.d of Directors

Juert W. Lilley..... President David C. Scull Vice President Walter N. Dean Secretary Carl S. Andren..... Treasurer James F. Culbertson Past President James O. Alexander David H. Amos John M. Beukers Frank S. Cassidy Laura G. Charron Kiell O. Enerstad Bruce E. Hensel John D. Illgen Henry E. Marx Mark P. Morgenthaler Maurice J. Moroney William L. Polhemus

Wild Goose Association



The International Loran Radionavigation Forum

Minutes of the 100th Meeting of the Board of Directors, January 27, 1992, San Diego, California.

1. Call to Order

The 100th meeting of the Board of Directors was convened at 5:30 pm at the Catamaran Hotel Resort, San Diego, California, by President Robert Lilley.

2. Attendance, Proxies and Statement of Quorum

The following Board members were in attendance:

Bob Lilley, President Dave Scull, Vice President Carl Andren, Treasurer Walt Dean, Secretary Jim Culbertson, Past President Laura Charron Bruce Hensel Mike Moroney

Proxy from John Beukers assigned to Mike Moroney

Also attending: Carolyn McDonald

The secretary reported that the number of Directors present constituted a quorum, but did not equal the two-thirds required for ratification of amendments to the By-Laws.

The president presented an agenda, attached as Exhibit <u>0</u> and supporting documents, copies of which are also referenced and attached.

3. Adoption of Minutes

It was moved by Andren and seconded by Charron that the minutes of the 98th and 99th meetings of the Board of directors be adopted as corrected. Approved.

> Wild Goose Association, Inc. P.O. Box 556, Bedford, MA 01730, USA

26. Committees

The status of the standing committees is as shown in the agenda, with the exception that Dean volunteered to take the Historical committee again. Vacancies still exist.

27. Canadian Loran-C Expansion Report

This 150 page report by Transmode Consultants for Transport Canada analyzes a number of possible ways loran coverage could be expanded in Canada. It concludes that there is a modest benefit/cost ratio for some expansion of loran coverage in eastern and central Canada. The report is nearly a year old. and little action has been seen.

28. Next Meeting

The next meeting of the Board will be held in Washington, at a place to be determined by Dave Scull. on 28 April, 1992

29. Adjourn

Meeting adjourned at 7:33 pm.

EXHIBIT O PI

WGA BUSINESS - 100th Board of Directors, San Diego

1. Board approval of the minutes of the 98th, 99th Board meetings

[3], [4]

- 2. Board approval of 3 appointed directors (Henry Marx, Kjell Enerstat, Bruce Hensel)
- 3a. USCG Handbook Completed work (See letter attached). [1] Executive Committee appointed special review committee. (Bob Miller, Bill Brogdon, Bill Mooney, Frank van Graas, Durk van Willigen, Per Enge).
- 3b. An FAA request to Capt. Weseman for a companion volume on aviation would result in a CG Auxiliary offer to write it (Dan Maxim).
- Hawaiian Chain: Executive Committee (Dave Scull) WGA sent a letter to USCG. (FVG was to take this to FAA ASE-100 for support. No word yet.)
- 5. Newsletter and equipment (see attached copy) Bill Brogdon will be the editor starting with 92-1 issue. He may be reached with news articles by fax, using a borrowed WGA machine, approved by the Executive Committee. Ohio University is lending him a laser printer; no cost to WGA.
- 6. Northwest Europe progress The Executive Committee sent letter to the WGA letter to Policy Group (draft attached) [5].
- 7. WGA Korean Loran-C D. Scull and R. Lilley sent letters for WGA, offering appropriate help as the Koreans begin to think about Loran-C. Is additional WGA action needed? See attached [6]
- 8. FAA October 16 meeting articles WGA Response? See attached [7], [8], [9], [10]
- 9. Administrative Operations Dave Scull status and changes
- WGA Bylaws preliminary suggestions to simplify dues payment and accounting for delinquent dues.
 See attached

[11]

Article VII, Section 1. Change to:

- f. Annual dues and fees shall be due and payable on January 10 for the year beginning January 1.
- g. Fees and dues paid at or after the Annual Convention may be designated to cover dues for the next calendar year.

Article VII, Section 2. Delete

The changes have the effect of simplifying considerably the administrative practices of the WGA. Members can be encouraged

to renew at the Convention for the following year, maintaining their dues currency for the forthcoming elections. Dues reminder notices would go out in October. Any members not paid by January will not receive Gazette mailings until dues are paid. Members not paid prior to the issue of ballots will not participate in the election that year.

EX O P2

At the Convention, a member would pay a \$20 lower registration fee than a non-member. Additionally, registration materials should include a slot for pre-payment of \$20 membership for the following year!

11, BOD Meeting schedule

Late April to mid-May, in Washington area (Location?) August, at Convention in Birmingham)

12. WGA/IOA and the future - John Waltz: Dave Scull Dave Amos Henry Marx

13. WGA Directory - B. Hensel, B. Brogdon suggestion - approval?

14. Loran-C National Standard - M. Moroney/C. Longman - status?

15. Awards - early this year - August Convention J. van Etten?

16. Radionavigation Journal status? - John Beukers

17. FANS Liaison - John Illgen - status?

18. WGA's 20th year - appropriate words, activities? -

19. Publication of past awards? Bob Frank notes?

20. Committees (all chairs members of WGA)

Audit (non-BOD) ---(J. van Etten?) Awards _ _ _ Constitution ---Convention J. Beukers/M. Moroney/J. Illgen, 1992 M. Morgenthaler 1993 Historical -----J. Beukers Journal Technology/Applications D. Amos ---(H. Marx?) Membership Newsletter B. Brodgon (chair is BOD member) Nominations/Election ---

- 21. FRP Next deadline is Feb 7. Note status of Serrell report. Recommendations?
- 22. Canadian Loran-C expansion report Ask B. Frank to write response/summary?

23. Businesses - Mfgrs card program - once Admin ops are moved? Data base update

24. Reprint Constitution - Status?

25. Ed McGann letters - receive and recommend

a. Vessel traffic systems b. Public relations c. Atlantic crossings	[12] [13] [14]
26. Henry Marx report - receive and approve	[15]
27. John Beukers letter - receive and recommend	[16]

28. Executive Committee courtesy letter WGA to RION [17]

29. Suggestions from Williamsburg Membership Meeting

M. Shuey - We need an even more clear policy on loran for the international community

- Interoperability WGA should bring in more GPS people, papers
- Be cognizant of RTCA Loran Committee Ad Noc 5. Will be expanded to look at loran sole means.
- B. Mooney WGA should publish a list of speakers on various subjects. Referral; data base; newsletter?

B. Mooney - LOPs should be put on charts

- Dave Scull offered to work with NOAA, using Bill Mooney's WGA '91 paper.

D. Johnson - Annual publication of WGA Directory

E. Fraughton - List committee opportunities on membership application forms.

F. Bud Kacsor - Need more user services, information.

Association SHEET Jan 24, 1992

ASSETS

Inventory

EXHIBIT	1	PI
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CURRENT ASSETS		
Operating Account	44,958.16	
Money Market	0.00	
Cenvention Temp Funds	0.00	
Bank C - Payroll	0.00	
Cash: Total		44,958.16
Accounts Receivable		0.00
Advances Peceivable		0.00

0.00
795.00

Office Equipment TOTAL CURRENT ASSETS

Advances Receivable

TOTAL ASSETS

45,753.16

45,753.16

LIABILITIES

CURRENT LIABILITIES	
Accounts Payable	0.00
FIT Payable	0.00
SIT Payable	0.00
FICA Payable	0.00
FUTA Payable	0.00
SUTA Payable	0.00
SDI Payable	0.00
Local Tax Payable	0.00
Deduction A Payable	0.00
Deduction B Payable	0.00
Deduction C Payable	0.00
Sales Tax Payable	0.00
TOTAL CURRENT LIABILITIES	0.00

TOTAL LIABILITIES

0.00

EQUITY

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Association Jct 1,1991 TO Jan 24,1992

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105 Operating Account					30,281.98	-
10-22-91 Dues & Proceedings	Cash	J1	323.69	-	30,605.67	-
01-03-92 Dues.proceedings & Convention 91	Cash	J2	10,820.00	-	41,425.67	-
01-03-92 James F. Culbertson	Ck 1362	J3	-	60.51	41,365.16	-
01-16-92 Poynter's Business Products (fax)	Ck 1363	J 4	-	7 95. 00	40,570.16	-
01-23-92 Dues, Proceedings, Videosw & Pins	Cash	J5	925.00	-	41,495.16	-
01-23-92 Dues, Videos & Pins	Cash	J6	1,030.00	•	42,525.16	-
01-24-92 Dues, Proceedings,videos Etc	Cash	J7	983.00	-	43,508.16	-
01-24-92 Dues, Proceedings & Sale Old Fax	Cash	J8	1,450.00	•	44,958.16	•
				055 51		
			15,531.09	000-01	0.00	
106 Money Market					0.00	_ `
108 Cenvention Temp Funds					0.00	-
110 Bank C - Payroll					0.00	-
120 Accounts Receivable					0.00	-
124 Advances Receivable					0.00	-
126 Inventory					1.478.70	-
130 Office Equipment	CK 1363	.14	795.00		2,273.70	-
01-16-92 Poynter's Business Products (Tax)	Cash	.18	-	1,478.70	795.00	-
01-24-92 Dues, Proceedings & Sale Old Tax	64511	••				
			795.00	1,478.70		
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220 ACCOUNTS Payable					-	0.00
231 FIL Payable					-	0.00
233 FICA Pavable					-	0.00
234 FUTA Pavable					-	0.00
235 SUTA Pavable			. **		-	0.00
236 SDI Pavable					-	0.00
237 Local Tax Payable					-	0.00
240 Deduction A Payable					-	0.00
242 Deduction B Payable						0.00
244 Deduction C Payable					-	0.00
260 Sales Tax Payable					-	31,760,68
356 Retained Earnings					-	0.00
410 Dues Renewal		. 4		190 00	-	190.00
10-22-91 Dues & Proceedings	Cash	11	-	370.00	-	560.00
01-03-92 Dues, proceedings & Convention 91	Cash	12	<u>-</u>	800.00		1,360.00
01-23-92 Dues, Proceedings, Videosw & Pins	Cash	ر ر 4 ا	-	870.00	-	2,230.00
01-23-92 Dues, Videos & Pins	Coch	17	-	840.00	-	3,070.00
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01-24-92 Dues, Proceedings & Sale Old Fax	Cash					
			0.00	4,090.00		
					-	0.00
420 Dues - New Members	Cash	J1		50.00	-	50.00
10-22-91 Dues & Proceedings	Cash	J2	-	110.00	-	160.00
01-03-92 Dues Videos & Pins	Cash	J6	-	50.00	-	210.00
UI-20-92 Dues, Videos & Filis						
			0.00	210.00		
(70) 0					-	0.00
450 rapers	Cash	J5	-	5.00	-	5.00
01-23-92 Dues, Proceedings, Process a Prins	Cash	J6	-	5.00	-	10.00
01-25-92 Dues, Videos & Filis	Cash	J7	-	43.00	-	53.00
UT-24-92 Dues, Proceedings, Proceedings, Process Etc.						
			0.00	53.00		

