### **BOARD OF DIRECTORS**

W. N. DEAN .... President J. F. CULBERTSON . Vice President L. F. FEHLNER . . . . . . . Secretary C. S. ANDREN . . . . . . Treasurer J. ALEXANDER **B. AMBROSENO** D. A. CARTER J. D. ILLGEN V. L. JOHNSON A. W. MARCHAL E. L. McGANN M. J. MORONEY W. L. POLHEMUS W. SCHORR J. L. TOMS J. P. VAN ETTEN



# WILD GOOSE ASSOCIATION

22 January 1987

MINUTES OF THE 75th MEETING OF THE BOARD OF DIRECTORS

The 75th meeting of the Board of Directors was held as scheduled Thursday 22 January 1987 at the Sampan Restaurant, Anaheim, California.

The following attended:

	Directors	Members	Proxies
W.N.	Dean, President	D. Scull	Dean for Illgen
J.F.	Culbertson, Vice President and	N. Keeler	McGann for Andren & Polhemus
E.L.	McGann		VanEtten
J.0.	Alexander		
M.J.	Moroney		

The number of Directors present, plus proxies, met the requirements for a quorum. The Agenda is presented as Exhibit 1.

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Item 1 - CALL TO ORDER

The meeting was called to order by President Dean at 1645, 22 January 1987.

Item 2 - SECRETARY'S REPORT

The minutes of the 74th Meeting were accepted - McGann moved and Alexander seconded.

Item 3 - TREASURER'S REPORT

The Treasurer's Report was read and accepted - Culbertson moved and Dean Seconded - Exhibit 2.

It was noted that there was no report on the financial status of the 1986 Convention New Orleans. McGann to contact Andren and have Marchal submit report.

### Item 4 - STANDING COMMITTEES

Constitution and By Laws - no report

1986 Convention - no report

1987 Convention - no report. Dean had contacted Convention Chairman (Toms) who advised that due to business moving and illness, things have been delayed. Toms needs Board advice on "scale" of hotel to be sought in the Washington, D.C. area (ie. Marriott or Hilton). After discussion Board decided that "up scale" accommodations were preferred. McGann raised issue of hotel rates for Military. Dean indicated that Toms had inquired and military rate rooms cannot be blocked for the convention. As discussed during the New Orleans Board Meeting, the military attendees can themselves arrange for the limited number of rooms available at government (GSA) rates and should be advised to do so in the convention announcements. It was moved by McGann, seconded by Culbertson and accepted by the Board that the 1987 Convention be held 20, 21, and 22 October 1987. This is TUESDAY, WEDNESDAY and THURSDAY - a departure from the traditional WED, THUR, FRI of previous conferences. Monday would be Golf and travel day with a possible "field trip" for Friday for those who can stay around. The following comments were introduced concerning the 1987 Convention: Nevin (Tony) Pealer indicated during the ION Conference that he volunteered to assist Toms with the Convention. Frank Brady (ION) has asked for information from the WGA Convention notebook on the accommodations in Santa Barbara (Site of ION 1988 Convention). McGann reminded that publicity efforts must be initiated as soon as possible. A theme for the 1987 Convention has not been announced. Information on the Convention is needed for the WGA Newsletter in February - to be sent to Bob Miller.

(Subsequent to Board Meeting, Culbertson contacted Toms and discussed action of the Board re. hotel room rates, comments by Pealer, and dates. Also discussed the convention notebook which Culbertson has received from Marchal and will forward to Toms)

1986-87 Journal . McGann reports that Ambroseno has Journal almost ready for mailing - one page had to be reprinted.

Membership . See Fehlner report - Exhibit 3.

-2-

<u>Newsletter</u>. Bob Miller reports via Culbertson that he will keep the Newsletters coming "on schedule" but still needs help with articles. The Boards takes note that Miller is doing an OUTSTANDING Job as our Newsletter Editor. Culbertson suggested that the Newsletter format include several feature articles that appear each issue such as NASEO/Users Report, Legislative Report, USCG Report, New Products, DOD Interface Report and USNO Timing Report. It was further suggested that the President formally appoint the people responsible for each article - suggested that Dean handle New Products, McGann Legislative, Paul Burkett for NASEO, Illgen for DOD and Bill Klepczynski for Timing. CAPT Keeler indicated he would help with the Coast Guard input. Need suggestions from the membership for other subject areas and for volunteer contributors.

Congressional . McGann reported there was some legislative interest in timing Loran chains to some standard - precipitated by efforts of Bill Polhemus and others - no legislative action, however. McGann advised that the FRP draft would not be released for public review and comment as public officials claim FRP draft does not fall under the Federal Procedures Act - lawyers opinion on this included as Exhibit 4. Discussed expected content of 86/87 FRP and statements by COL Phil Baker at ION conference that both Transit and Loran-C would be extended by 2 years in next FRP. McGann led general discussion of Polhemus (et al) actions to encourage Congress to mandate "mix" of navigation systems (3 systems) and to STOP administrative mandate of all efforts (and funds) going just to GPS. Internationally, McGann reports one station on-air in China another shipped. Canadians are feeling better about Loran-C - efforts underway to encourage Canadian Loran-C expansion. There will be an IALA meeting 11, 12 March 1987 - Notice included as Exhibit 5. Meeting expanded generally to include broader scope of interested attendees. Decca system changes to government operation may precipitate increased Loran-C interest. CAPT Keeler to represent the U.S. Coast Guard. McGann and Scull also will attend. WGA has been invited and Board discussed possibility of WGA representative at meeting. Board decided to advise IALA that a representative of the WGA would be there although not designated yet.

