



The Goose Gazette

The Newsletter of the Wild Goose Association,
for the Loran-C navigation community

News of the Spring, 1989

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WGA members are encouraged to submit material for publication. Materials should be sent directly to the Editor. All other correspondence for the WGA should be addressed to the Association address given below.

Editor: Robert W. Lilley
6393 Radford Road
Athens, Ohio 45701
(614) 592-1282

Publication Office
Ohio University
Avionics Engineering Center
Athens, Ohio 45701
(614) 593-1514
Fax: (614) 593-1604

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THE WILD GOOSE ASSOCIATION
P. O. Box 556
Bedford, Massachusetts 01730
(805) 685-8809

President's Message - John Illgen

I want to report actions accomplished by the WGA Board of Directors since the last newsletter. First, for the past one and one-half years, John Beukers (WGA Secretary) has been focusing on the following:

1. Publish an enhanced Radio Navigation Journal (in progress).
2. Increase the membership. This process has shown success using the method discussed at the last WGA General Assembly in Portland, Oregon. The process includes the dissemination of WGA inquiry cards that are included in Loran-C receiver and peripheral equipment boxes shipped to purchasers (users). The response to the sample run has been excellent. Statistics are now being compiled and will be reported at the Cape Cod convention.
3. Implementation of a plan developed by John Beukers and Jim Culbertson to enhance the WGA's professional position in terms of Convention improvements, WGA documentation standards, use of a more modernized data base management system to keep track of inquiry cards, dues, etc. This new data base system is flexible and expandable, and does not restrict the size of the membership. The data base must be managed and updated. Presently John is monitoring the system. For more on the management system developed by John, please contact him directly.

In order to centralize where WGA "does business," the inventory of back-dated Proceedings and Journals, member profiles (committees, offices, awards), T-shirts, golf shirts, hats, pins and more, also come under John's management system. This approach avoids moving all this material each time a membership chairman or committee member changes and allows a dynamic inventory to be maintained in the common data base. When requests come by mail for a copy of the Proceedings, Journal, etc., the Secretary responds directly, rather than forwarding the request to another tier of bureaucracy.

My purpose in conveying the above Secretary duties in such detail is because it is sometimes hard to realize the amount of behind-the-scenes work that has been going on in the WGA. John Beukers has developed a "Growth and Professional Standards Plan" and has now taken the action to implement this plan. John (and Marilyn), we all in the WGA are indebted to you for your identification of enhancements and growth strategies implemented to date.

Bob Frank (Chairman of the Awards Committee) has provided years of service, working with the Board and the entire membership to select those exceptional individuals who qualify for Loran-C Technology and Service recognition. This is another task that requires perseverance and hard work, due to the many details which must be dealt with, including surveying and selecting candidates, coordination with the newsletter and media, ordering certificates, awards and medals, editing and participation in Board Meetings.

(Continued on page 2)

President (cont'd from page 1)

Vern Johnson has provided services in conventions, Civil and DoD radionavigation issues, recent activity in Constitution and Bylaws and many other areas. The job of evaluating, changing and interpreting the Bylaws and Constitution can be a tedious job. With the new growth strategy now underway, we anticipate close monitoring of the Constitution and Bylaws to be sure they evolve in parallel with other WGA actions and changes. We thank you, Vern, for your continued support to the WGA.

WGA Conventions have added an important dimension to our appreciation of the technology and political drivers that influence Loran-C and other navigation systems. I could use this entire newsletter to thank all those responsible for past Conventions. However, let's provide recognition to this year's Convention Co-Chairmen, Mike Moroney and Ed McGann. The planning and execution of the preliminaries for this year's Cape Cod Convention are off to an excellent start. The work involved in orchestrating a Convention is massive. In fact, due to the amount of preliminary effort involved, Jim Culbertson and Jim Alexander have received Board approval to use a Convention Planning and Implementation company. This will permit Convention technical and program chairmen to focus on the technical programs, luncheon and banquet speaker selections and other details. It is clear that the companies that specialize in convention planning more than make up for their costs by negotiating and executing agreements at lower prices with hotels and other convention vendors. The company selected by Jim Alexander and Jim Culbertson has a track record and will be used for the 1990 Convention.

The Historical committee, including Walt Dean, John Castonia, Bob Frank and John Beukers, is coordinating the collection of WGA proceedings, journals, special technical paper

bibliographies and collections. These will all be controlled in the WGA data base management system. Gratitude is expressed to these committee members.