e Association

. Oct 1,1991 TO Jan 24,1992

. UCT 1,1991 10 Jan 24,1992					debit	credit
			debits	credits	balance	balance
						0 00
431 Bibliographies					_	0.00
432 Proceedings				97 40	_	97.40
10-22-91 Dues & Proceedings	Cash	- J I	-	3.09	-	333 40
01-03-92 Dues, proceedings & Convention 91	Cash	J2	-	230.00	-	457 49
01-23-92 Dues, Proceedings, Videosw & Pins	Cash	12	-	120.00		455-07
01-24-92 Dues, Proceedings, videos Etc	Cash	۲L	-	70.00	· _	583 60
01-24-92 Dues, Proceedings & Sale Old Fax	Cash	78	-	50.00	-	503.07
			0.00	583.69		
433 Video Sales					-	0.00
01-03-92 Dues.proceedings & Convention 91	Cash	J2	-	90.00	-	90.00
01-23-92 Dues, Videos & Pins	Cash	J6	-	105.00	-	195.00
			0.00	195_00		
			••••		-	0.00
440 Convention 1989					-	0.00
441 Convention 1990					-	0.00
442 Convention 1991	Cash	12	-	10,000.00		10,000.00
U1-03-92 Dues, proceedings & convencion y	0.0011					
			0.00	10,000.00		0.00
445 Business Cards					-	0.00
450 Journal Sales					-	0.00
455 Mid-continent Registration					-	0.00
456 Mid-continent Sponsor					_	0.00
457 Mid-continent Display Reg.					_	0.00
460 Newsletter Ads					_	0.00
480 Donations					_	0.00
490 Interest Earned				<u>.</u>	0.00	-
501 Contract Services					0.00	-
502 President Expenses			(0.51		60.51	_
01-03-92 James F. Culbertson	Ck 136	52 13				
			60.51	0.00		
503 V P Expenses					0.00	-
504 Secretary Expenses					0.00	-
505 Treasuer Expenses					0.00	-
510 Newsletter Expenses					0.00	-
511 Congressional Expense					0.00	_
512 Election Expense					0.00	
513 Membership Expenses					0.00	_
514 Awards Expenses					0.00	-
515 IALALiaison					0.00	· -
516 Convention Expense					0.00	-
517 Journal Expenses					0.00	_
518 Proceedings Expense					0.00	-
520 Freight Expense					0.00	-
530 Wages					0.00	-
531 FICA Expense					0.00	-
532 FUTA Expense					0.00 0 00	-
533 SUTA Expense					0.00 0.00	-
534 SDIExpense					0.00	-
540 Equipment Expenses					0.00	

EX/ Page 5

...ssociation JOURNAL Oct 1,1991 TO Jan 24,1992

					debits	credi ts
10-22-91 J1	Dues & Proceedings	Cash	410	Dues Renewal	-	190.00
			420	Dues - New Members	•	50.00
			432	Proceedings	•	83.69
			105	Operating Account	323.69	-
01-03-92 .12	Dues proceedings & Convention 91	Cash	410	Dues Renewal	•	370.00
			420	Dues - New Members	•	110.00
			433	Video Sales	-	90.00
			432	Proceedings	-	250.00
			442	Convention 1991	•	10,000.00
			105	Operating Account	10,820.00	-
01-03-92 13	James F. Culbertson	Ck 1362	502	President Expenses	. 60.51	-
01-01-22-13			105	Operating Account	-	60.51
01-16-02-14	Powerter Rusiness Products (fax)	Ck 1363	130	Office Equipment	795.00	- '
01-10-92 34			105	Operating Account	-	795.00
A4 A7 AA IF	Dura Dragadingo Videosu & Pips	Cash	410	Dues Renewal	-	800.00
01-23-92 JS	Dues, proceedings, videosw a mis	-	432	Proceedings	-	120.00
			430	Papers	-	5.00
			105	Operating Account	925.00	•
a. a. a		Cash	420	Dues - New Members	-	50.00
U1-23-92 JO	Dues, videos & Pins		410	Dues Renewal	-	870.00
	-		430	Papers	-	5.00
			433	Video Sales	-	105.00
			105	Operating Account	1,030.00	-
		Cash	410	Dues Renewal	-	840.00
01-24-92 J/	Dues, Proceedings, videos Etc	Cuon	432	Proceedings		100.00
			430	Papers	-	43.00
,			105	Operating Account	983.00	-
		Cach	410	Dues Renewal	-	1,020.00
01-24 -92 J8	Dues, Proceedings & Sale uld Fax	Gaan	472	Proceedings	-	30.00
			130	Office Equipment	-	1,478.70
	,		105	Operating Account	1,450.00	-
			540	Equipment Expenses	1,078.70	-
			240			

17,465.90 17,465.90

EXHIBIT

UNITED STATES COAST GUARD



OFFICE OF THE DIVISION CHIEF

15 North/Main Street Cranbury, NJ 08512

November 12, 1991

Robert W. Lilley, Ph.D. 150 South Plains Road The Plains, OH 45780

Dear Bob:

Enclosed for your records is a copy of the "final draft" of the Loran-C Handbook. I do not know the final release date for this document, but it should be within the next few months. I have asked Captain Weseman to estimate what the cost to WGA would be for purchasing this in quantity and will advise you as soon as I know.

Let me also acknowledge the fine contributions of the Wild Goose Association in the review of an earlier draft. I have no doubt that our product is demonstrably better because of your efforts and those of the fine committee you established. I would particularly like to acknowledge the efforts of Dr. Miller and Captain Brodgen who both read this cover-to-cover. (Either they are really dedicated to advancing the state-of-the-art of Loran-C or they are virtually incurable insomniacs.)

Thanks again for all your help. I have asked the Coast Guard to send you a more formal note of appreciation. Best wishes for the holiday season.

Kindest personal regards,

L. Daniel Maxim, DVC-ED

Board of Directors

Robert W. Lilley President David C. Scull Vice President Walter N. Dean Secretary Carl S. Andren..... Treasurer James F.Culbertson Past President James O. Alexander David H. Amos John M. Beukers Frank S. Cassidy Laura G. Charron Kjell O. Enerstad Bruce E. Hensel John D. Illgen Henry E. Marx Mark P. Morgenthaler Maurice J. Moroney William L. Polhemus



Wild Goose Association



The International Loran Radionavigation Forum

Wild Goose Association 1992 Annual Convention and Technical Symposium

Report to the Board of Directors January 19, 1992

by John M. Beukers, General Chairman

Overview

The 1992 annual WGA Convention and Technical Symposium is to be held in Birmingham, England from Tuesday August 24 through Thursday August 27, 1992. The theme is Loran-C/GPS Interoperablility, "Sharing the Success". The Convention is to be preceded by a one day seminar presented by Navtech Seminars on Monday, August 24, entitled Loran-C and GPS Interoperability.

Planning for the event is on schedule and as of this date there appear to be no difficulties.

Travel arrangements for people travelling from the United States to England have been organized and air fares are attractive for this time of year.

Events in the international radionavigation community over the past year for Loran-C have been positive providing an incentive for attendance at the Convention. Plans and advance bookings in anticipation of an attendance of 100 with 30 spouses have been made. Up to 288 can be seated in the lecture theater and accommodations in Birmingham at this time of year should be no problem if the attendance were to exceed 100.

Planning for the Technical Program is nearing completion. Session content has been established and Session Chairmen have been selected; some have already accepted. The call for abstracts will be mailed in the next few days. It is planned to provide copies of the Proceedings upon registration at the Convention.

An interesting spouse program has been suggested and is in the process of being firmed up.

Wild Goose Association, Inc. P.O. Box 556, Bedford, MA 01730, USA

FILE: E:\JMB\WORD\0119CONV 1 OF 8 REVISION A 920124

EX 3 PZ

It is planned to have an exhibition to be co-located with the area used for coffee and tea breaks.

It is important to note that convention arrangements and hotel accommodations are different to those normally encountered in the United States. We have had to adjust some of our traditions to conform to the local customs - for example the hospitality suite which will be run by the hotel. England at the current rate of exchange is not inexpensive and every effort is being made to keep costs under control. Industry support for the Convention will be essential; the incentives for exposure to new markets should be an encouragement.

The Board will have to consider the impact of an early convention on the presentation of awards and the transition of Directors following the annual election.

A detailed report of the Convention follows and can be made available for those who have further interest in the current planning.

Respectfully Submitted,

John M Beukers January 24, 1992

Copies:

Board of Directors, pp 1&2 Overview only Mike Moroney John Illgen Frank Cassidy David Last Carolyn McDonald - Navtech Kim Bate - BC & VB

Convention Committee

General Chairman John Beukers General Co-Chairman U.S. Mike Moroney Technical Program Chairman John Illgen Technical Program Co-Chairman, U.S. Frank Cassidy Technical Program Co-Chairman, U.K. David Last Technical Program Manager Carolyn McDonald Dale Johnson Exhibition Pre-Convention Seminar Navtech Seminars, Inc. Hospitality Dale Johnson International Affairs Norman Matthews, Ed McGann Convention Organizer Birmingham Convention & Visitors Bureau (BC & VB), Philippe Taylor Kim Bate (BC & VB) Registration & On-Site Manager Publicity Ellen Lilley, Marilyn Beukers Spouse Program Joanne Culbertson, Pauline Maroney, Marilyn Beukers Sports Program Volunteer required Helen Relihan Hotel Representative Hotel Liaison Kim Bate Travel Emporium, Kings Park, N.Y. Travel Arrangements Tours and Visits BC & CV

Location and Dates

The Convention is to be held in Birmingham, England at the Copthorne Hotel and City Library from August 25 through August 27, 1992 with a pre-convention seminar presented by Navtech Seminars, Inc. at the same location on Monday August 24, 1992.

Travel Arrangements

To transport WGA members, their spouses, friends and others from North America to the Convention site in Birmingham, England, a group arrangement has been made with Virgin Atlantic Airline for the transatlantic crossing. Points of departure available for this portion of the journey are New York JFK, Newark, Boston, Miami and Los Angeles. Arrangements will be made with American as a feeder airline to get people from within the continental United States to a departure point of their choice. The return date is open for individual preference but must be booked with the outward bound journey. Return will be from London, either Gatwick or Heathrow depending on the final destination in the United States.

Ex 3. P4

In order to coordinate travel from London Gatwick and London Heathrow it is proposed to fly everyone from the United States the evening of Friday, August 21, arriving either Gatwick or Heathrow (depending upon the point of departure) early Saturday, August 22. If an alternative departure date from the United States is contemplated then it will be the individual's responsibility to find a way to Birmingham.

Fast luxury coaches will pick up the arriving flock at Gatwick and Heathrow for the final leg of the journey to the Copthorne Hotel in the center of Birmingham, arriving around noon time. This will afford the balance of the weekend to relax and overcome the effects of jet lag before the activities begin on Monday.

The package offered by Virgin Airline is by far the most attractive that was considered. (American, British Air, Delta and United were contacted). To qualify for the Virgin Atlantic offer certain rules apply.

- 1. A 10% non-refundable down payment will be required.
- 2. Final payment is due 45 days prior to departure.
- 3. No changes are permitted once reservations have been made.
- 4. Tickets are non-refundable.
- 5. Tickets can be transferred. (Being checked)

To make the offer even more attractive and to provide an additional incentive to attend the Convention, it is proposed to make a draw of one free ticket for every 20 tickets purchased. This means that everyone stands a 1 in 20 chance of a FREE passage and if two are travelling together a 1 in 10 chance that at least half of the transatlantic crossing will be paid for. (Convention Committee and Board Members excluded??)