Awards . No Report

Item 5 - NEW BUSINESS

<u>1988</u> <u>Convention</u>. Location and Chairman. Last meeting suggested that Portland, OR, Albuquerque, NM and Southern California be considered. Dates would be 18, 19, and 20 October 1988 (T,W,T). After discussion Board decided on Portland, OR as the first choice. Dean will write letter to Bob Bronson requesting he consider being Chairman. It was suggested that the 1989 convention might be held near new Loran-C station location in U.S. or Europe.

<u>McGann's suggested survey</u>. Exhibit 6. Discussed possibility of this being done under a WGA Public Relations Director. Information might be of great value to DOT and USCG. Board agreed to have McGann carry this idea to the next step by presenting a plan, describe approach and outline. The survey would be merged later with any publicity efforts.

<u>GPS Timing of loran transmitters</u>. Board acknowledged receipt of Leo Fehlner's letter (Exhibit 7). Discussed such efforts with CAPT Keeler and Board agreed generally with DOT/USCG position that this would not be easy to achieve. Board decided that issue should be explored and Dean would write letters to Fehlner and Cong. Denny Smith to that effect.

Other new business . Package of material sent by Polhemus introduced (Exhibit 8). Capt Keeler discussed Coast Guard position that there has been no official Canadian Government request for the Coast Guard to take action upon (after the FAA letter) but he was not opposed to Canadian Loran-C expansion. Keeler explained deadlines facing him to meet FAA commitments and that time to make any changes in transmitter location has all but run out. Board discussed U.S. and Canadian advantages to moving station into Canada including dual-rating of Williams Lake. No Board action taken but reemphasized that WGA is an advocate of Loran-C expansion.

-3-

Culbertson introduced report (Exhibit 9) on Candidate Options for Use of the WGA Treasury pursuant to Board action at last meeting. Suggested that this report be acted upon at next Board meeting in April 1987.

Culbertson suggested that the Vice President of WGA take a more active role in coordinating the various Committees and volunteered to maintain close contact with Committee Chairmen to assist them in their efforts. Dean agreed with no Board objections.

Item 6 - NEXT MEETING

The next Board meeting will be held in Washington, D.C. (Nassif Building) during April 1987 on a date to be announced.

-4-

Item 7 - ADJOURNMENT

The meeting was adjourned at 2120.

ullals J.F. Culbertson

Acting Secretary

Distribution

President All Directors R.L. Frank J. Beukers CAPT Keeler D. Scull

EXHIBIT 1

### **BOARD OF DIRECTORS**

W. N. DEAN . . . . . . . . . President J. F. CULBERTSON . Vice President L. F. FEHLNER . . . . . . Secretary C. S. ANDREN . . . . . . Treasurer J. ALEXANDER **B. AMBROSENO** D. A. CARTER J. D. ILLGEN V. L. JOHNSON A. W. MARCHAL E. L. McGANN M. J. MORONEY W. L. POLHEMUS W. SCHORR J. L. TOMS J. P. VAN ETTEN



# WILD GOOSE ASSOCIATION

December 23, 1986

TO: WGA Directors and Committee Chairmen

FROM: WGA President

SUBJECT: 75th Meeting of the Board of Directors

The next meeting of the Board of Directors will be held Thursday, January 22, 1987, at 4:00 PM at the Sampan Restaurant, 420 S. Brookhurst, Anaheim, California, phone (714)533-1017. This will be a dinner meeting. Contact Jim Culbertson, (714)531-7974, with any questions.

### AGENDA

- Call to Order 1.
- 2. Secretary's Report
- Treasurer's Report з.
- 4. Standing Committee Reports
  - Constitution a.
  - ь. Conventions

- Johnson
- 1986 Convention Report 1. Marcha1 2. 1987 Convention Report Toms Journal Ambroseno Membership Toms Newsletter Miller Congressional McGann Frank
- Awards g٠
- 5. New Business

c.

**d**..

e. f.

- Location and Chairman for 1988 Convention a.
- McGann's suggested survey ь.
- GPS timing of loran transmitters c.
- d. Other new business
- 6. Establish next Meeting date

#### **BOARD OF DIRECTORS**

W. N. DEAN ..... President J. F. CULBERTSON . Vice President L. F. FEHLNER . . . . . . . Secretary C. S. ANDREN . . . . . . Treasurer J. ALEXANDER B. AMBROSENO D. A. CARTER J. D. ILLGEN V. L. JOHNSON A. W. MARCHAL E. L. McGANN M. J. MORONEY W. L. POLHEMUS W. SCHORR J. L. TOMS J. P. VAN ETTEN



WILD GOOSE ASSOCIATION

TREASURER'S REPORT JANUARY 16, 1987

Balance from October 22, 1986

\$13,448.23

EXHIBIT 2

TRANSACTIONS

### RECEIPTS

Dues	2.387.00	
Proceedings/Journals	85.00	
-	\$2,472.00	\$15,920.23

### **EXPENDITURES**

Journal Expense	4.826.00	
Newsletter Expense	420.58	
Stationary Expense	299.25	
	\$5,545.83	

WGA Account Balance as of January 16, 1987

Submitted: January 22,1987

Approved: Date Board of Directors

Carl S. Andren Treasurer

Walter N. Dean President

\$10,374.40

\$10,374.40

EXHIGIT 3

WILD GOOSE ASSOCIATION P. O. Box 556 Bedford MA 01730 USA

8 January 1987

To: Walter N. Dean

From: Leo F. Fehlner

Subject: 75th Meeting of the Board, Secretary's Report

Dear Walt,

A total of 496 dues notices were mailed betweem 1 and 15 December 1986. Included were 424 to the U. S., 52 overseas, and 20 to Canada. Notices were sent to members paid through 1984, 1985, or 1986. As of 8 Jan 87, 169 (34%) have responded. Dues collected as of 8 Jan are \$2164. There has been no response from the 84's, and those remaining deliquent on 31 March will be purged from our active records.

