



THE

GOOSE GAZETTE

volume 1

winter

number 3

1973-1974

RENEW YOUR MEMBERSHIP

If you are a member of the Wild Goose Association*, take a minute, get out your membership card, and check the date of expiration. If it says 1973, you should have been contacted by Walt Dean with a request to renew your membership. Please do it soon, do not postpone - We need your continuing support to keep the organization going. Who knows, perhaps Walt may even throw in a new goodie with the 1974 membership card. How about some more decals, Walt?

*If you are not a member, join now and get the much coveted book, "The Development of Loran-C Navigation and Timing."

ADMIRAL MOREAU ADDRESSES WGA BOARD

Admiral J. Moreau, Chief of the Office of Engineering, USCG, addressed the WGA officers and directors at their latest Board Meeting on January 16, 1974.

According to Admiral Moreau, the future of LORAN-C looks good, at least as far as the Coast Guard is concerned.

Recent tests of LORAN-C for varied applications have shown that the system can give excellent results with high accuracy and good reliability.

Admiral Moreau reported that airborne evaluations by commercial airlines have provided recent encouragement toward LORAN-C for civil aviation. The simultaneous development of low cost LORAN-C receivers and the expected expansion of the coverage area to include the US West Coast and further Alaskan coverage should give the LORAN-C system the push that it deserves.

2nd WGA CONVENTION IN WASHINGTON

Washington, D. C. - The second annual convention of the WGA was held on October 3, 4, and 5, 1973, at the Key Bridge, Marriott Hotel.

A varied and imaginative program arranged by our Convention Chairman, Hal Walton, made the three days of special events seem like one. Members and visitors agreed that the occasion has given the Association a new and vigorous impetus.

Starting on Wednesday, October 3, activities got under way with a tour of the Applied Physics Laboratories. Thanks to Wild Goose director Leo Fehlner who made the arrangements for members and guests, the special event included visits of the Exhibit and Museum Center, the Environmental Test Lab, the Satellite Injection Station, and the Propulsion Research Lab. Jean Von Schulz of APL organized the complete tour and made it a pleasant and informative afternoon for all.

A White House Tour occupied those who did not attend the technical sessions (or go shopping) and the sessions side of the WGA convention started Thursday morning.

As seen elsewhere in this issue, the technical sessions covered broad areas of Loran activities. These were: Ground Stations and Monitors, Receiver Development for commercial and military users, and applications of Loran-C. The technical papers totaled thirteen and each was of the highest quality and professional level.

At the end of the technical sessions, an award was made. Bob Doherty and Ralph Johler won the Wild Goose trophy for the best technical paper, and details of the judging are presented elsewhere in this issue.

The Thursday evening dinner dance was the usual success. Close to two hundred participants were present to hear Jacques S. Gansler, Assistant Director for R&D Planning at DDR&E.

Mr. Gansler addressed the convention audience on the subject of recent trends in Department of Defense philosophies in system development and he emphasized the need for increased cost consciousness. The procurement of complex systems, said he, must not be governed by performance alone, but by the continuing "trade-off" between performance and cost. He concluded that a careful balance between requirement priorities and systems cost must be maintained at all times, and urged both industry and the military to follow this concept.



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THE GOOSE GAZETTE

PUBLICATION OF THE
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EDITORIAL

In response to the ever-growing need for fast communication between the WGA Board and the membership, the Goose Gazette will now be supplemented by a monthly bulletin sent to all members. Although this issue of the Goose Gazette continues to carry out the objectives of a WGA Newsletter, it certainly sets no record for publication speed and only by a technicality can it be called the "Winter Issue."



CLAUDE PASQUIER

Some readers will point out that this is only the third issue since the inception of the Goose Gazette in November of 1972, but others may look upon the Convention coverage with a sense of nostalgia that comes only after a suitable time span.

The WGA Bulletin will supplement the Goose Gazette by creating a medium for exchange of information between members and provide a simple method for dissemination of the results of the WGA Board Meetings. Once again, I will request membership participation. The bulletin is for your convenience, not only as a reader but also as an author.

One of the problems in getting the Goose Gazette published on a timely basis with no loss of quality is the availability of volunteer time. The day may soon come when expansion of our membership and growth of our charter may require paid services. In anticipation of this occurrence, your Board has debated the possibility of publishing advertising in the Goose Gazette. Please give us your opinions concerning the advisability of advertising in the Goose Gazette.