The WGA Journal is presently undergoing preparation by John Beukers, Bob Lilley, Dave Scull, Walt Dean and Bob Frank. The committee has been and will place a great deal of effort on producing this technical publication that will be distributed to the entire membership. As each of us is called upon by this committee for inputs, let's provide them prompt reaction. Additionally, if you have any inputs that you would like the committee to consider for publication in the next Journal or future issues, call John Beukers.

The Membership committee, headed by Bill Garmany and Walt Dean, has become an even more important function in the WGA due to the growth strategy now underway. This committee responds to all new candidate members. The job is growing. We thank Bill and Walt for their perseverance.

Communications in an organization such as the WGA is important. The WGA must service a broad spectrum of people such as government and industry, civil and defense, national and international, program managers, executive management, users, engineers and scientists. To reach this broad spectrum of members, the WGA uses this newsletter, published quarterly by Bob Lilley. Bob could use assistant editors in Europe, Japan and other parts of the Loran-C world, to pass on information from the international community. Volunteers please contact Bob. The purpose of the newsletter is to publish timely Loran-C information and Board actions to the membership. Bob welcomes all Loran-C information that is newsworthy. We thank Bob Lilley for accepting the challenge and hard work required to produce the WGA newsletter.

Your Board of Directors are nominated and elected in accordance with the WGA Bylaws and Constitution. This task is another one requiring meticulous attention to detail. Jim Van Etten has been the chairman for several years, and we greatly appreciate the timely completion of tasks associated with this committee and professionalism put forth by Jim and his committee, which also includes Bill Garmany, Vern Johnson and Ed McGann.

Carl Andren has been responsible for maintaining records of WGA finances, IRS reports and most recently, adherence to additional financial and legal details that are factors when an organization is in a growth mode. Thanks, Carl, for your efforts in maintaining WGA's books and legal matters.

There are several special committees that include: Publicity (Jim Culbertson and Ron Wiener), Civil Radionavigation (Dave Scull), Congressional Liaison (Ed McGann), Department of Defense (John Illgen) and Convention Planning (Bob Bronson). These special committees will be highlighted in my column in the September issue of the newsletter.

(Continued on page 3)

Remember the WGA

Convention

Cape Cod

October 29, 1989!

Mike Moroney 617-494-2026
Ed McGann 617-275-2010

President (cont'd from page 2)

I feel it is of great importance that the WGA membership recognize contributions provided by Directors and committee members. All of us in WGA are committed to improving upon the solid base which has already been established by former WGA officers, board members and committee members. Our present Board wants to receive fresh ideas, areas where the WGA may improve and most of all, along with these inputs, a willingness by more members (new blood) to roll up your sleeves and go to work with us to implement these new ideas. Loran-C is now being recognized by more nations than ever before, and the civil user community in the United States is growing. DoD is still a major Loran-C user. GPS and Loran-C integration and interoperability offer challenges and potential benefits to all users.

Fellow WGA members - We have significant challenges ahead. If you are interested in playing an even more active role in these future challenges, please call Jim Culbertson, John Beukers, Carl Andren or myself.

Save Our Chart!

Capt. Henry Marx
Landfall Navigation

Until recently, the Defense Mapping Agency (DMA) published Loran-C Plotting Sheet WOXZP 5161, covering Newport, RI to Bermuda. International Chart # 108 was on the reverse, covering from Nova Scotia to Antigua. These charts are used by the hundreds for cruising in the area and for the Bermuda Race each year.

The DMA discontinued the chart, as being unnecessary for the U. S. military. We have asked the National Ocean Survey to take over this chart, to keep it available for small-craft users of Loran-C and satellite navigation systems.

1989 Awards

Bob Frank

It is not too early to start thinking of nominations for this year; awards will be presented at the 1989 Convention, but to give the committee time to review the submissions, a deadline for nominations is 15 July, 1989. Very few nominations have come from the general membership -- most input has been from the committee. Let's get the membership's thoughts! Nominations are needed 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, 1989, with emphasis on papers published in the year ending on that date.

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.

The WGA Bylaws contain details on awards and criteria. In 1985, previous restriction of the Paper Award to WGA members was removed insofar as papers in WGA publications is concerned. Restriction of Service Awards to members was completely removed.