There is a serious error in the draft of the paper I sent to Directors on 29 Dec 86. The first one who calls and tells me what it is will get a prize (Barney excluded).

Very truly yours,

Po

Leo F. Fehlner

cc: All Board members
 -> James F. Culbertson

EXHIBIT 4

Pil

NANCY PYEATT Attorney at Law 821 15th STREET NW WASHINGTON DC 20005 (202) 347-4332

13 January 1987

Mr E L McGann President Racal Megapulse, Inc 8 Preston Court Bedford MA 01730

## Memorandum: Federal Radionavigation Plan/Administrative Procedure Act

You requested my opinion on the question whether federal agencies that promulgate the Federal Radionavigation Plan (FRP) can be required to publish it in proposed form and invite comments by interested parties for consideration by the agencies prior to promulgation of a final FRP.

My conclusion is that it would be futile to attempt forced pre-publication of, and opportunity for comment on, a proposed FRP because, I believe, any federal court would hold that the FRP is, for one of the reasons discussed below, exempt from rule-making prescriptions of the Administrative Procedure Act (APA).

The International Maritime and Satellite Communications Act created the Communications Satellite Corporation and designated it as the "operating entity" of the United States in the International Maritime Satellite Organization. The same Act directed agency study of radionavigation systems "to determine the most effective manner of reducing the proliferation and overlap of such systems." The Act is significant because in it the Congress mandated military and international involvement in radionavigation systems, thus apparently creating an exemption from the normal rule-making obligations of federal agencies.

The FRP is a statement of policy promulgated by DOD/DOT with respect to government-operated radionavigation systems. Users and other interested parties are invited informally to submit comments between biennial FRP publications. The FRP is adopted by DOD/DOT without pre-publication in the Federal Register.

continued...

EXHIBIT 4

P-2-

### Memo to ELM re FRP/APA

The Administrative Procedure Act governs rule-making by federal agencies. A rule in this context is any agency statement designed to prescribe law or policy. This seems to posit DOD/DOT compliance with APA rule-making processes, which require Federal Register pre-publication of proposed rules and an opportunity for formal comment by interested parties. There are two exemptions:

1. The APA exempts "general statements of policy." Cases decided on this language indicate that an exempt policy statement is one that has no binding effect in administrative proceedings; that is, the agency applies the policy in a discretionary way whenever someone applies for a license or adjudicates any issue before an agency. Since there is no regulatory proceeding before any agency in connection with the FRP, it appears to be exempt from prepublication requirements of the APA.

2. The APA also exempts rules to the extent they involve "a military or foreign affairs function of the United States." There is not much case law interpreting this exemption. There is no doubt, however, that the FRP involves the military. It also assumes the cooperation and benefit of allied nations, so there is an element of "foreign affairs."

EXHIBIT5



ASSOCIATION INTERNATIONALE DE SIGNALISATION MARITIME

# INTERNATIONAL ASSOCIATION OF LIGHTHOUSE AUTHORITIES

Circular Letter to

. IALA members Members of the IALA Decca Working Group Members of the Loran-C Working Group IMO, IHO, ICAO, ICS, IAIN, CIRM, Royal Yachting Association, Wilde Goose Association Arab Institute of Navigation, Suez Canal Authority

N° 87-4 nfm:cv

### Paris, 5th January, 1987

### IALA Special Radionavigation Conference

Dear Colleague,

You may be aware that from the 1st January, 1987, the Racal Decca Co. has ceased to be responsible for the management of the Decca Navigator Chains around Great Britain and Ireland. From that date, this responsibility is assumed by the Lighthouse Services of England, Scotland and Ireland, for a period of 7 years.

Similarly, the management of the Decca Chain in Denmark will eventually be vested in the Danish Lighthouse Service.

Whilst this will have no practical effect on the marine user in the immediate future, it may lead to long term changes.

In the early 1990's, the US Coast Guard will no longer retain responsibility for Loran-C transmitters outside the USA. The question of the transmissions within Northern Europe after this date has been the subject of study by a Loran-C Working Group comprising representatives from Canada, Denmark, the Federal Republic of Germany, France, Iceland, Ireland, Norway, USA and IALA.

Even though by the mid 1990's Navstar GPS is expected to be available world wide, many administrations have concluded that there will still be the need for a land based radionavigation system until well into the 21st Century.

Such a land based system will be under the control of the national Authority concerned and will also act as a secondary or back up system.

In addition, Loran-C has wide applications for terrestrial navigation, and in the United States as the radionavigation system for small civil aircraft.

.../...

Société Générale, Agence AG Kléber, 75116 PARIS. Compte-Account nº 7/815 800/8

Due to the age of some of the Decca Navigator equipment in the United Kingdom, it is anticipated that its refurbishment may be required by about 1993. This being the case the UK Government has been studying the possibility replacing Decca Navigator coverage by Loran-C coverage in 5-6 years' time.

EXHIBITS

P2

Although the UK Government is not yet committed to the introduction of Loran-C it considers it to be an attractive alternative and it wishes to know the degree of acceptance of this view, particularly by neighbouring countries.

The Executive Committee of IALAhas agreed that a land based system is likely to be required into the next century and therefore considers that we are now at the point where policy decisions need to be made by administrations. It is also possible that Loran-C coverage could, without exceptional capital expenditure, be extended to cover the sea area from the entrance of the Baltic to Spain and Portugal and into the Mediterranean, and perhaps other parts of the world.

To assist administrations and others with their future plans, the IALA Executive Committee, with the conurrence of the Loran-C Working Group, has decided to convene a 2 day IALA Special Radionavigation Conference in London, on 11th and 12th March, 1987, so that the implications of any proposed changes can be fully discussed between interested parties.