LOST SIGNALS

Joseph A. Parini, formerly Vice-President, Engineering for the Instrument Division of LSI in Grand Rapids, Mich. was promoted to Division President. Parini is a board member of the WGA.

Norman A. Barkeley, formerly Vice-President, Contracts and Support Logistics for the LSI Instrument Division and a member of the WGA, was named President of LSI's Astronics Division, Santa Monica, Calif. The third WGA member to rise within LSI is Arlan R. Van Koevering, who became Vice-President, Engineering, succeeding Joe Parini.

Commander Tom Nolan, USCG, formerly attached to the LORAN Program Office at ESD, was recently transferred to USCG Hq., Washington, D. C. Tom's new position is Chief of the Vessel Traffic Systems Section in the Office of Research and Development, Navigation Projects Branch.

William R. Vogeler, formerly with International Engineering Co., where he was responsible for LORAN receiver development, has joined the Telcom, Inc. staff at the McLean, Va. facility where he will direct LORAN R&D efforts.

Robert Romandetto, formerly Marketing Manager, ITT Avionics, Nutley, N.J., now Director of Marketing and Contracts with Hartman Systems, Huntington Station, New York.

WGA Radio Navigation Almanac

At the January 16 Board of Directors meeting, the possibility of publishing an Annual was considered. This would be a glossy cover book intended not only for WGA members but for all radio navigation users particularly potential Loran users.

The Annual would be distributed to WGA members, airlines, shipping companies, government agencies, and other potential users at no cost. Additional copies would be available to all comers at about a dollar. The cost would be borne by annual dues, sale of advertising space, and sale of books.

The content would be:

1. A listing of WGA membership and company affiliation
2. An update of the WGA constitution
3. A listing of companies manufacturing and/or marketing Loran hardware with a listing of the equipment carried
4. A glossary of terms
5. Tutorial articles on Loran
6. System and equipment specifications
7. Bibliography
8. Advertising

This proposal is in furtherance of the WGA aims, but will require the support of both the membership and industry. It is ambitious, but can be accomplished in steps. Please send comments on your company's attitude toward such advertising and any individual offerings for material or assistance to Bill Roland.

Convention continued

The WGA convention was concluded on Friday, October 5, at noon following a brief meeting of the Board of Directors and a brisk panel discussion. The panel was made up of these Loran experts: John Beukers, Robert Doherty, Ed Durbin, Donald Feldman, Leo Felhner, Robert Frank, James Meranda, Joseph Parini, and Claude Pasquier. A discussion of the Loran-C system ranging from user problems to ground stations implementation and control was conducted. Problems, policies, and prospects of Loran-C were covered and audience participation was rewarding.

THE PRESIDENT'S CORNER

LLOYD D. HIGGINBOTHAM



As a result of the last balloting, you approved a constitutional change which established the provisions for local chapters. On 16 June 1973 the first "Gosling" was formally hatched. It is with a great deal of pride that I extend my congratulations to the New England Chapter of the Wild Goose Association with headquarters P. O. Box 228, Bedford, Massachusetts 01730. Special appreciation is extended WGA member Mel Chaskin for his effort in organizing the chapter. My best wishes to the Chapter in the coming years and for its continued enthusiastic activity.

It was most gratifying to me and your Board of Directors to receive the response the membership gave to the balloting. Only two ballots out of the total membership were not returned. Congratulations and sincere thanks. Also, I would like to extend my congratulations to Messrs. Claude Pasquier, Joe Parini, Jim Van Etten, and Tom Daniels for having been returned to office as members of the Board. Bill Becker has found it necessary to resign as a member of the Board. In accordance with our Constitution and By-Laws, his replacement was the one receiving the next largest vote in the last election. My congratulations to John Beukers, I and the other Board members look forward to working with John. I would remind you that four Board members and a new president will be elected in the coming year. Please send any nominations you may have for these positions to Mr. John Beukers, Beukers Laboratory, 30 Orville Drive, Bohemia, New York 11716.

The second annual convention held at the Key Bridge Marriott Hotel in Washington, D. C. on 3, 4, and 5 October was in my opinion a resounding success. The consensus of those to whom I talked was that the technical papers were of high quality and extremely interesting. Also, it was good to see so many old friends. I would like to express my appreciation for the outstanding jobs done by Hal Walton, the convention chairman, and to Ed Durbin for the technical paper session as well as the lively panel discussion which he organized and chaired. I equally appreciate the support that you, the membership, gave to this annual event. I look forward to the next convention, which will be held in the Metropolitan New York area, as announced in this issue.

