The false blink detection rate and the probability of flagging the receiver and incorrectly jumping forward on the tracked pulse (as a result of cycle slip detection algorithms) are both acceptably low at the certified minimum SNR of -10 dB (atmospheric) for NPAs.

While receivers certified to TSO-C60b are required to detect lost signal quicker than those certified to TSO-C60a, this does not necessarily result in more flagging in the real-world. For all practical purposes, LORAN-C transmitting station outages are at least 15-45 seconds in duration depending on the transmitter type and cause of the outage. Consequently, receivers certified to TSO-C60b will always flag during such outages. The ANI Model 7000 would probably flag all such outages [more testing would be necessary to state this conclusively]. I suspect that most, if not all, receivers certified to TSO-C60a would consistently flag such outages, as the total loss of LORAN-C signal for at least 15 seconds provides a lot of information to base a decision on.

So if the ten second integrity requirements don't result in more flagging than receivers designed and certified to TSO-C60a exhibit; why have manufacturers experienced more flagging during certification of receivers designed and certified to TSO-C60b than users of earlier receivers have become accustomed to? Paragraph 2.2.1.10 of TSO-C60b contains an additional integrity requirement to annunciate [flag] the lack of adequate navigation signals when compliance with the status indication requirements [blink, loss of signal, and cycle slip] cannot be assured. Further, "adequate" is specifically defined as signal-to-noise ratio, as well as geometry. In short, a receiver certified to TSO-C60b must flag when the SNR drops below the level at which the blink, loss of signal, and cycle slip tests have been certified to pass. Paragraph (a)(1)(vii) of TSO-C60b specifically requires this receiver characteristic to be tested during certification.

Unlike the ten second integrity requirements, the required flagging of inadequate navigation signals just discussed can have a significant impact on real-world receiver performance. It places a premium on the importance of a good installation. Poor installation practices that increase the susceptibility to p-stat interference will definitely increase the frequency of receiver flagging.

The importance of the screening of candidate airports for adequate SNR should be readily apparent. If one of the stations in the specified triad for a candidate airport has an SNR of -6 dB (atmospheric) 95% of the time, then one should expect a receiver designed to the MOPS approach limit of -6 dB (atmospheric) be flagged 5% of the time when placed in the approach mode. We elected to design and certify our Model 720X family of LORAN-C receivers to an SNR of -10 dB (atmospheric) in the approach mode to widen the gap between airport and receiver certification standards to reduce such flagging. [I realize that the accuracy of the atmospheric noise model in RTCA/DO-194 could impact the preceding discussion.]

By the way, although I feel it is essential to understand the issues discussed herein, I don't view any of them to be insurmountable barriers to the certification of a LORAN-C receiver for non-precision approaches. The issue of whether existing receiver designs are ready to be certified is a subject of much debate that I'll leave to the aviation experts. I am confident, however, that the day will come when LORAN-C receivers will be used for non-precision approach guidance throughout the country.

EURNAV 92 - Digital Mapping and Navigation

THE ROYAL INSTITUTE OF NAVIGATION and the GERMAN INSTITUTE OF NAVIGATION are delighted to announce their co-sponsorship of EURNAV 92. This international conference devoted to DIGITAL MAPPING AND NAVIGATION will be held at CHURCH HOUSE, WESTMINSTER, LONDON on 17, 18 and 19 November 1992. (NB: This is a change from the previous notice.) It will be the first time that these two institutes of navigation will have joined forces to present a conference.

In all forms of transport, there is a substantial transfer of activity from physical maps to those held on computer, and with this comes a whole new range of problems and opportunities. These include questions of digital map sources and publishers, product content and quality control, international standards and safety requirements, and software design.

Although there are some distinct needs for aeronautical, maritime, and vehicle navigation, both civil and military, there are also considerable areas of overlap, and there is a substantial potential to combine experience gained in each of the individual transport modes.

The conference will be of significant importantce to a wide range of interests, including experts from mapping and data collection agencies, navigation system engineers, transport user organizations, regulatory and standards bodies, and hardware and software suppliers. Given the international nature of the digital mapping used to support navigation systems, world wide attendance is expected.

For further details call:

The Director
The Royal Institute of Navigation
1 Kensington Gore
London SW7 2AT
United Kingdom
Tel: +44 71-589 5021
FAX: +44 71-823 8671

Managing Director
The German Institute of Navigation
Pempelforter Strasse 47
D-4000 Dusseldorf 1
Germany
Tel: +49 211 369909
FAX: +49 211 351645

Bits & Pieces

- Loran-C gives better than 40 meter 2drms repeatability over 48.3% of the East and Gulf Coast coastal confluence zone, and better than 80 meters 2drms over 90.8% of the same zone.

- The one million Loran-C receivers in use represent a capital investment of approximately 1/2 billion dollars.

- Over the past decade, the Loran-C stations in the eastern U. S. and Canada have been on-air and in tolerance 99.8926% of the time. This includes the long off-air periods during the mid-80's for transmitter replacement. When the authorized unusable time is deducted, the number rises to 99.9441%.

- China and Japan have placed orders for new Loran-C transmitters. Korea plans to replace the ancient type 39 transmitters in the Commando Lion chain. Canada, India, and South Africa are expected to place orders in the near future.

- Marine Loran-C receivers are outselling GPS by 15:1, according to one GPS receiver manufacturer.

- The "hottest-selling" piece of boat electronics equipment is the combined depthfinder/Loran-C unit. Most include speed and temperature sensors, and many of them include plotters.

Rent This space!

WGA Offers Advertisement, Promotion and Communication Opportunities at bargain prices!