You are thereforekindly invited to be represented at this Conference. Furthermore, as these radionavigations systems may be of interest to Authorities concerned with civil aviation and terrestrial navigation you are invited to include in your delegation persons interested in non marine applications of Decca Navigator and Loran-C.

Details on the venue and the draft agenda are attached. The final agenda will be circulated to participants at a later date.

All presentations and discussions will be in English only.

The Conference fee is £ 25, payable upon arrival at the Conference. The fee covers luncheon for 2 days, tea, coffee, etc.. and the Conference papers.

As accommodation at the Conference is limited, you are requested to return the attached form as soon as possible and no later than 1st March, 1987, stating whether you will attend.

Yours sincerely. PRUNIERAS, Socretary General.

EXHIBITS PZ

### IALA SPECIAL RADIONAVIGATION CONFERENCE

Dates: 11 & 12 March, 1987

Venue: Trinity House (Savage Gardens Entrance) Tower Hill London EC3N 4DH England

**Registration:** 09.00 - 10.30 11th March, 1987

**Commence :** 10.30 11th March, 1987

Fee: The Conference fee of £ 25, payable upon arrival, covers luncheons, tea and coffee on both days, plus Conference papers.

### DRAFT AGENDA

1. Opening of the Conference

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by the IALA President, Captain Sir Miles Wingate

2. The present situation with Decca Navigator and Loran-C

3. Presentation of future proposals by the United Kingdom

4. The future of Loran-C by the US Coast Guard

5. The work of the Loran-C Working Group

6. A proposal for the extension of Loran-C coverage in Europe

7. Loran-C for civil aviation use

8. Loran-C for terrestrial navigation

9. The operation of Decca Navigator transmitters

10. The operation of Loran-C transmitters

11. Conclusions

Each presentation will be followed by a period for questions.

All presentations and discussions will be in English.

EXHIBIT.5 P4

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### IALA SPECIAL RADIONAVIGATION CONFERENCE

Dates :

\_;

11 & 12 March, 1987

Venue: Trinity House (Savage Gardens Entrance) Tower Hill London EC3N 4DH England

### **REGISTRATION FORM**

Please complete the form below and return it to the IALA Secretariat before 1st March, 1987.

Service/Organization :	•••••••••••••••••••••••••••••••••••••••
Address :	
	•••••••••••••••••••••••••••••••••••••••
	••••••
Country :	•••••

We will not be represented at the IALA Special Radionavigation Conference.

We will be represented at the IALA Special Radionavigation Conference by ...... persons.

Signed :

Position :

Registration fee : £ 25 per person, to be paid upon arrival.

Form to be returned before 1st March, 1987 to IALA Secretariat 13, rue Yvon Villarceau 75116 PARIS France.

EXHIBIT 5 125

### IALA SPECIAL RADIONAVIGATION CONFERENCE

Dates :

11 & 12 March, 1987

Venue :

Trinity House (Savage Gardens Entrance) Tower Hill London EC3N 4DH England

### HOTEL ACCOMMODATION

A special rate has been negotiated with the **Tower Hotel**, some 5 minutes walk from Trinity House, as follows :

Single room with bath including continental breakfast :  $\pounds$  63 per night Extra for full English breakfast :  $\pounds$  3.

Reservations should be made direct to

The Tower Hotel St. Katherines Way London E1 Tel. + 44 (1) 488 4134.

Reservations should be marked for the attention of Miss Heather Bailey and mention should be made of the IALA Special Radionavigation Conference.

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# WILD GOOSE ASSOCIATION

November 13, 1986

Mr. Walt Dean President Wild Goose Association 16100 S.W. 72nd Avenue P.O. Box 23939 Portland, OR 97223

### SUBJECT: PROPOSED USE OF PRIVATE, CONFIDENTIAL MARKET ANALYST TO ASSESS CURRENT LORAN-C RECEIVER USAGE AND TO PREDICT MARKET GROWTH/ SATURATION IN THE YEARS OF PROBABLE GPS EVOLUTION.

Dear Walt,

One of the most difficult questions for all of us to answer is the actual number of Loran-C users today - particularly in unregulated users such as, the pleasure boat-market. With this uncertainty, it is most difficult to assess what the market size will be and what the number of users will be in the early 1990's when GPS may be coming into the civilian market.

Without factual data it is difficult to argue that the majority of users will have Loran-C and be satisfied with it, and thus have no need for civilian GPS.

I would propose that we explore using a private market assessment group which could collect private information from marketing, and hold it confidential so as to be able to assess the present user community, and then to use established analytic methods for the 1990's project.

In a meeting in Canada on their possible mid-continent project, Mel Walker Planning Advisor (Research, Planning and Coordination) for Transport Canada, suggested a group known as Technology Futures Inc. of Austin, Texas as an example of an outfit who has done good work for them. Members of our board may have other suggestions. Walt Dean November 13, 1986 Page 2

ELHIBITE PZ

I would propose the WGA allocate some seed money funds from its treasury with the balance to be made up by WGA member companies interested in the results. I would volunteer to get an estimate of cost and schedule, if there is any interest.

Regards,

Edward L. McGann

ELM:mv

cc: Wild Goose Board of Directors

Mel Walker Planning Advisor, Transport Canada

EXHIBIT 7

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#### WHY SHOULDN'T LORAN BE TIMED AS GOOD AS IT COULD BE ?

or more for less

by Leo F. Fehlner 15 November 1986

### THE PAST

Once upon a time Americans were involved in a war in Southeast Asia. Planners with imagination at the Pentagon foresaw usefulness of loran in support of the war the effort and sponsored the installation of loran transmitters in Thailand and Viet Nam. In due course, loran user equipment was developed which made possible the aircraft delivery of droppable stores with accuracy on the ground, even in zero visibilty, that excelled beyond the expectations of the developers. It also permitted loran-aided pinpoint touchdowns on runways. To accomplish this, the coordinate converter used in the receiver was calibrated in situ. using aerial pictures of geodetic features correlated with This was done all over southern Laos and Viet Nam. Ground loran. scores achieved in dropping stores was rated outstanding for many months when all of a sudden something changed over the whole calibrated area. Loran performance was ruined! Why?