By the time you receive this issue the "Holiday Season" will have been with us once again. I would like to take this opportunity to express my personal greetings as well as those of your Board of Directors. To you and yours, may the New Year meet with all of your expectations.

LADY BE GOOD

(REPRINTED BY PERMISSION OF LITTON SYSTEMS, INC. - 1971)

NOMINATIONS

The annual election for the office of President and four Directors of the Association will be upon us shortly. As Chairman of the Nominating and Elections Committee, I am asking you to submit nominations for these positions in writing, together with a biographical sketch of the person nominated, by March 25, 1974, to the Chairman of the nominating committee:

John M. Beukers
Beukers Laboratories, Inc.
30 Orville Drive
Bohemia, New York 11716

The four directors whose term expires this year are: Walter Dean, Robert Doherty, Wilbert Frantz, and William Roland.

LOCAL CHAPTERS

The latest additions to the Constitution and By-Laws provide for the creation of Regional Clubs. (See Article XIV of the Constitution and Article XII of the By-Laws).

Now that the legal hurdles have been cleared, local chapters should be organized to increase our membership participation and make the Wild Goose Association more effective. Let's follow the fine example of the New England Chapter.

Membership Chairman, Walt Dean, proposes the following geographical sections:

1. New England
2. Metropolitan N.Y.-N.J.
3. Washington, D. C. vicinity
4. North Central
5. Texas
6. Colorado
7. California
8. Miscellaneous - Overseas

by N. W. Emmott

Our story, which began in the summer issue of the Goose Gazette, is about a B-24 LIBERATOR Bomber, a veteran of World War II, found in the Libyan desert on November 9, 1958. The aircraft, christened the LADY BE GOOD, disappeared after a raid on Naples from its base at Soluch in Libya on April 14, 1943.

LADY BE GOOD - Continued

Then, on 11 February 1960, a radio operator at Wheelus Air Force Base in Libya received a message from a commercial transport carrying supplies to a team of oil prospectors in the desert. The plane's crew reported having seen a group of dead bodies near the wrecked aircraft. Since the area had been thoroughly searched the previous Summer, the Air Base commander was skeptical of the report, but he sent out an aircraft to investigate. Sure enough, when they landed at the reported location, they found the bodies of five men, lying mummified by the scorching air, amid a camp which contained shoes, flight suits, flashlights and clothes marked with the names of the crewmen of Lady Be Good. Four men of the crew were still missing, and photographic sweeps of the surrounding areas were made, but without result. However, prospectors combing the area for oil came on two more corpses, and finally a third. The ninth man has never been found.

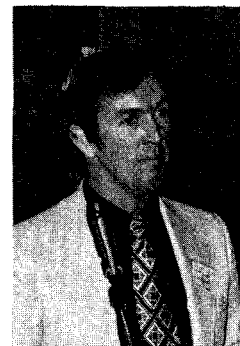


Second National WILD GOOSE Technical Symposium



Solid State Loran Transmitters
Ronald Rockwell
Sperry Gyroscope Company

The introduction of the fast high power SCR and the availability of Computer Aided design techniques has enabled the development of reliable, efficient, and precise Loran transmitters, which may incorporate automatic monitoring of the antenna current for continuous closed loop control of the transmitted signal.



The Accuracy of Loran
Ed McGee
Megapulse

This paper discusses the accuracy of Loran for navigation and timing.

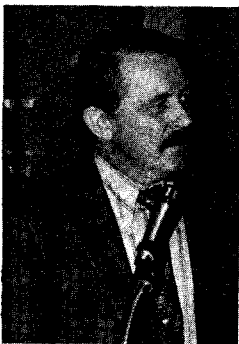


High Power, Half Cycle Generator, Loran Transmitters - A Simple Basic Design Procedure
Milton Dishal
ITT Avionics Division

This paper shows that the combination of paralleled half cycle generators plus resonated antenna is fundamentally a straightforward bandpass filter network. Using straightforward network analysis, the paper develops equations giving the half cycle energies required to produce a specified pulse leading edge, and shows how these required energies are affected by the overall network element values.

Controlled Dynamic Testing of the Loran System
Gerry Zemlin
ITT Avionics Division

A complete simulation and testing of the Loran system was described, including discussion of many important performance parameters.