The fares quoted are as follows

1.	JFK, Newark and Boston	\$700
2.	Miami	\$736
3.	Los Angeles	\$890

These are ceiling fares and could possibly be negotiated downwards depending upon the movement of air fares this summer.

All air travel arrangements are being made through The Travel Emporium in Kings Park, N.Y. and are being handled by the company President, June Foy. Individual itineraries will be prepared including continental travel to points of departure.

A booking sheet is being prepared that will request peoples' preferences for travel and the 10% deposit. This information will be part of the overall booking sheet for the hotel, registration and Navtech Seminars, Inc., Loran-C GPS Interoperability Seminar on Monday. This same booking sheet will include the extra-curricular activities and sign-up options for the spouse program and the kick off Mediaeval Banquet at Coombe Abbey.

Accommodation

Accommodation is handled somewhat differently in Europe than it is in the United States. The hotels are less competitive and rooms tend to be smaller. Two twin bedded rooms are more the norm, and it is only recently that there has been a move to double bedded rooms (room with bath is almost standard now). Delegates at conventions often "double up" and share rooms to reduce the cost. Double occupancy incurs an additional charge. Room rates normally include a full English breakfast (bacon and eggs etc). Hotel rates are high.

At the Copthorne there are 3 Executive Suites (small by U.S. standards), 16 Connoisseur Rooms (smallish, double beds and decent size bathroom). The balance are Classic rooms some with double beds but mostly singles with two to a room. All rooms have bathrooms.

The rates negotiated are almost half those normally charged during the exhibition season later in the year and are quite reasonable by UK city standards but still high compared with bed and breakfast type accommodation that runs around 30UKL per person.

Daily Rates.

τ	JKL\$	(1.75)	
		÷:	
Executive Suite, single occupancy	120	210	
Executive Suite, double occupancy	130	227	(to be checked)
Connoisseur Room, single occupancy	55	96	
Connoisseur Room, double occupancy	70	122	
Classic Room, single occupancy	45	79	
Classic Room, double occupancy	60	105	

It should be remembered that these rates include a full breakfast for both occupants. No government rates are available.

It is suggested that the three executive rooms be allocated to the WGA President, Bob Lilley, the Chairman, John Beukers - for meetings, etc., and the Co-Chairman Mike Moroney - for a mini hospitality suite for preferred customers! The increment over a double Connoisseur room is to be picked up by the Convention budget. So far attempts at getting free rooms have met a stone wall as this is not a practice of the European hotels. Negotiations are not final so this picture may change. The remaining rooms will be allocated on a first come first served basis unless the Board wishes to opt for the Connoisseur rooms and be located together.

Meeting Rooms

Meeting rooms are not provided free of charge along with the delegate accommodations as is the custom in the U.S. Although the Copthorne has meeting room facilities, they are not adequate for the session meetings and for lunch without breaking down and setting up. In addition the cost is high, even with a negotiated rate. For these reasons the City Library theater is going to be used for the seminar and technical sessions. Buffet style sit down luncheon will be served at the Copthorne.

Library

The City Library is located adjacent to the Copthorne and about a 2 minute walk. The library boasts a 288 seat theater and is an ideal setting for the technical sessions. A large foyer outside the main Adrian Boult auditorium will be used for the exhibition and cofee/tea breaks. This is located downstairs from the library theater. There are nominal charges for the theater and foyer. It is projected that industry support and exhibitors will provide the funding for these facilities.

EX 3 PB

Publicity

A jump start was made with the publicity for the Convention by handing out flyers at the Royal Institute of Navigation's NAV91 satellite conference held in London at the beginning of November 1991. Flyers have also been handed out at meetings in the U.S. A release has been made to IALA for inclusion in the March issue of IALA News. The call for abstracts will be mailed shortly to members and others. It will also go out to the media. This will be followed by a release to the media and organizations for calendar listings. Notice of the Seminar and the Convention is contained in the Navtech Seminar brochure that receives wide distribution both in the U.S. and overseas.

Publicity is currently being handled from Vero Beach by John Beukers. When Ellen Lilley receives the WGA administration computer system in March, the publicity preparation and mailing will be transferred to Ohio. Publicity in the U.K. will be run in parallel by John & Marilyn Beukers upon their return to the U.K. at the end of March.

Budget and Registration

A budget for the Convention has been prepared to determine the amount that must be charged for registration. A preliminary analysis indicates that the registration can be held to between \$350-\$375 (this is considered low by European standards, the RIN NAV91 registration was around \$500). This is based upon receiving industry donations of \$7500, the exhibition paying its way and the Convention registration providing \$10,000 of revenue to the Association. It is also based upon an attendance of 100 delegates.

Navtech Seminars, Inc.

The Navtech Seminar is all set and the promotional sheet has been prepared. A copy is attached to this report. The Seminar is to be run by Gerard Lachapelle with contributing lecturers David Last and Durk van Willigan.

Convention Program

Monday

Navtech Seminar - Loran-C and GPS Interoperability WGA Board Meeting (Is a second one required?) 7:30 pm Evening ice breaker: Mediaeval Banquet at Coombe Abbey, cc 1150.

> "You will be welcomed and attended by the gracious Ladies of the Court in their colourful mediaeval gowns, and served with Lindisfarne

mead, wine and succulent dishes. You will then be regaled with the food of love - music"

Spouse outing to Blenheim Palace. (Full day trip) Golf Tournament

Tuesday

Welcome by Lord Mayor of Birmingham and dignitariesPress ConferenceSessions A & B:Radionavigation Policy and ManagementLunch with SpeakerSession C:Panel Discussion "Why Loran-C in Europe"Session D:Loran-C Users; Applications and Experience

Spouse outing to Stratford upon Avon, Shakespeare & Shopping, (full day trip). Industry sponsored reception

Wednesday

Session E: Tutorial: Loran-C Overview

Session F: Loran-C Pulse Definition, Receiver Technology and Displays Seek your own Pub Lunch Session G: Loran-C Coverage, GDOP, Propagation and Antennas Session H: Atmospheric Noise, Skywave interference suppression

Banquet in the City Council House attended by the Lord Mayor and other dignitaries. Banquet Speaker

Spouse outing, half day trip to Warwick Castle.

Thursday

Session I: Loran-C Receiver Technology Session J: Loran-C/GPS Simulation Luncheon with speaker Session K: Loran-C/GPS Applications Session L: Loran-C/GPS Receivers

Spouse outing: Cotswold tour with stops at Bourton-on-the Water, Broadway, Seizincote Gardens. Lunch with Beukers at East Ridge, Longborough.

Technical Program

The technical program has been set up by the Chairman, John Illgen and his Committee. Session Co-Chairmen have been selected and are being contacted for acceptance. Some have already done so. The call for abstracts has been drafted and is at the printers; it will be mailed by the end of the month. Authors of papers accepted have been asked to submit their manuscripts in sufficient time to permit publication of the Proceedings prior to the meeting.

Exhibition

It is planned to have an exhibition of Loran-C and GPS equipment. This will afford an opportunity for manufacturers to present their various products and technologies to the international community many of whom will not have been exposed to these new developments in radionavigation. This aspect of the Convention will require promoting to encourage manufacturers to participate.

Hospitality Suite

Providing the usual congenial atmosphere for the hospitality suite has become a bit of a problem. Bringing liquor and snacks into the hotel room suites is not permitted (and even it was there is only enough room for a few people.) An alternative arrangement has been set up wherein the hotel will dispense drinks on a negotiated and prepaid basis together with snacks. A room has been set aside for this purpose. To defray the additional costs of this arrangement will require a little more arm twisting by the Hospitality Chairman. We WILL have a good time!

Spouse Program

See memo from Marilyn Beukers to Spouse Program Committee

Sports Program

WGA will have access to the Ryder Cup course and if there is a volunteer to organize a tournament then this can take place. Other physical activities need to be researched.

Post Convention Tours

The Birmingham Convention and Visitor Bureau will have a table at the registration desk for people wishing to plan tours after the conference. Tour brochures will be available and reservations can be made through the Bureau.

Attachments

Convention Phone and Fax List Draft Budget Navtech Seminar Program Spouse Program Outline

Copthorne Hotel Folder Library Exhibition & Conference Facilites Birmingham Convention and Visitor Bureau Folder Coombe Abbey Mediaeval Banquets Sample Booking Sheet Visitors Guide to the Big Heart of England Birmingham, The Big Heart of England Birmingham Museums, Art Gallery, Heritage Building, Living Displays To the Chairman

Loran-C Northwest Europe Policy Group

Dear Mr. Stenseth:

During the 20th Wild Goose Association (WGA) Convention, held in Williamsburg, VA, USA, between October 1st and 4th, 1991, the status and plans for radionavigation in Northwest Europe received a significant amount of attention. It was brought to the attention of the meeting by our overseas members that there was no clear statement of policy regarding the civilian use of GPS, the long-term availability of GPS signals and the potential future liability for cost reimbursement for signal use.

The WGA does not set government policy, but our charter includes a responsibility for cognizance of the technical and policy issues in radionavigation. Our annual convention provides the platform for our membership and visitors to exchange viewsand information, raise questions and formulate constructive policy and technical recommendations.

During the Williamsburg conference, presentations were made and information obtained which the WGA feels is pertinent to the present deliberations of the Loran-C Northwest Europe Policy Group:

1. GPS remains principally a U.S. military system.

This was made clear in the paper titled, "A Program Status Report on NAVSTAR Global Positioning (GPS)," presented by CDR Dennis R. McLean, USCG, Deputy Program Manager for DOT USAF Space Systems Division/MZT. It was emphasized that the primary mission for the system is weapons delivery.

WGA concludes that for the forseeable suture, the Precise Positioning Service will be denied to the civilian community and the accuracy of the Standard Positioning will continue to be controlled by the U. S. military.

2. System funding, and the eventual assessment of user fees remain uncertain.

WGA finds it difficult to project the long-term funding and user fees environment, since appropriations and revenue sources are reviewed and debated annually by Congress. In fact, the GPS environment has recently been altered by a U. S. statement that free availability world-wide may be limited to as short a period as ten years.

Clearly, the funding and availability situation would be seriously affected by a future U. S. military decision that GPS was no longer the principal source for navigation and positioning.

3. The DoD position regarding radionavigation requirements is

Withdrawal of DoD support for overseas Loran-C transmitters does not indicate any refusal to use an available signal. Evidence of this arose during Deserts Shield and Storm, when a greater number of Loran-C than GPS receivers were in use, and Loran-C-equipped aircraft conducted battle-damage assessment missions.

In addition, we know of current military systems (forwardfield Army meteorological data systems) for which use of Loran-C and Omega signals is essential.

We in the US are fortunate not to be faced with a dilemma on the civil side. Our Department of Transportation has maintained a clear policy of support for Loran-C through three administrations at the Federal Aviation Administration, for example. There is clear support for the hybrid partnership of Loran-C and GPS, as a move toward a sole-means navigation capability.

This is evidenced by the recent completion of United States Loran-C coverage by construction of four transmitters the mid-continent region.

WGA stands ready to assist the Loran-C Northwest Europe Policy Group in any way to reach the best technical and economic conclusion.

WGA believes that Loran-C, or Loran-C/GPS hybrid systems, provide the optimum short-term and long-term solutions.