Well, it turned out that loran was in use in northern Laos by another organization. Questionable position fixes there had been attributed to the receiver, and a loran timing problem was suspected. The operators contacted Coast Guard loran headquarters in Bangkok and requested a loran timing change in their favor. Without coordination with other users, a change was made which upset the loran performance in the calibrated area.

few Coastguardsmen may still be smarting from the Α rapid sequence of events that set the timing back to the way it was. Loran performance in aircraft returned to outstanding and operators in northern Laos figured out how to solve their loran This was an unfortunate event, but there was a bright problem. It taught many of us a lesson. To wit, you can fool Mother side. Nature everywhere some of the time, and you can fool Mother Nature somewhere all of the time, but you can't fool Mother Nature everywhere all of the time.

### THE PRESENT

Here it is almost 20 years later and the lesson learned in Southeast Asia has not rubbed off on the United States, Canada, Europe or anywhere else. Take for example the Northeast υ. S. Chain. There is a field monitor station in New Jersey, Maine, and Ohio. We all know that yearly variations in environmental conditions in Maine, Ohio, and New Jersey are widely different; and the chain services users from Laborador to South Carolina and Indiana to Bermuda. The chain tries to cope with Mother from Nature over all of this area on behalf of the users. How ?

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EXHIBIT 7 PZ.

An attempt is made to keep the numerical designation of the lines of position at the monitors the same at all times. Suppose monitor in Maine detects a movement of the lines that the of position, maybe due to a hard freeze, maybe due to atmospherics who knows ? What options does Maine have ? The timing of Seneca can't be changed because it is on Universal Coordinated Time - controlled by the Naval Observatory. (UTC) So Maine has tn adjust Caribou and Nantucket. Now New Jersey sees Nantucket move. What did it ? New Jersey doesn't know. Could be seasonal changes on propagation paths to New Jersey, or seasonal changes on paths to other monitors. or insufficient monitor immunity from atmospherics, man-made noise or cross rate interference. or transmitter malfunction, or . . . So New Jersey adjusts Nantucket and Carolina Beach. Now Maine is messed up and so is Ohio. A user in North Carolina says to himself "Gee, its beautiful weather today. Wonder why loran is changing".

Obviously, it is not possible to keep the timing observed at the monitors constant at the specified values. The best that can be achieved is some average compromise within specified tolerance. This does not provide within-tolerance service for all users everywhere - only a limited warranty to users near а monitor. Recently the Southeast U. S. Chain was observed near the Mayport Florida monitor to be out of tolerance continuously for over a month - for long periods by as much as 2 to 3 times the specified tolerance. Position errors ranged from 100 to 300 feet. This was subsequently blamed on equipment failure at the Mayport monitor leaving control solely in the hands of the other two.

Long term independent monitoring of the Southeast U. s. Chain has disclosed other deficiencies in timing, dubbed loran anomalies. On the average of about four times a day, timina glitches occur suddenly having amplitudes up to 1.6 microseconds (1600 feet). Recovery takes about a minute. And at other times the timing wanders off in one direction for no apparent reason in 20 nanosecond steps as much as 60 to 120 nanoseconds, stays constant for a while, then steps back to where it was or overshoots. Clearly, the present system of timing control leaves something to be desired.

#### THE FUTURE

How could loran timing be made better ? First listen to the Asia. lesson of Southeast Don't try to fool Mother Nature everywhere all the time. Then make bold changes in the philosophy of operation of the loran system. Give users a rock-solid timing control system that allows them to develop, for themselves, the best coordinate converter for their own area of It interest. would have a solid foundation in the temporal stability of the loran emissions.

We could proceed as follows. There are satellites flying overhead which distribute very precise timing by means of which clocks on the ground can be synchronized to UTC. The master stations of chains now use microphase steppers to adjust the

EXHIBIT 7 P3

output of their frequency standards to the rate of going of UTC. The Naval Observatory supplies the sizes of the adjustments.

Let's abandon the monitor stations. Install at each transmitter station a satellite timing receiver and microphase stepper to keep each transmitter clock in UTC. Then freeze all transmitter timing parameters. Now the loran emissions are slaved to UTC and great things happen:

> Coordinate converters can be calibrated to any accuracy for any specific use in any specific area, and for any specific season or for all seasons.

> There would be no more loran anomalies and no more transmitter wander.

No more timing deviations due to atmospherics or cross rate interference.

Chain controllers wouldn't be responsible for Mother Nature's vagrancies.

Legal responsibility could be limited to the quality of the timing.

New chains wouldn't have to be "calibrated" by the Coast Guard.

No monitor stations would have to be supported.

The Naval Observatory would be relieved of one of its functions.

Airport approach plates could be upgraded from non-precision to precision.

Harbor charts and harbor approach charts could also boast of precision.

Operations and maintenance costs would be reduced.

There would be better (super) loran service at less cost.

And perhaps best of all, with a rock-solid timing foundation, we might be able to finally understand the influence of Mother Nature on ground wave propagation. Isn't the subjunctive mood wonderful ?

### CONCLUDING REMARKS

Why shouldn't loran be timed to be as good as it could be ?

EXHIBIT S 121



# POLHEMUS ASSOCIATES INC.

P.O. BOX 5, CAMBRIDGE, VERMONT 05444; PHONE 802/644-5569 November 14, 1986

Mr. Kurt F. Photenhauer c/o Congressman Denny Smith 1213 Longworth Building Washington, DC 20515

Dear Kurt:

Greetings from the cold country!