Send nominations with supporting information to:

Robert L. Frank (313) 645-9848
30795 River Crossing
Birmingham, MI 48010

WGA Bibliography

John Beukers

Through the efforts of WGA members and supportive government and industry sources, a definitive loran bibliography is now within reach. In addition to WGA's own publications, the Transportation Systems Center bibliography is available, thanks to TSC's Ian McWilliams and FAA's George Quinn. John Illgen provided a copy of his company's navigation listings. Two NTIS indexes are also to be included.

Information is sought on the loran library which was maintained by the Air Force, and a library prepared by Alburn in 1972. This collection contains 672 titles of R&D reports prepared by Technology, Inc. for the Air Force. Also sought is access to the U. S. Coast Guard's R&D library listings.

This bibliography will be published in the Journal of Loran Navigation as it is compiled. If anyone can help obtain the desired complete listings, please contact Secretary John Beukers.

COCO, Staff Needed

The WGA has received a request from Mr. Donald Tierney, of SHS International of Fairfax (VA), "I am the US recruiting agent for a Saudi Arabian firm. They have asked me to recruit the following former US Coast Guard personnel for assignment to Saudi Arabia. All must have experience with the Loran-C system."

- 1 Chain Operations Coordinator
- 1 Loran Systems Engineer
- 5 Loran Site Supervisors

These are tax-free positions, offering multi-year contracts. There are no fees. Call (703) 437-0961.

Top Secret?

Members Rod and Susie Stebbins wrote a kind letter to WGA relating some of their experiences with loran since 1981. Based on their own travels, the Stebbins' publish "Coastal Loran Coordinates," giving positions of "...havens, ports, rocks and ledges, reefs and wrecks ..." as a guide for boaters.

They tell of the "early days" when informal lists of loran coordinates were the only guides to destinations: "...loran always knew where we were, but did not know where we wanted to go." Some boaters kept their lists top secret, or gave out altered lists (to protect the old fishin' hole?).

The Stebbins' 36-foot Sea Ray is equipped with triple- redundant loran with autopilot coupler, four VHF's, and a lot of other Silicon Valley goodies. They write: "Our contribution seems small by comparison to the mission of the Association, for all we have accomplished is documentation of destinations; with the many seminars we give each year on our travels, we spread the message that boating with a loran is easy, practical and affordable...."

[That "small" contribution sounds pretty significant to us. ed.]

Help

It would be impossible to turn out this WGA Newsletter without assistance. Your editor is fortunate to have the help of student intern Dana Potopsky, during the preparation of the Winter newsletter, and again for this Spring issue.

Did You Know?

April, 1989 is the 15th anniversary of the designation of Loran-C to be the official maritime radio navaid for navigable waters in the U. S. and Canada. One and one- half decades have seen a lot of progress!

'89 WGA Convention

Ed McGann
Mike Moroney

Outstanding response to the Call for Papers was a rewarding assurance of member support for the 1989 Convention. Everyone who took the time to prepare and submit an abstract is to be commended; the Technical Committee had difficulty selecting papers to meet the goals of the 17th technical meeting. At this point, it appears there will be good participation from several countries around the world.

The staff of the Tara Hyannis Resort continues to impress the WGA '89 committee with their dedication to providing the best accommodations possible. The dining, meeting and social facilities are excellent. The general decorum will be very conducive to a productive technical exchange, while providing ample opportunities such as golf, swimming, tennis and a fitness room, for relaxation. The hotel rates are very reasonable and the session will begin Sunday evening with a traditional New England clambake with lobster and all!

Reserve the dates and plan to come early or stay later if you can. The hotel will extend their reduced rates if you register early.

It is important now to adhere to the various "due dates" to assure both your attendance and the success of the convention. Authors are reminded to submit their papers before July 17th so that proceedings can be distributed at the convention. When you receive your reservation form, please return it to the Tara as soon as possible because the hotel has reserved a limited number of deluxe rooms, at special WGA rates, overlooking the golf course and a beautiful garden area.

So, arrange your schedule and start making plans now to attend 29 October to 1 November! See you on Cape Cod!

In Memoriam

Giff Hefley

One of the true drivers behind the development of Loran-C, Giff Hefley, died this February of complications of Alzheimer's Disease.