.rd of Directors

. Culbertson President d C. Scull Vice President Valter N. DeanSecretary Carl S. Andren Treasurer John D. Illgen Past President John M. Beukers Exec. Administrator James O. Alexander David H. Amos Kjell O. Enerstad Bruce E. Hensel Robert W. Lilley Henry E. Marx Edward L. McGann Mark P. Morgenthaler Maurice I. Moroney William L. Polhemus James P. Van Etten

EXHIBIT 5 PI

Wild Goose Association



The International Loran Radionavigation Forum

December 9, 1991

Mr. Jae Kuk Kim, Director Navigational Aids Division Korea Maritime and Port Administration 112-2, Inoui-dong, Jongro-ku. Seoul 110-410, Korea Fax# +82-2-744-9591

Dear Mr. Kim:

Loran-C Proposal Technical Evaluation

This is a follow up to our letter of December 4, 1991, and makes some further suggestions as how to obtain the best possible advice for the purchase of Loran-C transmitting equipment.

We would like to stress that the Wild Goose Association regards the international program for Loran-C as a key factor in providing a radio-navigation aid that will meet the obligations of the International Maritime Organization. For this reason we want to do everything we can to ensure the integrity of the system hardware to provide high reliability and transmissions that meet all specifications.

Running concurrently with your program, European and Mediterranean countries are faced with a similar situation. Expert advice is being sought to obtain the best technical solutions that will maximize coverage and provide a system of high reliability. These solutions are not necessarily straightforward and require specific technical knowledge found only in those that have many years of experience with loran.

I have been in touch with our overseas Directors who are involved in the international loran program and they strongly recommend, before you make any commitments, you contact the Northwest Europe Loran-C Policy Group and that you make known your proposal to the Director General of the International Association of Lighthouse Authorities. The contacts of the organizations are provided at the end of this letter. These organizations are supported technically by Universities in the United Kingdom, in the Netherlands and in the United States. Some of the best Loran-C engineers are associated with these Universities and their work has provided the basis for the European decision to adopt Loran-C in Europe.

In closing, I must emphasize the importance of obtaining experienced loran advice which is a specialty of its own. Electronic technology alone may not provide you with the loran service you

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Mr. Jae Kuk Kim, Director December 9, 1991 Page 2.

are seeking - there are many system parameters that must be addressed to obtain an acceptable transmitted signal.

If you have any difficulty reaching the contacts we have provided, or, if we can be of further assistance, please do not hesitate to contact me.

Yours sincerely, Robert W. Lilley, Ph.D. Voice (614) 593-1514 Fax (614) 593-1604

Northwest Europe Loran-C Policy Group Kjell Enerstad Norwegian Defense Communications Administration Oslo Mil/Akerhaus 0015 Oslo 1 Norway Phone: +47 2 40 26 19 Fax: +47 2 40 25 30

Secretary General Noramn F. Matthews International Association of Lighthouse Authorities 20tcr. rue Schnapper 78100 Saint Germain en Laye France Phone: +33 1 34 51 70 01 Fax: +33 1 34 51 82 05

EXHIBIT 6 ·P1



LET'S SLOW DOWN

C SAN FOR CONSTREME

OVER THE PAST 10 YEARS I'VE FLOWN 3.500 hours with a high-quality IFRapproved loran navigator in my airplane. The primary lorans in my airplanes have been the Texas Instruments TI9100-the first panel-mounted loran approved for IFR-the Arnav AVA-1000 and now the Bendix/King KLN 88. All three of these lorans have been reliable and accurate and were state-of-the-art at introduction. There have been many more lorans in and out of my airplanes on shorter-term test bases, too. I'm only telling you this to present a credential. I am a loran believer, a loran user and I want us to slow down on loran approach approval. This wonderfully convenient en route navigation system is not yet ready to join other traditional nav systems to provide unrestricted instrument approach guidance.

I think all of us who have flown lorans are impressed with the overall accuracy, particularly the repeatable accuracy of a good loran receiver. The AVA-1000, for example, displays distance to the waypoint down to one-hundredth of a nautical mile. Using only the loran, I could tell if I was in front of my T-hangar or the one next door because I had stored my hangar door as a waypoint in the AVA-1000. Even the DME on the field couldn't give me such a precise location because the hangar blocked the line-of-sight path to the antenna and the DME indicator reads only to one-tenth of a mile.

With such incredible loran accuracy already in my panel 10 years ago, I was certain we would be flying loran approaches to almost every airport in the country by 1992. But as I logged more hours with loran, my attitude toward loran's achievable accuracy versus its potential accuracy changed. Once in a while forces beyond my control or the control of the people who designed and built the loran receiver render the system worthless. Nearby thunderstorms are the most common loran interrupter

but P-static buildup during flight through precipitation can also block loran signal reception. Worst of all, I have no way of knowing for sure why signal reception is lost. It could be interference from a big thunderstorm hundreds of miles away, but it's also possible a loran transmitter simply went off the air for a moment. When the warning flag drops on those rare occasions, I'm left to wonder if my loran receiver has a problem or if interference of some sort caused the signal loss.

Interruptions in loran signal reception while flying en route are a nuisance but are not in any way dangerous. If you're flying in the clouds using your loran for IFR navigation and it drops off, you know you have broad obstruction clearance at your assigned altitude or the controller could not have approved the off-airway route. Merely holding heading for the few minutes it



typically takes a loran to lock back on after signal loss is no big deal while in cruise. But what if that happens when you are a few hundred feet above the ground in the clouds on an approach? You could be flying below other navaid signal coverage and have no choice but ! to dead reckon until you can climb to reception altitude of a VOR, or until loran signals are regained. It will normally take more than a minute for a loran receiver to identify and begin to track usable signals after reception has been interrupted. It's also likely that this reinitialization process will take even longer in bad weather conditions because the P-static or thunderstorm in-

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EX 6 P2

terference that caused reception to be lost in the first place will impede the process of reacquiring the signals.

But, you say, ILS or VOR transmitters can go off the air during an approach, too. That's true. But it's not very likely, compared with the odds of losing loran signal reception. Here's why.

During a conventional approach you need to receive signals from only one or two transmitters—the localizer and glideslope on an ILS, for example; on some approaches you need both VOR and DME signals. To fly a loran approach you need signals from three transmitters. On a conventional ap-

ATMOSPHERIC INTERFERENCE CAN MAKE A LORAN USELESS.

proach the transmitters are at most a few miles away. When you fly a loran approach the transmitters are many miles away, and at least one will be hundreds of miles away. It doesn't take a rocket scientist to understand that the greater the distance between a transmitter and receiver, the better the odds something can interfere. And loran signals are in the low end of the frequency spectrum, where lightning, aircraft systems and other "noise" is abundant, compared with the VHF and UHF frequencies used by the ILS or VORs. A VOR or ILS receiver is working with very strong signals compared with those a loran receiver must detect even when flying under ideal conditions. We have large margins of signal strength to overcome potential interference on a conventional approach but that's just not true for loran. Atmospheric interference that wouldn't faze an ILS signal can make a loran useless. I'm confident we can overcome most bad-weather loran reception problems in the future, but those improvements are not yet available.

For these reasons I don't think loran is dependable enough at this time to become a routine part of our IFR approach system. We have not and cannot allow any potential system errors to creep into an instrument approach. Pilots can and do screw up approaches but the approach must not screw the pilot. We have to know that if we follow the published procedure, we are absolutely protected from hitting the ground or an obstruction. If it is even remotely possible that you could be doing everything right and still hit the ground, then we might as well have no system at all.

Bendix/King is the first manufacturer that I know of to technically gualify to certify a loran for unrestricted instrument approaches, but the company is proceeding slowly. The KLN 88 meets all the approach requirements of TSO C60b, the specification that sets minimum standards for new IFR lorans. But in the real world the KLN 88 cannot overcome the problems of interference generated by the airplane or the atmosphere. Nor can the receiver do anything about momentary loran transmitter shutdowns that, according to the U.S. Coast Guard, operator of the loran system, occur on an average of once each day for each transmitter. The momentary failure of a single transmitter would affect approaches at hundreds of airports and force all loran receivers using that transmitter to reinitialize.

Another potential problem with loran approaches is the temptation for the approach designers to add complications. Loran approaches will be most useful at airports surrounded by rugged terrain that blocks signals from a VOR or makes an ILS impossible. Because loran signals have no line-ofsight restrictions, a loran approach could guide a pilot down a valley into the airport. Such an approach demands several step-down points that add greatly to pilot workload. If loran signals are lost while flying such an approach, you would be left dead reckoning in an area of high terrain.

I believe that loran approaches can eventually be accommodated into our system, but we're not ready yet. We need more progress on P-static control while flying in clouds and precipitation. We need to understand more about how thunderstorms affect loran signal propagation. And we need to develop loran approaches that are as easy, or easier, to fly than a VOR/DME approach. Certainly loran approaches can be designed and approved now for special circumstances, just as they have been for helicopter operators flying in the Gulf of Mexico.

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

Loran/ GPS Update

The gap is gone, but loran still has crosses to bear (Las Cruces?), and GPS beckons, beguiles and bamboozles.

Though happily wedded to loran after a whirlwind romance, pilots are already flirting shamelessly with satellites. Is this a misguided infatuation, or does loran really have enough flaws to justify a wandering eye?

It turns out that while the filling of the nefarious midcontinent gap earlier this year with two new loran chains gave complete loran coverage from sea to shining sea and from Canada to Mexico and beyond, a few small glitches have surfaced in some loran receivers. And the loran makers have been scrambling to get full IFR coverage over the electronic counterpart of the Louisiana Purchase.

IFR Approach Ruckus

On top of that, a grand brouhaha has developed over attempts to set up safe IFR loran nonprecision approaches. In brief, Bendix/King has flatly declared the whole IFR approach business is such a can of worms that with the present level of technology of both loran receivers and ground transmitters, pilots are likely to be exposed to a totally unacceptable hazard level.

The Aviation Consumer January 1, 1992

To boot, it turns out that the FAA is no monolith of support for IFR loran approaches. *The Aviation Consumer* found out from personal conversations that one camp is rather skeptical of proceeding down that road until some kind of paired backup system is available, using either Vortac or GPS (and the latter is several years down the road, at the least). According to this point of view, most pilots are perfectly happy to use loran 95 percent of the time for VFR navigation, which it does eminently well, so why venture into risky waters?

Bendix/King has really turned a spotlight on the apparent shortcomings of loran in IFR approach work with their stand. And it may surprise VFR pilots who have sailed far and wide and encountered few problems to find out how potentially risky it is (according to Bendix/King) to trust loran exclusively when the chips are down.

Competitive Juices Flowing

But to add spice to the matter, other loran makers like Arnav Systems, Northstar and II Morrow believe Bendix/King's attitude stems more from shortcomings in their KLN-88 receiver than from insurmountable problems with the loran system itself. Therefore, they are busy plugging away developing their own equipment for IFR approaches, apparently quite confident that they can pull it off. On the other hand, lending weight to Bendix/King's stance is the fact that its KLN 88 not only meets the TSO C60b requirements for IFR use, but surpasses them. In response to competitor's slights to their loran, Bendix/King adamantly says their KLN 88 is "dynamite" equipment. (What else would they say?)

At any rate, the competitive rewards are obvious for getting to market a loran receiver that will handle IFR approaches into possibly hundreds of airports that formerly had no instrument access.

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EX 6

The matter came to a head this past October, when the FAA held a powwow in Washington, D.C. of loran makers and other interested groups to check out the efforts of Bendix/ King as the first applicant for receiver certification and figure their future course of action with respect to IFR loran approaches. When the dust settled, the FAA said it was committed to pursue and perfect the project, other loran makers went off to get their their equipment ready, and Bendix/King sounded a public alarm.