I believe that we have five candidate topics to discuss and I have listed them in descending order of priority....

- o The possible "marriage" of Loran-C and the satellite-based Global Positioning System (GPS)
- Facilitation of senior-level discussions between the FAA/USCG of our DOT and their counterparts in Canada leading to location of one of the new mid-continent Loran-C transmitters in southern Saskatchewan.
- o The Microwave Landing System Cost/Benefit concerns held by Congressman Smith
- o Search for alternatives to the present procedures used by FAA to certify avionics equipment.
- Incorporation of the notion that the U.S. DOT should be directed to "always" maintain at least two radionavigation/location systems of comparable performance, whose signals are available from ground level to any altitude, and which are not vulnerable to the same natural or man-made environmental phenomena.

See you next week.

Regards,

Wm. L. Polhemus President

WLP/avs Encls.

EXHIBIT8

# <u>Attachment I</u>

Loran-C/GPS

With calibration, state of the art Loran-C airborne equipment can reliably produce a measurement of geographic position to an accuracy of less than 300 feet, and usually to something like 100-150 feet. This is essentially the same accuracy promised to the civil aviation community by the USAF for the GPS system.

The transmitted signals from each system are claimed to be available to any vehicle whether sitting on the ground in mountainous terrain or operating at altitude.

Since Loran-C is a Low Frequency (100 kHz) system and GPS an Ultra High Frequency (UHF = 1200 - 1400 MHz) system each is vulnerable to quite different environmental phenomena, manmade interference, and even overt hostile act.

The military services contend that GPS is a 10-20 "coathangar" system and that Loran-C can't match that accuracy and is not a world-wide system. This lack of accuracy is due in part to factors external to the transmitted signal, which can be measured and later removed by the operator...and in part to minute timing errors within the transmitter system itself. Given a very accurate and precise knowledge of time, such as exists within the GPS system, the Loran-C "Times of Transmission"

ELHIBIT8 03

(TOT) could be controlled so as to also yield 20-coathangar accuracy.

The U.S. Coast Guard has undertaken a brief study of the feasibility of synchronizing Times of Transmission utilizing GPS as the reference and has tentatively concluded:

- a that it is feasible
- b USAF would cooperate
- c accuracies could be of the order of 10 to 20 nanoseconds ( a nanosecond is approximately 11.8 inches in length)
- d cost would be less than \$2 M including the non-recurring engineering

The GPS system implementation schedule has undergone some important modifications because of the loss of Challenger, and other difficulties, and in consequence may not meet all projected performance objectives for a number of years to come.

In the meantime the Loran-C mid-continent gap will have been closed and many User groups will have opted for Loran equipment. Thus the civilian demand for GPS gear may be much smaller than is forecast and the anticipated reduction in sale price significantly delayed. With respect to technical risk, the French government recently installed a U.S. manufactured Loran-C chain for use by its nuclear subs which employs the existing GPS satellite system to calibrate time of transmission. The procedure involves longer intervals between timing updates than is envisaged by USCG, but even so this chain achieves a better than 56 nanosecond level of accuracy.

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All technology required to implement a similar capability within domestic U.S. is fully matured. The principle difficulties remaining are, in my belief, essentially logistic. Given appropriate Executive-level support the capability could be demonstrated within a year.

### The Technical Payoff?

The Loran system would immediately enjoy a several-fold increase in redundancy of positional information thereby becoming almost invulnerable to single transmitter outages...a matter of great concern to FAA; certain operational idiosyncrasies of the Loran system such as cycle misident and decreasing accuracy with distance (from transmitters) due to GDOP would be removed; anomalous behavior due to atmospheric disturbance and ground variations in conductivity might be brought under much more rigorous control etc.

Of very great importance in my view would be the opportunity

it might provide to put together User Equipment which could independently or simultaneously employ either <u>or both</u> Loran or GPS Lines of Position since each system would provide data of comparable accuracy in a similar format....range/range as opposed to hyperbolic.

EXHIBITS

This hybrid system approach would allow us to safely and reliably bring the GPS system into use several years earlier than will otherwise be the case....and could allow the DOD to move ahead somewhat earlier in time in achievement of some of its stated operational performance objectives....for example SAC Quick Reaction very accurate navigation system alignment capability for its Alert aircraft could be available by fall 1987; Air and Army National Guard units, which are frequently employed for Search and Rescue and Disaster Relief missions, could be provided with a relatively low-cost, high accuracy navigation capability, right now; and would have the potential to accommodate GPS-only signals in the mid or late 1990s when and if these outfits were deployed outside domestic US at some later date.

EXHIBITE PL

### Attachment II

### Canada/U.S. Coordination

For several years my outfit has been involved in evaluating and demonstrating Loran-C performance in southern Canada, primarily in Ontario.

In 1984-85 the Ontario Ministry of Transportation became convinced that Loran was the radionavigation aid which would best suit the diverse needs of aviation within the 400 thousand-plus square miles of the Province.

We participated in a formal Cost/Benefit Study which confirmed the Ministry's intuition and disclosed also that there was significant support to be found from Provincial organizations outside of aviation (emergency medical services, law enforcement, natural resources management, maritime industry [Ontario has a 1000-mile long waterfront], intercity trucking etc).

The study lead to briefings, appearances before the federal government's National Airspace Review Committee, senior personnel in Transport Canada (their FAA) and presentations to a group similar to the U.S. National Association of State Aviation Officials.

The II Morrow team helped us in conducting very important

EXHIBITS

demos on three different occasions.

These activities paralleled the efforts of Paul Burket and NASAO to convince our FAA to accept Loran for use in the National Airspace System....a project in which your office is involved.

The Ontario MTC projects were successful in generating strong support for Loran across Canada (I was sent out to British Columbia earlier this month to brief two groups) but has been almost totally unsuccessful in its efforts to convince the Feds to go ahead.