Three Goose Gazette formats are offered:

1. Half-page advertisements may be placed in the Gazette for $75 per insertion, or $250 for four prepaid insertions. Your advertisement must be submitted as camera-ready copy.

2. Business cards may be submitted, and will be published for $5.00 per insertion, or $15.00 for four prepaid insertions. The consultants and business people among us may appreciate this method of "getting the word out." Please provide at least two clean business cards with your order.

3. Classified ads, in the following categories, will be accepted for $5.00 per insertion of 50 words or less. Please provide typed copy with your order. Standard or bold-face type may be specified, for all or part of the entry.

a. For Sale
   Equipment
   Services
b. Wanted to Buy
c. Exchanges
d. Situations Wanted
e. Positions Available
f. Miscellaneous

Please contact the Goose Gazette editor with your orders or your questions. All submissions must be accompanied by payment; copy will not be returned unless a request is made at the time of the order.

U. S. HYDROGRAPHIC CONFERENCE 92 PROCEEDINGS

The U. S. Hydrographic Society announces that the proceedings of the fifth biennial conference, held in Baltimore this February, which was attended by delegates from 20 countries, have been published. They comprise 35 bound and two loose papers by leading domestic and international experts. Topics include Automated Charting, Coastal Mapping, Tides, GPS, Sonar Systems, Nautical Data, Marine Information, Electronic Chart Display & Information Systems (EDCIS), and the US ECDIS Test Bed Project.

Bound Copies of the 240-page publication are available at US$ 35 for North and South American subscribers from The Hydrographic Society of America, PO Box 732, Rockville, MD 20848-0732, USA
Tel/FAX: 301-460-4768 (Contact Mr. Jack Wallace)

Persons from other countries may obtain copies at 25 from the co-sponsor, The Hydrographic Society, Polytechnic of East London, Dagenham, Essex, RM8 2AS, UK. Tel: 081-597 1946 FAX: 081-590 9730

INSTITUTE OF NAVIGATION 48th Annual Meeting

The ION will hold its 48th annual meeting from 29 June to 1 July, 1992 at ANA Westin Hotel, Washington, DC

The General Chairman is Dr. Frank van Grass, Department of ECE, 361 Stocker, Ohio University, Athens, OH 45701
614 593-1536

The Program Chairman is Col. Zdzislaw "Stan" Lewantowicz, WL/AA, Wright Patterson AFB, OH 45433-6543
513 255-3354

Dr. von Grass is a WGA member. WGA members Bill Adams and Bill Polhemus are Session Chairmen.

VTS 92

The Seventh International Symposium of Vessel Traffic Services is scheduled for 8-12 June, 1992 at the
Hyatt Regency Hotel
Vancouver, BC Canada

WGA members interested in VTS, and particularly in integrated navigation systems, should take note of this conference. Mr. R. Kingston, Director General, Marine Navigation Services Directorate, Canadian Coast Guard, will give the opening address. Mr. W. A. O'Neil, Secretary General of IMO, also will give an address.

Further information, including session topics and papers, is available from:
MMM Meeting Management Group LTD
#502 - 1155 West Georgia St.
Vancouver, BC V6E 4E6 Canada
604 681-5701 FAX 604 681-8601

In Memoriam

Mr. Millard F.Perry, Jr., had a stroke on 12 Dec. 1991, and was paralyzed on the left side. He developed trouble breathing and died on the 23rd, the day after his 78th birthday. He was the husband of Edith R. (Ruedebush) Perry. WGA members will rember that "Fill" worked as an electronics manager for the Singer Corp. for 22 years, and for the Navy at Groton for five years prior to retiring in 1982.

He was a graduate of The University of Rhode Island, a registered professional engineer and a licensed real estate broker. He served on the Governor's Commission on Alzheimer's and Dementia and on the legislative committee on Medicare. As a Silver Haired Legislator, he was involved with the national Department of Elderly Affairs. He was in the Army Air Corps in WW II, and was an Eagle Scout. He was a member of Calvin Presbyterian Church, Cumberland, Rhode Island. He has a daughter, Beverly E. Perry, who sent this notice to WGA.

NORTHWEST EUROPE APPROACHES RATIFICATION

As we go to press, the nations of northwestern Europe are preparing to ratify the agreement for Loran-C as the terrestial system to be used until general-purpose satellite systems are available, and afterwards in parallel for the forseable future. This agreement is a significant statement concerning the willingness of the nations to cooperate to bring reliable, accurate navigation systems into being for regional use.

LORAN-C in CANADA

WGA has received the final report of Canada's Ministerial Task Force on Aviation Matters. The report emphasises that the Air Navigation Plan understates the benefits of Loran-C, and recommended that Transport Canada should, where signal coverage is adequate, start a program to provide for Loran-C approaches, beginning with airports not currently having an approved approach or at airports where traffic indicates a significant advantage.

GPS INFORMATION CENTER EXPANDS

The Coast Guard's GPS Information Center (GPSIC) has expanded to include information on Omega and Loran-C. This is a logical step, given the location of the unit at the Omega Navigation System Center in Alexandria, VA, and the need for a "one-stop" source of electronic navigation information.

The voice line is open from 0800 to 1600, weekdays: 703 866-3806. There are two computer bulletin boards. For 300-2400 bps, use 703 866-3890, and for speeds up to 9600 bps, use 703 866-3894. The bulletin boards use 8 data bits, 1 stop bit, no parity, full duplex, Xon/Xoff, Bell and CCITT protocols.

The bulletin board is a handy source of radionavigation information.

The Goose Gazette
Wild Goose Association
P. O. Box 556
Bedford, Massachusetts 01730

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