The Olathe, Kans.-based company warned that it would not certify the KLN 88 for unrestricted loran approach operations "until the entire loran C system, including the KLN 88, offers pilots an approach means that meets their expectations for a safe, usable, and available means of executing an instrument approach." But unless any misunderstand this to mean they are bailing out of the program, they said they were continuing to pursue approach certification.

Loran Station Outages

One of the main concerns of Bendix/ King for IFR operations was the surprisingly common occurrence of loran transmitter outages or shutdowns. It turns out that there is an average of one shutdown per station

Though the KLN 88 is one of the most sophisticated panel-mounted lorans available, Bendix/King believes the current level of loran system outages represents too great a threat to permit loran approaches.





Arnav Systems is developing the R-50i for loran approach certification.

perday throughout the country. That adds up to about 7,000 shutdowns a year, intentional or inadvertent.

Furthermore, the average off time is not just a fleeting two or three seconds, but a full 20 to 30 seconds. Add to that the minute to a minute-anda-halfittakes a typical loran to reboot and provide an accurate position fix, and you've got an aircraft flying "blind" for a couple of minutes at a critical time. And since each loran station provides navigation guidance over a pretty good chunk of geography, aircraft flying approaches at hundreds of airports could be affected, and left stumbling without accurate guidance for an awkward period of time.

The U.S. Coast Guard, which operates the loran stations, confirmed the outage frequency to The Aviation Consumer, saying the stations can go down because of thunderstorms, power outages or maintenance. If there is a threat of a lightning strike, the station can shut itself off momentarily without warning to protect itself. This is especially so in parts of the country where there are a lot of thunderstorms, such as in Texas and Oklahoma and near the Gulf of Mexico. Naturally, the monster transmitter towers (700 feet tall) are an inviting target for lightning strikes.

On the west coast, there are still many tube transmitters, so extra maintenance is required on them, and they have to be switched off every so often. Occasionally system sensor relays indicate there's a small arc in the system, of say 50,000 volts. The only way to stop the arc is to turn the power off momentarily.

Receiver Recognition

According to the rules the FAA has set up for IFR approaches, a loran receiver should recognize the outage within 10 seconds and warn the pilot. Another way the receiver is notified of a loran station problem is when a special warning signal is sent out, called a blink. In the past, this has been done manually by a Coast Guard person on 24-hour watch. (Also, the Coast Guard will send the blink out to warn receivers the loran signal is not reliable when it is necessary to readjust the loran transmitter without shutting it off.) But since human reaction is not lightning-quick, an effort has been under way to develop a quicker automatic blinking mechanism, called Autoblink. Autoblink equipment is being made and hopefully will be delivered this coming summer.

Bendix/King says its judgment about the flawed reliability of loran for IFR approaches is based on extensive test experience since June 1990, while flying thousands of miles and spending lots of money. Furthermore, they maintain that since While some aspects of making a manual loran approach might be complicated, the KLN 88's unique mapping feature should help make things picture clear.

EX 6P.4

their KLN 88 not only meets but exceeds the TSO C60b requirements, complying with the TSO doesn't ensure that a loran is safely certifiable "in today's loran environment."

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The company called for improvement in three main areas to achieve safe IFR loran approaches:

• Signal Availability—Significant improvements must be made over a minimum C60b loran's ability to navigate in atmospheric-related noise including thunderstorms and precip static discharge. Also the number of station outages must be reduced. The average of one per day per station is too high. Furthermore, the FAA should require that aircraft certified for loran approaches have adequate bonding and P-static discharge capability on a continuing basis.

• Approach Charts—Provide missed approach procedures that can be used at any point during the approach on loss of a loran signal. Include VORs and NDBs on loran approach charts to help if loran is lost. And disqualify as alternates airports having only a loran instrument approach.

• Pilot Workload—Reduce it by simplifying approach procedures.

Among the outcomes of the conference were FAA commitments to follow up on many of the issues brought up by Bendix/King, such as to work for reduced signal outages, cut the average outage time from 20-30 seconds to about three seconds, review the loran TSO and minimum operating performance standards to see if changes should made, include at least one other navaid on the approach plates and screen approach procedures for complexity.

Complex Procedures

On the subject of complexity, many voices including those from the FAA

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said that simplifying approach procedures should be an ongoing concern. However, in private conversations with *The Aviation Consumer*, some competitors of Bendix/King suggested that the KLN 88 did not offer the most facile vehicle for the pilot who had to switch between automatic and manual mode on certain approaches while stepping through several waypoints.

6

Bendix/King freely concedes there are situations where the pilot has to deal with an extra bit of knob turning and screen page flipping, as when he has clearance only to a specific waypoint on the approach. Then it's "heads-down time" because of the need to go to an OBS mode.

However, the KLN 88 has the ability to store up to an astonishing 6,000 automated approaches where the aircraft is led through the approach ballet without interruption.

It remains to be seen how other lorans will deal with this situation, which could be an interesting competitive matter.

Everybody Else

In the face of Bendix/King's cautionary alarm flags, the reaction of the other loran makers and some users was one of unabashed impatience. The other loran builders, especially, wanted a minimum of fussing with requirements, having already spent big bucks and much time on getting C60b approval their equipment.

Typical were the remarks of II Morrow spokesman Dale Johnson: "We believe the current MOPS (Minimum **Operating Performance Standards**) are a product of years of collective effort and are quite adequate. Designing a receiver to meet the TSO C60b is admittedly difficult; however, we think the TSO has been well thought through and the requirements can be met. Small refinements or changes to the TSO are not a concern to us; however, we at II Morrow would be opposed to any major changes. We have spent about threeand-a-half years developing a product to meet C60b and are now in the

The

1992

Aviation

Consumer

January 1,



process of certifying equipment for IFR operations. The Loran-C system is safe, is accurate, and is easy to use."

Echoed Ken Foret of Northstar: "The approaches that I've seen flown are perfectly safe. There are many pilot reports of successful approaches, good signals, good accuracy, good data. What's happened to all of that information? Where is that information playing into the tough decision that the short-term signal outages are a big deal?... Our problems can be solved. There is no reason to stop now. Let's charge on to the maximum extent."

Said Frank Williams, president of Arnav Systems: "We believe that we can meet all the requirements of DO-194 (the RTCA criteria on which the TSO is based) and recommend we push for immediate certification under the current guidelines."

Signal Interruptions On Approach

Special attention was paid by each of these loran makers to the business of how to deal with loran outages from any of the stations in the designated triad (picked for its special accuracy) during the approach. One common suggestion was to allow the loran to pick up signals from other stations for the missed approach, even if this put the loran back on a coarser cruise accuracy mode. (More accurate than with no signal, it would appear.) Since some loran receivers can pick not only other stations, but other entire chains, this would seem to be an eminently logical course of action.

One theme running through these discussions concerned the speed with which various lorans could be up and running at full accuracy with An Apollo 2001 navigation management system with completely new software is II Morrow's candidate for C60b approval and loran approach capability. A GPS can be coupled to the unit.

signals reacquired after a "momentary" signal outage. Several loran builders said theirs could track signals accurately through something short like a 10-second loss of signal and reacquire the signal quickly, coming back on the correct cycle. Since King's KLN 88 takes a minute to a minute to a minute and a half to come up to speed after a "momentary" outage, are the others faster? Their makers seem to think so. It would be interesting to see figures on that.

But all this may be academic, since as soon as the pilot sees an outage flag on the approach, he's presumably not going to dead reckon or "coast" for more than an instant or two to see if the loran comes back on line. If he's got any regard for his skin, he'll skedaddle into a missed approach, especially if he's down low, or near mountains or obstacles. Further, Bendix/King makes the point that, according to the Coast Guard, most outages are longer than "momentary."

They're 20 to 30 seconds, on average. Add that to the time anybody's loran takes to come up to full speed, and in Bendix/King's view you have a small eternity while the pilot is sailing along without any loranguidance whatever.

But if thunderstorms have rendered all the loran stations in the area useless for navigation, how does the pilot on a loran approach even make a missed approach? Not on loran, certainly. Hence, Bendix/King's concern that another mode of navigation be available for MAPs.

No Problem

Is Bendix/King's concern for loran signal outages out of proportion to reality? Comments from some loran users at the conference seemed to suggest so. Gerald Gold, vice-president of Petroleum Helicopters Intl., reported his firm has been using loran for many years, and all of their some 300 aircraft are now equipped with it. "I was interested to hear the Coast Guard present information on signal outages because, frankly, I've never seen it to be much of a problem. We notice momentary outages so infrequently that we don't pay much attention to them."

He said Petroleum Helicopters has been using loran since about 1978 to

Loran Approach Progress

The first 10 IFR approach procedures were published in anticipation of early certification of the Bendix/King KLN 88, but these have been Notamed out of service.

An additional 20 procedures have: been developed and are currently

take its IFR helicopters offshore to IFR destinations and have yet to experience a problem due to loss of loran signal or inability to get down. They use loran in conjunction with airborne radar.

Bendix/King acknowledges this kind of successful offshore experience, but counters that those pre-C60b lorans, though excellent units, don't meet the stiffer flagging criteria (to detect





Foster AirData's F4 Phoenix was one of the first lorans to receive the new midcontinent chain software, a matter simplified by having the whole works on the plug-in upgrade cartridge (shown below, ready to fit in a slot at the back of the unit).

on hold. The balance of about 500approaches identified with the aviation community can be developed at the rate of about 150-200 per year, according to the FAA.

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To date, over 100,000 loran receivers are installed in aircraft.

inadequate navigation signals within 10 seconds in the approach mode with signals down to a SNR [signalto-noise-ratio] of -6dB. Actually, the KLN 88 does it down to -10dB.)

Risk Management

We were interested to note the comments of some at the FAA conference (Phil Boyer, president of AOPA and Ken Foret of Northstar, for example) that while there may be some limitations in dealing with loran, or even VOR and ILS, this is simply a matter of "risk management," something experienced pilots know about and deal with.

Bendix/King spokesman Doug Henkel may have put his finger on a key area of concern for his company when he countered: "It is not acceptable in our opinion to rely on the FAA and the avionics industry to 'educate pilots of loran approach limitations.' The loran manufacturers will be the ones getting the phone calls and letters from upset customers. Worse yet, the manufacturers will be the ones named in liability suits." (Our italics.)

Filling the Gaps

An issue that has produced less melodrama but more immediate practical benefit was the filling of the midcontinent gap last year with two new loran chains, and the filling of older lorans with new software and sometimes hardware to make full use of them. How well are the loran makers responding to the needs to upgrade their equipment? Here's a quick progress report.

• Foster AirData—The company claims that two of its lorans, the F14 and LRN 501, were the first to fly with the new gap-filler chain softThe Aviation Consumer January 1, 1992

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EX6 P.7

ware. The upgrade was made simpler by the format of the two lorans, which incorporate all the needed software right in the update cartridge. However, though both lorans are certified for enroute IFR flight in the rest of the country, they still are undergoing flight testing to qualify for IFR in the new chains. Hopefully, approval will be gained this month (January) or next. But the two lorans are still approved for IFR while using the old chains, even though some of those overlap with the new.