During winter 1985-86 Transport Canada personnel produced a study report which claimed that Canada would have to buy 12 to 14 transmitters at a cost of \$180-200 M in order to satisfy the Provincial and aviation community demands. The report was shot through with invalid assumptions and patently false assertions.

During the summer just past the Canadian NASAO-like or organization hired us to conduct a study similar to the Federal effort....our conclusions, seven transmitters (six, if the Canadians could persuade the U.S. to locate its northernmost, new, mid-continent station in southern Saskatchewan). Cost, approximately \$ 61 M. Furthermore, by utilizing existing U.S. and Canadian chains to their fullest potential, particularly the new U.S. midcontinent chain, Canada could add (literally) 1 million square miles of Loran coverage for about \$18 M...i.e. from western Ontario all the way to the Pacific (below 60° N latitude) would enjoy coverage suitable for meeting Non Precision Approach criteria.

EXHIBIT 8 PS

This approach is beginning to attract some meaningful support, but it needs a "hands across the border" boost from the U.S. And this is where Congressman Smith's office might be able to help. (Two weeks ago we did succeed in forcing formation of an industry-government joint technical working group for the purpose of resolving the differences of opinion regarding environmental issues.)

I have on several occasions discussed, both with USCG and FAA personnel, the desirability of encouraging Canadian participation in the Loran Program thru the device of <u>formally</u> offering Canada the opportunity to tie into the mid-continent chain. Preferably this would be accomplished by locating the proposed Montana transmitter in Saskatchewan but at the very least we should notify the Canadians that we are preserving two slots on the Montana Master and its chain for anticipated Canadian transmitters.

The resistance within a small enclave within the Canadian

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Federal government to any Loran activity is so strong that I really think that it will take the Saskatchewan gift to break the log jam.

Why should we do this?

- Balance of Trade considerations....the Loran
  transmitters would be manufactured in the U.S....and
  most of the reciever/computers would be manufactured
  in the U.S.
- Political considerations....we've been banging on
  Canada with import restrictions and duty fees,
  particularly within the lumber industry. The
  Saskatchewan site could be a quiet offset.
- There is a major fly-way to northern Alaska and the Beaufort Sea area which goes north from Washington, Idaho, Montana and No. Dakota up thru the Prairie Provinces and Alberta. Loran coverage would greatly facilitate these operations.
- o Many U.S. and International operators fly to the western U.S. from Europe across the sub-polar route down thru Canada. Again; Loran coverage could prove beneficial particularly when automatic dependent surveillance is introduced.
- o There are alot of U.S. flyers who operate across the border into lower Canada who are Loran-C equipped but find they run out of coverage when they get a short distance north of the border. Many of these U.S. GA

flyers wind up as casualties according to Transport Canada investigations.

EXHIBIT 8 PIO

o Despite USCG statements to the contrary I believe that overall accuracy of coverage within the US would not be adversely affected by the move; and I foresee this approach as almost essential to removing opposition to Loran within the Federal government.

### What action(s) do we need?

USCG tells me that the U.S. and Canada must sit down together to discuss the subject within the next 40-45 days or the window of opportunity on choice of sites will close.

The FAA and USCG state that they have no way to approach the Canadians unless asked to do so by the Canadian government. The Canadians with whom I've spoken haven't found the vehicle to let the "ball begin". So, Impasse.

### Suggestion!

USCG might advise the Canadian Coast Guard (which operates 4 of the North American transmitters) that the U.S. DOT is committed to providing an "aviation standard of service", utilizing the Loran system and this committment could impact Canadian operations i.e. by requiring NOTAMS.... and by the way the U.S. wishes to tie its new mid-continent chain in to their Williams Lake transmitter! Would Canada have any wishes to express before the new Montana station is sited....for example might it fit into a plan for mid-Canada? We (the U.S.) suggest an early get together to discuss possible Canadian interest in FAA/USCG plans.

We need to nudge SEC DOT along these lines, I think.

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809 Independence Avel, S.W. Washington, D.C. 20591

Coopertment of Parisportation Redenat Aviation Acceletistration

# JAN 2 1987

The Honorable Denny Smith House of Representatives Washington, DC 20515

Dear Denny:

Thank you for your letter of December 8 in support of the Long Range Navigation (LORAN-C) Program. I appreciate your sharing the encouraging letter from Mr. Dale Johnson of II Morrow, Inc., with me, and I am pleased to hear that pilots are so satisfied with the system.

1 + 1 + 1 + 1 = 1

I welcome the opportunity to discuss your ideas for linking the LORAN-C and the Global Positioning System and suggest that we get together soon.

Thanks again for your continued support of our plans to modernize the air traffic control system.

Sincerely,

Donald D. Engen Administrator

Enclosure Constituent's Correspondence DENNY SMITH STH DISTRICT, OREGON

WASHINGTON ADDRESS: 1213 LONGWORTH HOUSE OFFICE BUILDING WASHINGTON, D.C. 20515 (202) 223-5711

> SALEM ADDRESS: 4035 12TH STREET, S.E. 740 Post Office Box 13089 Salem, Oregon 97309 (503) 399-5756

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Congriss of the United States Kouse of Representatives Washington, **D.C.** 20515 COMMITTEES: BUDGET INCOME SECURITY TASK FORCE STATE AND LOCAL GOVERNMENT TASK FORCE BUDGET PROCESS TASK FORCE

INTERIOR AND INSULAR AFFAIRS Subcommittee on Energy and Environment Subcommittee on General Oversight, Northw Power and Forest Management Subcommittee on National Parks and Recreat

VETERANS' AFFAIRS

MILITARY REFORM CAUCUS

January 6, 1987

Mr. Bill Polhemus P.O. Box 5 Cambridge, VT 05444

Dear Bill ...