Meteorological Influences on Loran C Ground Wave Propagation
Robert Doherty
OT/ITS Department of Commerce

Upper atmospheric changes in weather conditions are observable on Loran signals due to the extreme severity of frontal systems in the mid-continental U.S., especially in the winter. Variations of these types must exist to a lesser extent on other Loran paths. To the degree that they can be predicted, the position fixing accuracies can be improved for any Loran chain.



Application of Loran C
George Hapgood
Teledyne Systems Company

This paper discusses the application of Loran C for direct ranging in accuracy in area hyperbolic and direct hyperbolic position fixing. The direct ranging offers performance advantages over hyperbolic.



Cross Chain Loran Navigation
Jim Meranda
Teledyne Systems Company

A method has been described which indicates a practical approach to improving the limited coverage areas available from existing stations.

GDOP Revisited
Tom Jerardi
Johns Hopkins University

A review of some of the classical literature indicates some errors have occurred and have been corrected in subsequent papers. Revised data may affect the optimum location of Loran stations.

ium



How to Harvest Full Potential of Loran C
Leo Fehlner
Johns Hopkins University

It is expected that the predictable accuracy of a single Loran-C fix can be made equal to the repeatable accuracy through a new technique for processing the received signal involving both group and phase propagation velocities. The improvements required of the transmitters are accurate control of the transmitted wave form, and accurate control of the time of occurrence of the zero crossings of the carrier. Improvements required of the receivers involve more thorough rejection of noise, increase in internal precision, lower probability of false cycle identification, and implementation of the group/phase velocity technique of distance measuring.



Clarinet Pilgrim
Walter Dean
Magnavox

A general discussion of the proposed methods of Loran signal phase modulation was presented.



x Loran C/D Positioning System

describes Accufix, the first self-contained
able system utilizing the Loran concept
or position fixing.

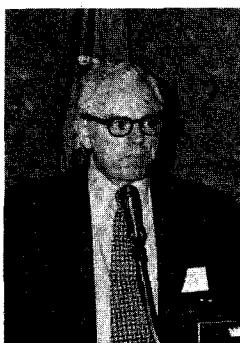
Applications of Loran C Retransmission
John Beukers
Beukers Laboratories

In 1965 a new concept was proposed to the meteorological community, namely that of signal retransmission. In this scheme the tracking signals are received by the balloon borne package, and retransmitted to the ground station where they are processed to determine the remote package position. It has taken eight years to perfect the total system which includes the radiosonde design for compatibility, telemetry equipment and computer hardware/software for Navaid signal processing and meteorological computations.



RN-101

Loran-inertial
directing of



Kalman Filtering to Direct Ranging Loran
ams Company

cusses a Direct Ranging Loran (DRL)
light test results have indicated that the
ementation offers 20% improvement in
of good coverage common to both hyper-
ranging implementations. In areas of poor
ing system geometry (GDOP of 10 to 1),
mplementation utilizing Kalman filter
improvement as high as 20 to 1 over the

Optimum Receiver Processing for Atmospheric Noise
Lt. Cdr. Don Feldman
U.S. Coast Guard

This paper describes a new model for atmospheric noise waveforms observed at the output of the antenna bandlimiting filter. This model, which is based on statistical analysis of sample records of these waveforms, is used to analyze the performance of typical radio navigation receivers and to determine near optimum receiver performance. The analysis is verified by simulating the receiver structure and testing the receiver with the actual noise sample records.



An Automatic Vessel Control System Utilizing Loran C
Marty Day
Amecom Division of Litton Systems, Inc.

The increased concern for safety and the ecology of our world waterways creates a need for positive control of shipping traffic in the coastal and inland waterways. This paper describes a Loran-C oriented system to obtain the vessel's present position and the techniques used to utilize this data in a traffic control system. A successful feasibility demonstration of these techniques was conducted in the Fall of 1972 under the sponsorship of the St. Lawrence Authority of Canada.



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Among the belongings of the eight dead men there were a number of written records, including a diary kept by Lieutenant Toner, the co-pilot. The pages told the story.

The crew, commanded by Lieutenant William J. Hatton, had bombed Naples according to plan at ten o'clock at night, and then set course for their base at Benina, on the Libyan coast near Benghazi. It was about 600 nautical miles away as the crow flies -- about three and a half hours flying time for an aircraft lumbering along at about 180 knots groundspeed. Probably the route called for a diversion out to sea, to avoid potential attacks for fighters. In any case, the journey should not have required more than about four hours, or a little more.