As for the F4 and LRN 500, these require an internal modification to handle the two new loran chains. However, approval is hoped for in the same timeframe as the F14 and LRN 501. Price to the user of the update for the F4 and LRN 500 will be \$195. There was no charge for the cartridge incorporating the new chain software for the F4 and LRN 500 aside from the usual \$75 for the cartridge. Foster AirData reports it may not enter the lists to certify a loran to C60b for approaches. But it is planning to come out with a sophisticated, expensive (\$35,000 or so) LNS 6000 this year. This will be the first Foster product with GPS.

 Northstar—Updates incorporating the NOCUS and SOCUS midcontinent chain software have been available for \$120 by returning M1As to the dealer or factory. However, these do not track the Las Cruces, N.M. station in the southern chain. This prompted one Aviation Consumer reader to complain that this compromised position accuracy for pilots flying in that area. Northstar replied that it did not believe this would be the case unless there were noise interference, such as from strobes. But the company has had reports of problems in the California/Arizona border area, in some installations, and they are looking into the possibility that there is some kind of interference they are not aware of.

The company said it was planning to incorporate in the M1A software to handle the Las Cruces secondary at some point in the future. It was already doing so in the IFR-capable M2, which should be ready for ship-

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ment this month (January). Part of the problem is that the SOCUS chain has five secondaries, instead of four or less, like most other chains. And the nav calculation software in the M1A can handle only four.

Incidentally, the new M2, which will be IFR approved and have a cartridge update feature, is expected to list at \$4,995. Price of the VFR version, called the M2V (formerly called the M1B) will be \$4,495.

• II Morrow—Midcontinent gap software is available for all units, to

The Burlington, Vt. RNAV-A approach, with its heading change and stepdowns, was deemed one of the more complicated approaches. It and its fellows were Notamed into limbo. Note the lack of a nonloran navaid to use in case loran outages give the pilot no safe way to make a missed approach.

be installed by dealers or at the factory. The price ranges from \$100 for older sets without databases to about \$195 for the others. The IFR-certified 612A and 614 can have the



Not all GPS receivers will forecast satellite coverage, but Trimbles do.

midcontinent gap chains added, but then would lose their IFR certification. II Morrow is talking with the FAA to see if the chains can be added without it being a major change that would disqualify the sets for IFR work.

The company says it is working out swap deals for VFR 618s with customers, however, on a one-on-one basis. And as far as being able to track Las Cruces, all the II Morrow units provide the fifth secondary tracking loop. The company is developing a version of the NMS 2001 for C60b approaches. The current version, incidentally, can be paired with a GPS.

• Arnav Systems—Software that will track the new midcontinent chains is available for all models at a price of \$250 each, upgradable with an internal E-PROM change by dealers in the field.

The IFR-approved R50i with the new chain software reverts to a VFR version called the R50v. The company is working toward recertifying the unit for IFR with the new chains, hopefully to be ready by the time this appears in print. And it intends certifying the R50i for approaches.

Since the Arnav R21 loran can track only four secondaries, Arnav split the SOCUS chain into a north and a south section, each using four secondaries.

• Azure Technology—Provided upgrades for the Long Ranger for \$49. The company discontinued production of the Locator lorans because it could not upgrade them for the new chains. • Texas Instruments—Upgrades can be provided for all models. Price at the factory for the TI9100 is \$395, for the TI9100A \$449, for the TI91 remote unit \$495 and for the TI9200 \$299. Or local dealers can do the job after they, in turn, purchase the upgrade kit. (The company will provide a list of dealers.) Contact Texas Instruments at (800) 232-3200, ext. 940.

Going with GPS

A lot of pilots are chomping on the bit to get a GPS satellite tracker, and prices as well as unit sizes are tumbling almost day by day. However, there is precious little rationale for acquiring one strictly for flight operations in the continental United States, now that the midcontinent gap has been filled.

GPS could conceivably be used as a backup to loran when that's affected by precip static or atmospheric disturbances, but only on an unofficial basis since so many imponderables are involved, as the military yanks satellites on and off line at will for testing. It certainly will not be approved as an official IFR backup in a loran pairing for several years, at least.

When venturing outside the lower 48, however, in areas where loran signal coverage may be poor, such



EX6 P.B

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as in the Bahamas or Caribbean, GPS can make good sense. But this holds true only if pilots are willing to accept the present casual, experimental status of the satellite navigation system. Also, there are times when the present array of 16 satellites (out of the 21 officially planned, plus spares) leaves gaps in 2D, not to mention 3D coverage for varying periods of time.

Therefore, according to plots run for us by Trimble and Garmin, two big GPS makers, there could be a complete blank off Miami and in the Bahamas for up to 30 minutes a day. However, any GPS receiver worth its salt, like the Trimble units, will plot coverage ahead of time for your route of flight. Be aware also, however, that the entire system can be turned off for long periods of time, at the behest of the military. In fact, not long ago the system was turned off for two whopping 72-hour periods. This kind of interruption, hardly momentary, would naturally put a crimp in your navigational style as you tooled over the horizon to the Virgin Islands or Venezuela, if you had no other navigational backup available.

NANU of the North(star)

However, we are told that the shutdowns are not made on a whim. Instead, they are normally scheduled ahead of time, and pilots can either phone for information or hook up their computer by modem to a special bulletin board operated by the GPS Information Center of the Coast Guard. This service lists upcoming intentional outages. We tried both, and got speedy (as in 2400 to 9600 baud) service on the BBS and a friendly reply to our questions on the phone.

The phone number for queries, comments, etc. is (703) 866-3806. For a voice tape recording, call (703) 866-3826. And for the bulletin board dial (703) 866-3890 for modem speeds of 300 to 2400 baud or (703) 866-3894 for modem speeds up to 9600 baud.

Incidentally, the Notice Advisory to Navstar Users is code named NANU.

The Aviation Consumer January 1, 1992

Dick Weeghman

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LORAN-C APPROACHES? NOT JUST YET. . .

In a move that's sure to generate controversy, B/K says Loran-C is not ready for nonprecision approaches.



By RICHARD N. AARONS

Bendix/King engineers surprised FAA officials and angered competitors recently when they stated at an industry work-group session that the Loran-C system is not ready for nonprecision approaches. The "system" as B/K. defines it, includes B/K's KLN 88 loran navigator, the FAA's certification rules, the U.S. Coast Guard's signal availability and the FAA's drafting of approach procedures. B/K's competitors could care less about the capability of the KLN 88. But, arguments that certification standards, signal reliability and the procedures themselves are somehow defective means unwanted challenges for other manufacturers seeking approach approval for their products.

Doug Henkel, KLN 88 product manager, says B/K's goal "continues to be nonprecision-approach certification of the KLN 88 loran. However, we will not certify the unit for unrestricted loran approaches until the entire Loran-C system, including the KLN 88, offers pilots an approach means that meets their expectations for a safe, useable and available means of executing an instrument approach."

The KLN 88 is a sophisticated loranbased navigator with a Jet Electronics Technology (JET) Loran-C sensor at its heart. The unit has been TSOed to C60b for enroute and approach use. But B/K engineers believe compliance with this TSO alone does not ensure that a loran is certifiable in today's Loran-C environment." The company has been testing the system in the approach mode since September 1989, when the KLN 88 was introduced. These tests, according to Henkel, have identified system deficiencies that require FAA or Coast Guard involvement to correct before pilots will have acceptable loran approaches.

Here's an abbreviated version of B/K's list of what must be done to bring the KLN 88 and the rest of the Loran-C approach system up to a safe approach standard:

Signal Availability-The KLN-88's ability to provide nav data in the presence of interference from thunderstorms, lightning, precipitation. static and high ambient electrical noise must be improved. The Coast Guard must reduce momentary station outages that now occur on the average of one per day per station. An outage of a loran station could interrupt approaches at hundreds of airports. Recovery of the KLN 88, and probably other C60b lorans, after a momentary station outage requires about one to two minutes. (Outages of VOR/LOC systems and reacquisition are usually instantaneous.) Also, the FAA must provide practical regulatory guidance to ensure that aircraft certified for loran approaches maintain adequate bonding and P-static discharge capability on a continuing basis.

Approach Charts-These must provide pilot-manageable missed-

approach procedures to ensure obstacle and terrain clearance upon loss of loran signal at any point during the approach. Courses should be depicted using a magnetic variation close to the actual value, rather than a variation associated with a nearby navaid. Included too on loran approach charts should be VORs and NDBs with associated names, identifiers and frequencies, even when the navaid is a waypoint in the approach. Alternate airport requirements should be amended so that an airport having only a loran instrument approach would not qualify as an alternate.

Pilot Workload—Approach procedures must be simplified to reduce pilot workload. For example, B/K suggests development of straight-in approaches with minimal altitude step downs. B/K also says it would incorporate changes to the KLN 88 to optimize its use with loran approach procedures that ultimately evolve.

Henkel believes the issues associated with approach charts and approach procedures are solvable. "Our paramount concern is that of signal availability. Specifically, it is our belief that pilots will find lorans that meet the minimum approach requirements of TSO C60b unacceptable for unrestricted approach operations because of the increased probability, compared to currently available approach navigational aids, that during the execution of a loran approach, they will lose radio navigation and have to deadreckon.

"B/K began development of the KLN 88 believing that TSO C60b approval would ensure that the sensor portion of the unit would be adequate for approach usage. We no longer believe this. Although the existing TSO C60b does not preclude the design of an overall acceptable loran sensor for approach usage, meeting it does not ensure the sensor is adequate."

No doubt that last comment will generate the most debate from B/K's competitors and even some of its customers. Next month we'll take a look at some of the technical aspects of this issue and talk to other loran makers. Stay tuned. B/CA

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EX 6 PIC

FAA Urged to Fix Loran C Problems Before Approving IFR Approaches

EDWARD H. PHILLIPS/WASHINGTON



Scrious deficiencies in the existing Loran C navigation system must be resolved by the FAA and industry before unrestricted instrument approach operations can be safely authorized, according to Bendix/King.

In a report released last month, the Olathe, Kan.-based avionics manufacturer cited unreliable signal availability, faulty approach chart design and human factors problems as chief drawbacks of the system. As a result, the company is delaying FAA certification of its KLNSS Loran C receiver.

"We will not certify the KLN88" until the catire Loran C system and the receiver ments general aviation pilots" "expectations for a safe, usable and available means of Cocuring are insertiment approach." Douglas K. Henkel, product manager, panel-mounted autonics for Bendix King, seid.

In its present form, the Loran C system consists of 18 transmitters that provide chains of signal coverage for all 48 conterminous states and parts of Alaska. Currently, about 110,000 receivers have been installed in general aviation aircraft. Pilots use the system for en route navigation.

To date, 10 instrument approaches to airports have been approved by the FAA but banned from use until Loran C receivers and aircraft system installations are certified.

Another 20 instrument approaches have been developed by the FAA, and about 500 additional approaches could be commissioned at a rate of 150-200 per year. Richard Arnold, FAA Loran C program manager, said.

Other avionics manufacturers are ac-

Many light aircraft, such as this Mooney MSE, are equipped with Loran C. System problems must be resolved to make instrument approaches safe, according to Bendix/King.

tively pursuing approach certification of their receivers, despite system drawbacks. To date, however, none has received approval for instrument approaches, seconding to Anthony J. Broderick, FAA associate administrator for regulation and certification.