Giff's association with low-frequency loran began just after World War II, with the Air Force and Operation Musk Ox, deploying 180 Kc transmitters and receivers into Canada. Later, he joined the Central Radio Propagation Laboratory of the National Bureau of Standards; one of his first assignments was leading a team to monitor Sperry's CYCLAN tests on the West Coast. That was where I first met Giff, and learned to appreciate his keen insight into radio propagation and the operational problems of a loran system.

Later, when the CYTAC system went out into the field for evaluation, Giff was in charge of the CRPL team monitoring its progress, assisted by Bob Doherty and Ralph Johler. The technical success of the program was due in considerable measure to his understanding of system problems and innovative approach to evaluation.

When Loran-C was installed on a widespread basis in the 1960s, Giff recognized its utility as a time synchronization source. His pioneering efforts in this endeavor earned a Department of Commerce silver medal for Meritorious Service. He retired from government service before publication of his book "The Development of Loran-C Navigation and Timing" as NBS Monograph 129, in 1972.

All of us who have profited from association with loran owe a debt to Giff Hefley. I personally owe Giff a lot, for the good times we had, and for all he taught me. I won't forget him.

Walt Dean

FCC Part 15 Change a Mixed Blessing

Bob Miller
Walt Dean

In a Report and Order released 18 April, 1989, the Federal Communications Commission revised the rules regarding the operation of radio frequency devices without an individual license (Part 15; GEN Docket 87-389). The new rules will not come into effect for ten years. Although the Loran-C band 90 - 110 kHz was added as a restricted band, the U. S. Coast Guard (USCG), Federal Aviation Administration (FAA) and National Telecommunications and Information Administration request that emission limits be imposed on power-line carriers (PLC) operating in the Loran-C bands for safety reasons was denied, since "This would be an extremely burdensome requirement for the electric utilities and would serve only to limit interference to Loran-C reception by vehicles and aircraft that are located extremely close to power lines carrying PLC information." The Coast Guard, after consulting with the FAA, had asked for PLC protection at 75 meters based upon Instrument Flight Rules for non-precision approaches to airports.

Although PLCs have no emission limits, they still operate on an unprotected, non-interference basis to other users of the 10-490 kHz band.

Dissatisfied with these results, the USCG and FAA have filed with the FCC a Joint Petition for Partial Reconsideration and Further Rulemaking. The petition points out that, contrary to the claims of the utilities, relatively inexpensive computer programs can predict the radiated fields from the power lines. The text of this petition is too lengthy for presentation here, but a copy of the full text is on file with the WGA Secretary.

The idea that a user of a loran receiver can simply move further away from the power line to avoid interference is completely unacceptable. The Wild Goose Association has filed a memorandum with the FCC supporting the USCG/FAA position.

More discussion is a certainty.

Under an agreement signed in January, 1989, the North American Electric Reliability Council has provided the U. S. Coast Guard a listing of electric utility power line carrier radio systems (PLCs) operating in the band from 70-130 kHz, which may be released to established Loran-C user groups for the purpose of evaluating potential interference to the Loran-C system. The Coast Guard considers Loran-C user groups to be such organizations as the Radio Technical Commission for Maritime Services (RTCM), the Wild Goose Association, Loran-C equipment manufacturers and dealers. An updated listing will be available quarterly.

Power line carriers operate on an unprotected, non-interference basis to Loran-C and other authorized users of the band 10-490 kHz, in accordance with Parts 15 and 90 of Federal Communications Commission (FCC) rules. Cases of PLC interference to the Loran-C band which cannot be resolved locally should be sent to the local FCC office for resolution. Advise the Coast Guard at the address below if resolution is not forthcoming.

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."

Power Line Carrier Data Base

Walt Dean
Bob Miller

For the time being, the Coast Guard will provide copies of this 300-page list at no charge. User groups desiring a copy should enclose a self-addressed mailing label and a note requesting the listing and describing their organization to:

Commandant (G-TTS-3)
U. S. Coast Guard
Washington, DC 20593-0001

Updates need to be requested separately each quarter. The Coast Guard expects to have this same information available on a MS-DOS floppy disk within the next few weeks.

Letters to the Editor

In future *Goose Gazette* issues, we will host a "Letters to the Editor" column. Comment and dialog via this column are encouraged. Questions or comment on previous *Goose Gazette* articles will be shared with the authors, so responses may be printed when appropriate. Letters must be signed, and have return addresses. Editing may be done, to fit space. We'll try to preserve intent (and tone).