At twelve minutes past midnight, the radio operator obtained from Benina a radio bearing. He pressed down on his radio key to transmit a long dash, which the ground radio direction-finding station at Benina measured to find the direction from which the radio signal was coming. "330 degrees". Benina transmitted back to Lady Be Good, indicating that the aircraft was north and slightly west of its destination. Hays, the navigator, checked his map. Everything seemed according to plan. He should be northwest of his base. Hatton twisted the knob on the autopilot to alter the aircraft's heading so that he could fly down the 330° bearing Benina had given him.

The aircraft flew on through the night. Hatton checked; according to his chart, he should have crossed the coast. Beneath him, however, there was no trace of the sign of the curving lace-edge of surf on the North African beaches. He told the radio operator to contact Benina and get another bearing. Lamotte, the radio operator, tried to do so, but without answer. He reported that the radio station might be inoperative, or that it had been silenced lest it should help direct enemy aircraft bent on attacking it.

Another hour and a half passed. There was still no sign of the coastline. Hatton began to worry; fuel was running low. Below them there was nothing -- the nothing that the crew had grown to associate with the Mediterranean. Then a red light glowed on the instrument panel, and an engine coughed and died; and then another. They were out of fuel.

One by one the men, their Mae Wests strapped on, checked their parachutes and jumped. The aircraft, its engines dead, kept flying straight ahead, the automatic pilot at the controls of the empty craft. It touched the ground, bounced, and then slowed to a stop. The landing was gentle enough, though it broke open the fuselage, that the crew could well have survived it.

The men floated down to the ground and the men's feet touched the desert. Thinking themselves over the sea, they had expected to be doused into salt water, and were amazed to find themselves on dry land. It must be an island, they thought, and considered themselves saved. They listened for the sound of the sea, but heard nothing but the silence of the desert.

Hatton, the aircraft commander, shouted to collect his crew, found them all except Woravka, the bombardier. Hatton fired signal flares, but without result. The men made an inventory of their belongings, and then set out northward. If they were to march, it would be better to do so in the cool of the night. When dawn came, their spirits rose. Stretching before them was the track made by the Italian convoy. All they had to do, they reasoned, was to follow it to safety.

During the day they set up a tent made out of a parachute and rested under it, out of the sun. When late afternoon came, they set out again. To make it possible for Woravka to follow them, they marked their path with the mute arrows that nobody was to notice for another decade and a half. Hatton distributed, a day and a half after they had bailed out, half a sandwich apiece. It was not hunger but thirst that tormented them, however. During the night they spread cloths out, hoping to collect dew, but the cloths remained dry.

On 6 April they came upon the track left by the British vehicles. Uncertain as to which way to go, they debated whether to continue their original path. Hays and Adams, two of the crew, volunteered to walk along it for several hours that morning, and then to return and report. That afternoon they returned, with the news that the new track had petered out among the dunes. The crew kept on its original way.

By the morning of 10 April five of the men could advance no further. They remained under their parachute-tent, Toner making notes now and then in his diary. The nights were bitterly cold, the days blazing hot. On Sunday, 10 April, Toner wrote, "We pray for help. Nothing new, except a couple of birds in the sky. We are very weak. We can neither walk nor sleep. We want to die."

The next day he wrote, "We pray all the time. We expect help soon."

On 12 April Toner wrote "No help. Very cold night." Those were his last words. (to be continued)

TECHNICAL PAPER REPRINTS

Our system broke down! Paper Chairman, Ed Durbin had arranged to have sign-up lists to request copies of the technical papers presented at the convention, but the voracious appetite of the audience was such that not only did all the available copies get gobbled up, but, the sign-up lists also disappeared in the process.

If you desire copies of the technical papers presented on October 4th and 5th, please get in touch with the authors. They have indicated their willingness to respond to all reasonable demands.

LETTER FROM THE BOARD

As all members of the Wild Goose Association know, the organization is devoted to LORAN. We have quite successfully operated in this manner so far. The membership has been built up to over 300 and the enthusiasm has been sustained.

Several of our members have asked the board members if we would consider expanding the charter. This thought is an interesting one. If we expand, what should the limits be? Several things suggest themselves: All hyperbolic navigation, all radio navigation, all long range radio navigation, etc. We would appreciate hearing from members and non-members alike in regard to this question. If the membership decides that expansion is desirable, it should be done in such a manner so as not to duplicate charters of other existing organizations.

Please send your ideas on this matter to the editor.