Bendix/King officials are recommending that the FAA implement changes to airborne and ground-based hardware to make the system more safe. They include: Improving electronics for Loran C receivers that allow safe navigation despite interference from thunderstorms and lightning, precipitation static and high ambient noise levels.

cur about once each day at each station, total about 7,000 outages per year. The signal loss lasts for about 20-30 sec. and is caused by lightning striking the 700-ft.high antennas, power fluctuations or routine maintenance, according to Commander Richard Armstrong, U.S. Coast Guard. The service is responsible for monitoring and maintaining the Loran C system,

Because each station is an integral part of the national chain, signal loss could simultaneously affect instrument approaches at hundreds of airports. In addition, it takes 1-2 min. for the system to return to normal status, further reducing the level of series, according to Bendix/King Henkel.

Issuing regulations mandating that pi-

lots ensure that adequate electrical bonding and precipitation static discharge capability of their aircraft are maintained. Electrostatic interference associated with thunderstorms can cause unreliable signal reception.

The company also wants the FAA to improve the human factors aspect of fiying a Loran C instrument approach by: Redesigning instrument approach procedure charts to include obstacle and terrain clearance criteria, since flight tests have indicated the Loran signal "may be lost without warning" at any point during an approach Henkel said

Publishing magnetic variation that reflects the actual value found in the area where the approach is being flown, not the magnetic value of a nearby navigation aid. This would help obviate confusion between the value on the chart and that displayed on the Loran C unit.

Including VOR and NDB navaid data on Loran approach charts to aid pilots in orientation during the procedure. Such information would be especially useful if Loran signals are suddenly lost.

 Prohibiting the use of airports featuring only Loran C approaches from qualifying as an alternate airport for IFR flight operations.

• Streamlining approach chart procedures to reduce pilot workload, including creation of straight-in approaches with a minimal number of altitude step-downs to the missed approach point. Pilot interface with the Loran C unit during an approach is significantly different from that for other types of instrument approaches. Henkel said.

An FAA report on Loran C states that officials are aware of these problems and corrective actions are being taken. Broderict said. Agency plans include: Assessing signal outages with the Coast Guard to determine what can be done to minimize signal loss. Coast Guard personnel will test and maintain the system during hours when the demand is lowest in an effort to reduce signal outages. Conversion of the transmitters to solid state electronics from vacuum sete technology is planned for Fiscal 1996, the FAA's Arnold said. Redesign of transmitter switching network would reduce signal loss to about 3 sec.

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 Reviewing Technical Standard Order (TSO) C60b and other pertinent operational performance standards for needed revisions applicable to Loran C receiver certification. The TSO sets requirements to certify Loran C airborne equipment.
 Publishing local magnetic variation and navigation data from at least one other navaid facility on approach charts.

Examining the design and complexity of approach procedures and investigate ways to make them more user-friendly.

Much of the Loran C controversy centers on the aircraft receiver, which is the heart of the airborne system. A 15-month flight test program conducted by Bendix/King showed that meeting the TSO criteria "does not ensure that [the receiver] sensor is adequate and certifiable."

The system does not provide the same level of signal availability that pilots are accustomed to from other approach navaids. Henkel said. The TSO requires the sensor to detect a loss of Loran C signal within 10 sec. in the approach mode and to display a warning to the pilot. Some older Loran units not certified under the TSO lack the warning display capability.

The FAA's Loran C Early Implementation Program testing used mostly non-TSO receivers. Concern about signsl availability during an approach did not emerge as a significant problem during those tests, according to Henkel.)

Six Loran C system monitors, however, have been installed nationwide to monitor for signal loss, Arnold said. An automatic "plink" alarm designed to warn pilots when signal deviation exceeds 10 sec. is planned for installation in 1992, he said.

Agency officials ecknowledge Loran C's instrument approach limitations and the need to improve receiver and sensor electronics. "The black boxes out there today, while appropriate for en route guidance, are not suitable for instrument approaches," Barry Harris, acting FAA administrator, said.

In addition to manufacturer certification of Loran C equipment, buyers must obtain field approval for installations in their aircraft. If field approvals cannot be obtained, the Supplemental Type Certificate procedure may emerge as the only recourse for owners who want to certify their system for Loran C instrument approaches.

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HENREL⁶ BRODERIER²

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DORNIER GMBH. WILL INTEGRATE voice and data communications between ATC centers in Germany, the Netherlands, Belgium and Luxembourg using a Northerm Telecom DPN-100 Packet Switched Data Network. The contract Dornier won is valued at 1.6 million European counting units (S2 million). The equipment will use 64 kbps. line transmission of radar and flight plan data so that civilian centers in Amsterdam, Bremen, Brussels, Dusseldorf and Maastrict, as well as Dutch, German and Belgian military ATC centers, have access to the same data. The German computer firm Comsoft has signed a 7.3-million ECU (S9.2-million) contract to provide the network distribution equipment over the next two years.

ADVANCED COMPUTER CODES AND MATHEMATICAL MODELS developed at Sandia National Laboratories will predict the stresses and strains a part will experience during the manufacturing process. Welding, forging, sheet forming, brazing, casting and injection molding can subject parts to more severe conditions than they would experience in service, often reducing their lifetimes substantially. Sandia-developed codes will allow computer analysis of these processes, replacing expensive prototyping and experimental techniques, according to laboratory researchers. The codes have been used in developing heat sinks for batteries, analyzing deformations and strain rates during sheet metal forming, and studying glass solidification processes.

HONEYWELL'S AIR TRANSPORT SYSTEMS DIV. and DDC-I of Phoenix. Ariz, are jointly developing avionics software for the Boeing 777 using DDC-I's Ada compiler system (DACS). The Ada language will be used in the 777's information management and air data/inertial reference systems. Originally developed as a military avionics language. Ada is becoming more accepted for commercial acrospace applications.

BE AVIONICS, INC., WILL INSTALL individual-seat video systems in British Airways aircraft. Under a SIS-million contract, business class seats on all the airline's widebody aircraft are to be upgraded. Deliveries are scheduled to begin this summer. BE Avionics also is under contract to supply individual-seat video systems to Singapore Airlines and Cathay Pacific.

NORSAT INTERNATIONAL and Douglas Aircraft have agreed to cooperatively develop a fiber-optic network to distribute in-flight entertainment video and audio to airline passengers. Telephone service and video games also are planned. On-board and satellite video will be distributed through a 16-channel system that could be expanded to 24 channels. Using a touch screen display, passengers will be able to shop and order food, paying with a credit card reader installed.

HORIZONS TECHNOLOGY, INC., which developed the map, operator and maintenance station (MOMS) for the AV-SB, is spinning off acrospace technology into civil applications. MOMS displays digitized maps and photographs on conventional desktop computers for preflight mission planning. Using that technology and the data compression techniques developed, the company is developing laptop computer systems that a fire department or another emergency response team could have in the /vghjcle. It would replace volumes of paper blueprints with a CDROM. The laptop etreen-shows not only drawings but also actual photographs of entrances and utility access.

NAVY AND AIR FORCE TEST RANGES are evaluating GPS-equipped Sidewinder missile-size pods to track aircraft during flight and weapons tests and war games. Interstate Electronics Corp. developed the pods, which contain a GPS receiver and use an L-band data link (1,350-1,400 MHz. or 1,429-1,435 MHz.) to transmit the aircraft's position and time to ground tracking stations.

THE EUROPEAN COMMUNITY HAS ACCEPTED the Joint Aviation Authority's Joint Aviation Regulations, the counterpart of U.S. Federal Aviation Regulations, as law, which will be effective as soon as it is translated into nine languages. At that point national variance will disappear, allowing the FAA to work with one body instead of 18-20 countries. Most of the countries in the world have standards anchored on the U.S. FARS, the European JARS or the Soviet CARS, according to William Marberg, vice president for Air Traffic Control at Unisys.

AVIATION WEEK & SPACE TECHNOLOGY/January 6, 1992 39

October 24, 1991

Subject: Valdez Vessel Traffic System

Dear Admiral E:

The Wild Goose Association (WGA) continues to be deeply concerned by the actions of the USCG on the subject issue. We fully understand the political necessity to respond to the Exxon Valdez tragedy. However, it is difficult to reconcile the present posture of the USCG as expressed in the exchange of letters attached with the long term nationwide interests in Vessel Traffic Systems, Harbor/Harbor Entrance operations and wide-area dependent surveillance programs.

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It is even more difficult to understand the apparent reluctance of the USCG to implement side-by-side Loran-C/GPS operations in this ideal test and evaluation environment not only to accomplish the Congressionally mandated safety improvements in the area but also to provide a solid basis for decisions related to the interoperable systems of the future.

Let us remind you that in 1982 the USCG issued a Federal Register announcement indicating their intent to install a differential Loran-C based VTS in Valdez. It was described in that announcement as a simple straightforward implementation capable of meeting the traffic safety objectives even with that decade old technology. Unfortunately someone's cost/benefit assessment led to the decision not to implement this \$500K or so system and this resulted in the <u>multi-billion</u> ecological, political and economic impact of the Exxon Valdez incident. If USCG had done what it knew was right at that time, the Exxon Valdez incident would not have occurred. So much for cost benefit assessments!

The WGA hopes that the successful experiences over the past decade of the million Loran-C users will not be washed away in the penny-wise implementation of the up-coming Valdez VTS. Let's make it both GPS and Loran-C. To go just two steps further, the Oil Pollution Act of 1990, frequently referenced as the basis for going solely to GPS in this program does not mandate a satellite based system but merely mentions satellite positioning among any other available dependent surveillance technologies of which Loran-C is currently predominant. Admiral E. October 24, 1991 Page 2

If the Valdez implementation is indeed to be the forerunner of the future VTS, Harbor/Harbor Entrance systems for the United States, please let such decisions not be made on some temporary expediency basis. The Exxon Valdez incident clearly shows the folly of such an approach.

EX7 P2

Let us wisely and carefully-and with open and public commentary and assessment-move on to the systems of the future. The WGA stands ready to meet with you at your convenience to review and discuss our position on this issue.

Sincerely,

Dr. R. Lilley President

RL:ff

Attachments WGA Letter to Manko Manko's Response



October 24, 1991

8 Preston Ct. Bedford Mass, 01730-2380 (617) 275-2010 Telex 92-3358 RACAL MEG BFRD

Subject: Northwest Europe (NWE) Loran-C

Dear Admiral E:

The Wild Goose Association (WGA) wishes to express its continuing support for the NWE Loran-C program and urges the United States government to exert all possible efforts at this crucial time toward achieving the continuation and expansion of Loran-C operations in that region. Specifically, the WGA looks to the U.S. Coast Guard for continued leadership in the efforts to affect a transition in this region from U.S. operations and funding support to operations conducted and funded by the nations of the Northwest Europe consortium.

Appropriate actions by the U.S. government at this time will assure the continued availability into the future of the proven Loran-C system in the North Atlantic and NWE regions so as to serve U.S. users and interests while minimizing the costs to the U.S. related to the possible decommissioning of the present sites. Such action to achieve the continued operations of Loran-C and that region and other areas of the world would not only benefit U.S. interests-both political and economic-but would be in complete accord with the U.S. commitment to a future maritime international navigation capability consisting of terrestrial and satellite systems as expressed by our country's support of the IALA/IMO initiatives on this matter.

I would like to assure you of the continued support of the WGA in these efforts and to offer to the USCG any assistance which they may require in the promotion and achievement of this goal.