1989 WGA Standing Committees

Audit	Cal Culver
Awards	Bob Frank
Constitution	Vern Johnson
Convention	Ed McGann Mike Moroney Frank Cassidy Per Enge Robert Goddard Jimmie Toms Daniel Callanan
Historical	Walt Dean John Castonia Bob Frank John Beukers
Journal	John Beukers Bob Lilley Dave Scull Walt Dean Bob Frank
Membership	Bill Garmany
Newsletter	Bob Lilley
Nominating	Jim Van Etten Bill Garmany Vern Johnson Ed McGann

1989 Special Committees

Publicity	Jim Culbertson Ron Wiener
Civil Radionavigation	Dave Scull
Congressional Liaison	Ed McGann
DoD Liaison	John Illgen
Convention Planning	Bob Bronson

Additions and corrections requested.

Aviation Matters

(reprinted from FAAviationNews, January, 1989, with permission)

"... [The Federal Aviation Administration] is fully committed to Loran-C for air navigation as a supplementary aid ... it is important for pilots who purchase receivers to respect their current limitations, and to refrain from unlawful and unsafe use"

Q. Can I borrow a loran receiver that operates from a battery or plugs into the cigarette lighter, and just use it under VFR conditions, without getting any official approval?

A. No. Any avionics equipment, including loran, is considered "installed" if it is attached to the airframe or engine, or is drawing power from the electrical or pressure system of the aircraft. The installation must be approved by an authorized repair station, manufacturer or inspection authorization holder. A primary concern here is to make sure that the loran does not interfere with other equipment in the aircraft. This also applies to the installation of a loran antenna.

Q. For landing, how far into a terminal area can you go with loran?

A. Insofar as you can identify the coordinates and the various fixes and check points, you can proceed to the initial approach point, or to the point where ATC issues you vectors for the approach. At present, you cannot use loran for any type of instrument approach, unless you are in the Limited Implementation Program (for loran non-precision approach).

A Directory of Directors

This listing is provided so that members may contact WGA directors conveniently. In future issues, we will try for a master list of directors and committee chairmen, with numbers. Please call, with your ideas and suggestions as we work to grow and improve the WGA!

WGA Director Name	Busn. Phone

Carl S. Andren(treas)	202-331-9097
David C. Scull	202-366-4355
Edward L. McGann	617-275-2010
James F. Culbertson(vp)	714-531-7974
James O. Alexander	714-432-0516
James P. Van Etten	201-661-0876
Jimmie L. Toms	301-695-4040
John D. Illgen(pres)	805-563-0665
John M. Beukers(secy)	516-862-7500
Leo F. Fehlner	301-622-0529
Maurice J. Moroney	617-494-2026
Robert D. Bronson	503-581-8101
Robert W. Lilley	614-593-1514
Vernon L. Johnson	201-228-2642
Walter N. Dean	503-684-1600

International Matters

Ed McGann

Expanded Coverage

Eight nations of Northwest Europe and Canada have signed (at the working group level) a memorandum of understanding, agreeing on the operational, financial and political issues of establishing an extended Loran-C coverage area reaching from the northern Spanish coast, around northern Norway to the Barents Sea and across the North Atlantic to link up with the North American Loran-C coverage. Final ministerial level approval is expected at a November-December, 1989 meeting, with work to begin immediately.

All existing tube transmitters will be upgraded to solid-state operation, and new stations will be added. The two existing stations in France will become part of the configuration, which will develop in stages. All new stations and equipment updates are scheduled for completion in late 1992. The present chain configurations will be maintained until the end of 1994 when US interests in that area end, and subsequently the North American and Norwegian chains will be reconfigured to accommodate more effectively the additional stations.

IALA Meeting

In June, 1989, the second meeting of Mediterranean and Iberian peninsula nations interested in the future of Loran-C in that area was held, under the sponsorship of the International Association of Lighthouse Authorities (IALA). The Spanish government was host for the meeting. The purpose of the meeting was to establish working groups patterned on those of the Northwest Europe groups so as to formulate plans for post-1994 Loran-C operation in their respective areas.

Japan

Japan and the United States have begun formal talks on the return of Loran-C in the area of the Japan Sea chain. These talks will address the post-1994 period, but also include the possibility of near term host nation operation.

China

The Peoples' Republic of China (PRC) and U.S.-based Megapulse, Inc. will jointly build three more transmitting stations to cover the northeast coast of the PRC. The first three stations are undergoing tests in the southeast PRC coastal areas. Installation of the new stations is scheduled for early 1992.