LORAN LIBRARY

During the recent Wild Goose Association Convention, a discussion of the Loran Library indicated that many members of the Wild Goose Association were either not familiar with the library or did not have access to the library index. To remedy this situation, the following information is being disseminated to members of the Wild Goose Association.

The Loran Library was developed under an Air Force contract by Technology Incorporated to provide a centralized source of technical information pertaining to Loran technology and related subjects. Copies of all documents available from Defense Documentation Center (DDC), NASA and National Technical Information Service (NTIS) have been collected in hardcopy, microfiche or microfilm and are currently filed at either the Loran SPO at ESD or at Technology Incorporated in Dayton, Ohio.

In addition to the DDC, NASA, and NTIS documents, technical reports obtained directly from the authors and clippings of magazine articles are also included in the Loran Library.

A comprehensive cross-reference index has been maintained with an IBM 7094 computer program and twenty-five copies of the index were printed and distributed to government and other research agencies during the past year.

Requests for copies of the index and/or document loan should be sent to:

Walter Mason
Technology Incorporated
P. O. Box 3085, Overlook Br.
Dayton, Ohio 45431

CONTRACT AWARDS

The Electronic Systems Division (AFSC) awarded contracts to ITT Avionics Division, Nutley, N.J., and LSI Instrument Division, Grand Rapids, Mich., on August 1, 1973, for the second Phase of the AN/ARN-101 Program. This Phase is for each company to modify and flight test an F4D with a prototype AN/ARN-101 to perform Qualification and Reliability Testing on 4 preproduction systems.

The Electronic Systems Division (AFSC) awarded a contract to Sperry Rand Corporation, Sperry Gyroscope Division, Great Neck, N.Y. on January 25, 1974, for the development of Loran C/D Ground Chain Equipment. Contract is Fixed-Price, Incentive Fee type in the amount of \$13,572,000.

CONVENTION BANQUET and DANCE



MR & MRS RL FRANK



BEST PAPER AWARD 1974 CONVENTION

to be held at PLAYBOY CLUB

Robert H. Doherty and J. Ralph Johler won a Trophy for the best technical paper presented during the Second Annual Convention. The co-authored paper, "Meteorological Influences on LORAN-C Ground Wave Propagation" was presented by Bob Doherty and goes a long way toward explaining certain "mysteries" concerning phase variations observed on the East Coast LORAN-C chain. As a consequence of their analysis, Bob predicts that a phase change will occur before the passage of a warm front and after the passage of a cold front at the surface of the ground.

Many other fine papers were also presented. Summaries of these papers appear elsewhere in the Goose Gazette.

Jim VanEtten, Awards Chairman, indicates that the papers were judged on the basis of criteria established by the Awards Committee. These criteria are: Contribution to LORAN, Novelty, Innovation, Accuracy, Credibility, Presentation. The judges were Ed Durbin, Dick Pasciuti, Claude Pasquier, and Bill Roland.

We geese, on our way to the Winter Resorts, decided to stop for a little refueling and relaxation. We landed in the Jersey mountains, and had so much fun we decided to hold our 3rd Annual Convention on October 2, 3, and 4 at the Playboy Club. (We Drakes must stick close to our friends, the Bunnies).

Since flying can be strenuous, we also want to ride a bit, and so we are having our first golf tournament (with carts) on October 2nd, and for those of us who don't play golf, there is tennis, horseback riding, swimming, billiards, health clubs, exercise rooms, and card rooms.

On Thursday, October 3, while we guys are discussing our secrets of precise navigation, our gals will be on a Bread, Cheese and Wine tour, and hope they stay sober for the Dinner Dance that night.

For those of you who want to bring along your family, two children under 12 can share your nest free, (all rooms have two double beds) and baby-sitters can be made available.

And for those who need more time to relax, arrangements can be made to stay longer and take advantage of all the facilities.

So save your vacation days and plan to make this the greatest and best convention ever. Full details, maps, brochures, etc. will be mailed to each of you very soon.

R. Romandetto
Convention Chairman

GLORIA the GOOSE

by RICKY PASQUIER



THE

GOOSE GAZETTE

4 TOWNSEND ROAD
ACTON, MASSACHUSETTS
01720

Robert L. Frank
Mail Station C8, Sperry
Gyroscope Division
Great Neck, N. Y. 11020



Call for papers

Send title and abstract of technical papers you wish to present at the 1974 Convention to Ed Durbin.

ELECTION RESULTS - OCTOBER 1973

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