Sincerely,

Dr. R. Lilley President

RL:ff

EX7 PA

MEMORANDUM

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To: Bob Lilley From: Gann Ed UN October 24, 1991 Date:

RACAL Megapulse

8 Preston Ct. Bedford Mass. 01730-2380 (617) 275-2010 Telex 92-3358 RACAL MEG BFRD

Subject: Public Relations - WGA Convention and FAA/NASAO NPA Conference

Per our conversations last Wednesday, I would like to remind you of the desirability or perhaps the necessity-of getting out some press releases and promoting some favorable images for Loran-C programs.

WGA CONVENTION

It seems to me that there were very substantive issues which were made public at Williamsburg i.e.:

- A. IALA view of worldwide Loran-C status.
- B. NWE and other areas or countries status and progress.
- C. Side-by-side comparisons of GPS/Loran vehicle location performance.
- D. Announcement by United Parcel Service (UPS/II Morrow) that it was equipping all their vehicles with Loran.

FAA/NASAO NPA CONFERENCE

With all the unfortunate rumors which circulated in the aviation community prior to the conference, including in Canada and abroad, it is absolutely necessary that FAA publicly announced its renewed and unchangeable support for the Loran NPA program. Their public announcement should be supported and enhanced by releases from the WGA and NASAO, HAI, AOPA, etc.

I urge that the WGA immediately send a letter urging such a public expression to FAA.

cc: M. Shuey - AOPA
P. Charles - HAI
P. Burket - NASAO
V. Bencivenga - FAA

ELM:fmf

EX7P5

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OCT 2 9 1991

October 23, 1991

AVIONICS

To: Dr. R. Lilley

From: Ed McGann

SUBJECT: Avionics Article on Atlantic GA Crossings (Oct. 1991)

Dear Bob:

The attached article raises a raft of issues highlighted as follows:

- 1. Is the "dramatic increase" at least in part motivated by the widespread use and acceptance of Loran-C?
- 2. Is it implied that there have been anything more than a "corresponding" increase in fatalities and lost aircraft -- and that those events are due to the inappropriate use of Loran-C? It would appear to be so implied since the first commentary referenced the newly suggested guidelines on use of Loran-C. Has WGA or anyone seen the data that led to the inference that the incidents which led to the issuance of this document were clearly related to the inappropriate use of or reliance upon Loran-C? Not that I think anyone should make such a trip "sole means Loran-C" that is crazy. However, the "spin" on the whole article seems biased.
- If the FAA Administrators statements at ICAO/FANS indeed have 3. the worse case negative-effect and the NWE Loran-C project folds not only will we have all the negative effects of that action (as expressed in the draft letter to you of today intended eventually for the USCG OFF of Nav). But, I now believe that DOD/USCG interest will move to shut down the existing stations end of 1992 (not 1994) based on "no requirements" - thus FAA or someone will have to pickup ongoing costs of any Loran-C use over the North Atlantic or the signals will disappear. This issue again shows that one hand of FAA clearly does not know what the other hand is doing On second or what even the simplest ramifications are. thought - maybe shutting off North Atlantic Loran will reduce the general aviation crossings of the North Atlantic and return to the better days of yesteryear.
 - Action: As the WGA Exec. Comm or Board decides. Someone has to at least clear up the slur!

Attach: Avionics - Oct 1991, Page 24

8 Preston Ct.

Bedford Mass. 01730-2380 (617) 275-2010 Telex 92-3358 RACAL MEG BFRD

Washington Watch



FAA Issues Guidance on Atlantic Crossing by GA Aircraft

Dramatic increases in General Aviation ilights over the North Atlantic are behind a corresponding increase in fatalities and lost aircraft. To make the trip safer, a joint committee of FAA and ICAO (International Civil Aviation Organization) has published the North Atlantic International General Aviation Operations Manual.

It warns, for example, that Loran C is not reliable everywhere in the region: "This statement contradicts some maps depicting Loran C ground wave coverage, but experience demonstrates that you should NOT use Loran C as your sole means of area navigation in the North Atlantic." The manual recommends self-contained navigation such as INS/IRS or Omega/VLF.

Flights from Baffin Island to Greenland need two independent ADF receivers (with BFO), according to the manual. Portable ADF is no longer acceptable. The same is



Circle Reader Service No. 84

true from Goose Bay, Labrador, to Narsarsuag, Greenland, but for Goose Bay to Reykjavik, Iceland, pilots may have one ADF and one Loran C.

"The Danish CAA strongly recommends two ADF sets because of poor Loran C reception around Greenland," the manual says. One Loran C and one ADF are sufficient from Gander, Newfoundland, to Shannon, Ireland, and from St. John's, Newfoundland, to Santa Maria island in the Azores. The manual warns that Loran C reception ends short of the Azores.

On northern routes, pronounced magnetic variation-as much as 40 to 45 degrees—has a dip effect that causes a compass to turn slower than in lower latitudes, the manual says. Other than a few VOR/NDB routes known as "Blue Spruce," navigational aids are few and far between and coverage sparse at low altitudes.

The manual discourages all but the most experienced and wellequipped pilots from attempting a crossing over the North Atlantic, especially because of complex weather systems.

The manual contains information about specific locales, for example, "Canada, Denmark and Iceland require that pilot and aircraft must be IFR-rated for transoceanic flight, regardless of altitude flown. Other North Atlantic states allow VFR flight at or below FL055 [5,500 ft.]."

Pilots are urged to file IFR. Canadian Air Regulation 540 is reprinted, which lists required avionics: airspeed indicator with pitot heat, pressure altimeter, direct reading magnetic compass, a gyroscopic direction indicator or a gyromagnetic compass, turn and bank indicator, gyroscopic bank and pitch indicator, rate of climb indicator and an outside air temperature gauge. Operations at night require navigation lights, two landing lights or a single landing light with two separately energized filaments, illumination of essential instruments, an electric flashlight at each flight crew station and a Type W emergency locator transmitter (ELT) that is water activated, selfbuoyant and water resistant.

"Guard your ELT with your life," the manual says, "it could be your only salvation."

Another crucial point is that pilots are to keep a listening watch on the distress frequency 121.5 MHz and keep in touch with other aircraft on the air-to-air frequency 131.8 MHz.

"The moral support alone may be enough to settle nerves and return the thought processes to normal," the manual says.

Each aircraft crossing the North Atlantic must also have HF radio in addition to VHF except for routes over Greenland at FL 250 (25,000 ft.) or above. The manual cautions that atmospheric conditions can make HF signals fade so transmitting or receiving a single message might take several attempts. Also, sunspots can disrupt HF communications for minutes to several hours, and other aircraft may not be close enough to relay messages in an emergency.

Even though radar coverage in the North Atlantic is very limited, the manual emphasizes operating a Mode C transponder: "In any emergency situation your chances of survival are vastly increased if you are radar identified and searchand-rescue services can be radar vectored to your position."

Other topics include flight planning, clearances and survival gear. The last section is a checklist crossreferenced to other sections of the manual to be sure that preparations are complete before departure.

"It is much too late to be climbing into [protective] clothing while presiding over an engine that is refusing to cooperate and at the same time trying to contact a friendly 747 to explain that you have a problem," the manual advises.

A copy of the manual is available for sale from the Superintendent of Documents, USGPO, Washington, DC 20402.

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EXHIBIT 8 Proz

Board of Directors

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Wild Goose Association



The International Loran Radionavigation Forum

To: Dr. Robert Lilley - President

From: Capt. Henry E. Marx

Subject: 1/27/92 Director's Meeting - W.G.A. - Report:

I am sorry not to be able to attend the upcoming Director's Meeting due to business pressures and the cureent Depression.

The news from the Recreational Marine User Community is that "New Boaters" are very rare and the present rage seems to be the new 5 Channel Magellan G.P.S. Units which are retailing for under \$1500.00.

Most recreational boats over 20 feet have a Loran C receiver onbaord and it is being used to navigate the vessel. However, if serious thought is being given to a new unit - the direction of purchase is clearly G.P.S.

What this tells me - and as I have previously said - is that for the W.G.A. to remain a viable organization into the twentieth century, we had better actively recruit and include the G.P.S. Community into our group. The sooner we start, the easier it will be - before they get an active user organization.

E. Marx

Wild Goose Association, Inc. P.O. Box 556, Bedford, MA 01730, USA

EXHIBIT 9

Facsimile Transmission

John M. Beukers Beukers Technologies, Inc. 5080-106 Harmony Circle Vero Beach, Florida 32967-7222

Phone & Fax: 407-563-0627

Date: January 13, 1992 Fax No.: 1-614-582-1282 To: Bob Lilley

Subject: WGA 1992 Convention, Birmingham, England

Dear BSG

Happy New Year!

I am considering the plans for the Banquet during the 1992 WGA Convention in Birmingham. The dates for the Convention have been set as August 24-27. This is two months earlier than normal which brings up the questions of awards, elections, board meetings and membership dues..

This is to alert that we may need to deviate from the our normal routine. Would you please take this up with the Executive Committee and let me know what you decide. Impacted is the ceremony at the Banquet and the early decisions for awards (plus the bringing over of the plaques etc). In addition, if the new directors are not installed there will be no need for the second board meeting. However, ballots will have been counted by that time so we will know what the new slate is to be.

Also impacted will be the non-member registration which includes a payment for membership dues. We will have to make a decision to the effect that anyone signing up will have membership for the balance of the year(an additional two months) and the following year or establish some other scheme. It is normal practice to allow the payment to cover the balance of the current year and the following year.

I need this information to prepare the paper work before the end of February.

Regards

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Board of Directors

Robert W. Lilley..... President David C. Scull Vice President Walter N. Dean Secretary Carl S. Andren Treasurer James F.Culbertson. Past President James O. Alexander David H. Amos John M. Beukers Frank S. Cassidy Laura G. Charron Kiell O. Enerstad Bruce E. Hensel John D. Illgen Henry E. Marx Mark P. Morgenthaler Maurice J. Moroney William L. Polhemus



Wild Goose Association



The International Loran Radionavigation Forum

January 23, 1992

Mr. N.B. Dahl, President Royal Institute of Navigation 1 Kinsington Gore London SW7 2AT United Kingdom

Dear Mr. Dahl:

In 1994 the United States Coast Guard will be handing over operation of Loran-C transmitters located outside of U.S. territory to host countries. This has prompted a great deal of debate relating to the future of radionavigation systems to satisfy the obligations of international organizations such as IALA, IMO and ICAO. Loran-C and Satellite systems along with DECCA have received much attention, particularly in Europe where the debate has been prolonged and turbulent but appears to be nearing conclusion.

With this activity in mind and the growing international interest in Loran-C, the Directors of the Wild Goose Association - the International Loran-C Radionavigation Forum - decided that it would be appropriate to hold its 21st, and first overseas, annual Convention and Technical Symposium in Europe. Since one of our Directors is now living part of the year in England it seemed natural to select your country as the venue. The convention is to be held in Birmingham during the week of August 23rd and is to be preceded by a Loran-C/GPS seminar put on by Navtech Seminars, Inc.

We have a great deal of respect for the Royal Institute of Navigation and are sensitive to the fact that we will be bringing representatives from the international radionavigation community into RIN "territory". The WGA Board of Directors felt that it would be a courtesy to inform you personally of the Association's plans so that you might advise your Council. Of course we welcome any of your membership to attend.

If you feel there are any areas in which we might collaborate or suggestions that you might have to make the event a success I would welcome the opportunity to pass these on to our Convention Committee.

Sincerely Robert I President

Wild Goose Association, Inc. P.O. Box 556, Bedford, MA 01730, USA