Korea

The Republic of Korea has begun placing personnel on site at the two Loran-C stations there, which used to be part of the old Commando Lion chain. Korea will formally take control of these stations in September, 1989. The two stations work with the Japanese chain stations, and are currently under USCG control.

FRP

The 1988 edition of the Federal Radionavigation Plan (FRP) which was made available recently, presents a very positive picture of the present status and CONUS future of Loran-C and addresses much more frankly than previous issues the circumstances that need to be considered in realizing an operationally effective and economically justifiable mix of navigation systems for the United States and its interests throughout the world. Unfortunately, most of the FRP comments regarding GPS are again wrong or inaccurate.

ICAO

The WGA submitted significant commentary to the world aviation body, ICAO, critical of their recent Future Air Navigation System (FANS)

report which almost exclusively focused on satellite systems to the exclusion of terrestrially-based aids. To date there has been no response by ICAO to the WGA commentary.

Elections (and dues)

Jim Van Etten

Ballots for election of your WGA President and Directors were mailed to the membership who were paid up for 1989 or were at least paid up through 1988. Those who received ballots but had not paid their 1989 dues must have included the dues (or an explanation that WGA made an error) with the ballot, in order for the ballot to be counted. (There was a note included with the ballot advising that you are not up to date if WGA believes that to be the case.)

Ballots will be counted during the first week in July, and results will be reported in the next issue of the newsletter.

ION Meeting

The WGA was well represented at the Annual Technical Meeting of the Institute of Navigation, held in Alexandria, Virginia, June 27-29. John Illgen was chairman for the session on **Interoperability and Integration** and John Beukers was chairman for the session on **Loran-C Applications**.

All speakers for the latter session were from the WGA and included Capt. Henry Marx of Landfall Navigation, Ron Wiener of Azure Technology, Vincent Lally from the National Center for Atmospheric Research, Bill Mooney from the MITRE Corporation and Walt Dean from ARNAV Systems, Inc.

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Missing Papers Needed for WGA Files

Please contact John Beukers at (516) 862-7500

As mentioned elsewhere in this newsletter, we are collecting a file copy of each publication of WGA. The list below gives those papers for

which we cannot find copies. If you can, please locate a copy and send it to the Secretary. If necessary, we can copy the document and return your original. Many thanks for your help.

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Missing or Unpublished Papers

If you have a copy, please may we borrow to copy for our files.

114	Hoover	On the Circle of Uncertainty	Vol. 10-3
143	Rogoff	Viewnav - Precision Navigation, Planning, and Tactical Control	Vol. 12-4
174	McKenzie	How Good the Aircraft Are Doing With The Signals From Fox Harbor	Vol. 13-17
586	Roland	Loran Station Presque Isle - Prototype for the Future	Paper 1-1
587	Dean	How We Got To Where We Are	Paper 1-2
588	Parini	A Remote Target Locating System - PAVENAIL	Paper 1-3
589	Pasquier	Technical Description of the AN/PSN-6 Loran Personal Navigator	Paper 1-4
600	Doherty	Semi-Automated Loran Stations	Paper 3-9
668	Manning	West Coast Loran-C - The Promise and the Product (Abstract Only)	Vol. 6-12
683	Smoler	Practical Small-Vessel Installation of Loran-C Receivers	Vol. 7-3
684	Dishal	Exact Drive Requirements for Loran-C Transmitters	Vol. 7-4
686	Enias	Integrating a Loran-C Non-Precision Approach Capability into the National Airspace System	Vol. 16-2
687	Sedlock	Future of Loran-C	Vol. 16-3
688	Pfotenhauer	Forging a Future for Loran-C/GPS Interoperability	Vol. 16-4
689	Solomon	Overview of Possible Establishmnt & Ranking Criteria for Loran Non-Prec. Approach Candidate Airports	Vol. 16-21
690	Beukers	Improved Tracking with Loran-C Cross Chain Capability	Vol. 16-27
691	Rogoff	The Precision Use of Loran-C in Harbor Navigation	Vol. 16-14
692	Spradley	The Datum Game...or, Will The Real North American Datum Please Stand Up?	Vol. 16-15
693	McCullough	Seasonal Loran Variations in New England	Vol. 13-24

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

Bulk Mail
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 Athens, Ohio