Thought you would be interested in the enclosed letter from Don Engen. I'll give you a call as soon as we get something set up.

Hope your holidays were happy. I'

I'11 speak with you soon.

Sincerely,

Kurt Pfotenhauer Legislative Assistant

ENCLOSURE

U.S. Department of Transportation

Research and Special Programs Administration

JAN 8 1987 🔬

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The Honorable Denny Smith House of Representatives Washington, D.C. 20515

Dear Mr. Smith:

Thank you for your letter and your interest in improving the Loran-C system. The plan your letter describes to further enhance the Loran-C system is most interesting to me as I fully support efforts to improve transportation efficiency. As you may be aware, linking the Loran-C timing to the Global Positioning System will necessitate a complete revision of existing control equipment and philosophy. It would also have some negative impact on those Loran-C users who rely on observed data to improve system accuracy. These factors suggest that we carefully plan our approach to such a system to ensure minimum disruption of existing users and also to ensure that industry becomes involved to provide receivers capable of taking advantage of the system.

I intend to ask the Coast Guard to take the lead in reviewing the requirements and impacts of your "plan." Your offer of budgetary assistance is appreciated and will be most helpful. Thank you again for your interest in helping to improve our transportation industry.

Sincerely,

The Administrator

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400 Seventh Street, S.W.

Washington, D.C. 20590

M. Cynthia Douglass

to Polhemus from Car J. Lang BSPA Cymthin Song-lass is the adammustration for RSPA.

### **BOARD OF DIRECTORS**

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# WILD GOOSE ASSOCIATION

22 January 1987

EXH, TT9

PI

To: Walter N. Dean President, Wild Goose Association

From: J.F. Culbertson Vice President, Wild Goose Association

Subj: Report on Candidate Options for Use of WGA Treasury

During the WGA Board meeting at New Orleans in October 1986, Lloyd Higginbotham brought up the subject of what was being done with the reserve in the WGA treasury and that something should be done to get this back to the membership pursuant to original thinking of WGA's founding fathers. A number of ideas were discussed briefly at the meeting but no conclusive Board action was taken. Instead, I volunteered to collect ideas for consideration and present them at the West Coast Board meeting.

The following list of suggestions have come from discussions with various members of WGA and the Board.

1. Compensation for Directors. Suggestions here have ranged from a stipend for attendance to financial assistance in travel to meetings. I do not detect strong support for this and of course, it does not really return anything to the membership, per se.

2. Life membership. This affects the treasury indirectly but may be worthy of consideration. IEEE has recently initiated a Life Membership procedure involving years of membership and age. The impact on the treasury, of course, would be the loss of annual membership dues from those so honored. A formula for this could be similar to IEEE's where the years of membership plus age have to add to 100. Since WGA is only 15+ years old, someone would have to reach 85 years if we hold with the IEEE rules - so some different age quotient would have to be used. And, for Charter Members, we could use an additional figure so they would be honored first. I believe this would be popular particularly among the older members of WGA.

-1-

3. Advertizing. There have been several suggestions along this line. John Beukers, his wife and I talked briefly on what they might do to achieve some publicity for WGA including some professional looking brochures. The general idea is to have something that can be sent to organizations having shows and technical meetings that tell them Loran-C IS NOT dead and that there is an organization which can help them get professional technical papers, displays etc. Also to get better advertizing of the WGA meeting so more of the global radionavigation community will know about it and be encouraged to attend. We need better literature to hand out telling prospective members about WGA that includes information on membership rates, etc. There appears to be several different areas here and WGA needs a Publicity Director to pursue this and make recommendations to the Board for spending part of the Treasury to accomplish.

( EXHIBITS P2

4. Paid Executive Secretary. This has merit and with the right person properly located, it should be examined. With someone paid to look our for WGA's interests, there will be fewer "missed opportunities". In the past we have depended upon volunteers to make sure our reports are made to the State of Massachusetts, our logo copyright is in order, etc. and the Secretary or the President have kept most of the other correspondence sorted out. I am not sure WGA should continue leaning on the Leo Fehlners and Vern Johnsons or expect those who follow to continue in their foot steps. We should consider hiring an Executive Secretary while Loran-C is still "rolling" and put WGA back into gear.

5. University Effort - Research donations. The initial reaction is that this takes far more dollar investment than we are talking about in the Treasury. Believe the biggest contribution we could make here is to have our Loran-C brocures get into the University systems, be present and visible at appropriate technical meetings, and help universities identify sources of information and talent as well as industry that could assist in research efforts.

6. Educational Fund. Again, the Treasury probably could not do anything meaningful except to "seed" such an endeavor. Maybe a fund set up separately in some ones name which accepts donations and, tied in with 5 above, provides financial assistance to students pursuing Loran related studies or research. AFCEA and ION have set up college funds and scholarship assistance programs and we can learn from them how to approach this.

7. Stimulate Articles for Publication. Not sure how treasury funds would be expended to do this. One suggestion is to actually pay for ads in major trade and business magazines (like Fortune) read by CEO's and Controllers, who say how money is spent, so they will see that Loran-C is alive and well and may influence reversal of negative Loran-C funding patterns. The Loran related industry may be in a position to assist with the cost of this, if it catches on. The WGA Proceedings and Newsletter should be the first place that good articles and information on Loran-C and WGA appear. I suggest that the WGA Newsletter format be hardened so that there are articles each issue covering important evolutions with Loran-C. That is, a NASEO Report each time, a Coast Guard Speaks Report each time, etc. Contribitors will be solicited and assigned and readers then will look forward to receiving their Newsletter and reading what's up in an area they expect to see something about!

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I suggest this report be distributed to the Board for their consideration and that this matter be taken up for business at the next WGA Board meeting.

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Respectfully sn Culber tson