

MARITIME SAFETY AGENCY  
2-chome, Kasumigaseki, Chiyodaku, Tokyo, Japan

9th March 1966

Captain John B. Speaker, Jr.  
Commander, Far East Section  
U. S. Coast Guard  
APO 925  
San Francisco, Calif, 96525

Dear Captain Speaker:

Thank you very much for your letter of 3 March 1966 and the photographs of Loran C equipment which you have so thoughtfully sent us in compliance with our request. We would like to use these photographs for inclusion in our new brochure.

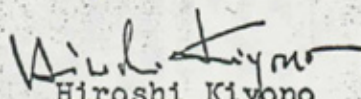
There are two other matters on which we would like to have your advice and information. They are as follows:

(1) It has been pointed out by the Pan American Airways (PAA), U. S. Navy and the Japan Air Lines (JAL) that the coverage of our Loran chain 2S1 and 2S2 in the northern Pacific area is not sufficient to provide aids to aircraft which make flights through the northern Pacific ocean. It is therefore considered necessary to improve the efficiency of the chain in the near future.

(2) Presently, there is a lack of service between your C. G. Loran rate 1L2 and our MSA 2S1 rate. This is a very serious problem for many aircraft which fly over the North Pole.

We would greatly appreciate your early reply to the aforementioned matters.

your sincerely,



Hiroshi Kiyono  
Chief

Radio Navigation Aid Section

RECEIVED  
UNITED STATES COAST GUARD

ADDRESS REPLY TO:

66 APR 6 PM



COM. 14TH CG DISTRICT


Commander  
Far East Section  
U. S. Coast Guard  
APO San Francisco 96525

10553  
5 April 1966  
Serial 870

From: Commander, Far East Section  
To: Commandant (OAN)  
Via: Commander, Fourteenth Coast Guard District (o)

Subj: Northern Pacific Loran Coverage

1. Enclosed herewith is a copy of a letter recently received from the Chief, Radio Aids to Navigation Section, Japan Maritime Safety Agency. The letter is self-explanatory.
2. Since an appropriate answer will involve statements concerning long range planning and the need for inter-governmental cooperation, it is considered inappropriate for this command to formulate a reply. It is requested that you give this matter your consideration and reply accordingly.
3. Mr. Kiyono will be advised that this matter has been referred to higher authority.

  
JOHN B. SPAKER, JR.

Encl: (1) MSA ltr to COMFESEC dated 9 March 1966

RCVD APR 13 1966 OAN

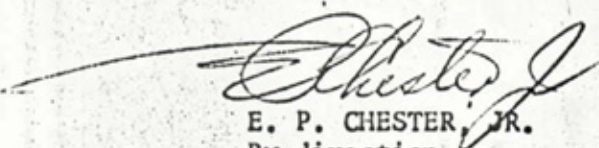
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10553  
7 April 1966

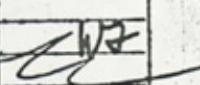
FIRST ENDORSEMENT on COMFESEC ltr 10553 Ser 870 of 5 April 1966

From: Commander, Fourteenth Coast Guard District  
To: Commandant (OAN) ← MAIL

Subj: Northern Pacific Loran Coverage

1. Forwarded, requesting Commandant reply to JMSA.
2. We concur that there is a lack of coverage between Japan and Alaska, however we have received no prior inquiries about coverage in this area.

  
E. P. CHESTER, JR.  
By direction

ACT	INFO	OAN	DIVISION
	3	CHIEF	
	2	ASST	
		PLAN	
		A & V	
		PROJ	
4-1		ELEC 1	
		ELEC 2	
		ELEC 3	
		PUB	
		N.M.	
		CHARTS	
		ALL	

(OAN-3)

\*The result of all this work would be to provide, by groundwave, lines of position in the center 200-225 miles of the Attu-Hokkaido baseline. No other intersecting Loran lines of position would be available in this area.

APR 25 1966

Mr. Hiroshi Kiyono  
Chief, Radio Navigation Aid Section  
Maritime Safety Agency  
2-chome, Kasumigaseki, Chiyodaku  
Tokyo, Japan

*Airmail* ✓

Dear Mr. Kiyono:

Captain Speaker sent your letter of 9 March 1966 on to the Commandant for reply to your questions concerning coverage of the North Pacific Ocean and between the Aleutians and Japan.

I have discussed your letter with our engineers. They have confirmed my opinion that there are no means, presently available, by which our two nations can provide coverage in that area. The only possibility would be to utilize the phase information available from our Loran-C signals and thereby develop Loran-A signals from your Hokkaido station and our Attu station. To do this would require some extensive research and development in addition to the equipment installations at the two Loran-A stations. ~~\*The result of all this work would be to provide by groundwave one speed line of position in the center 200-225 miles of the Attu-Hokkaido baseline. It just does not seem that such a small benefit is economically worthwhile.~~

As for increasing the coverage from your 251 and 252 pairs, again I think that the benefits accruing from increasing the power (if your stations are not now broadcasting a megawatt pulse) are too minimal to call for the conversion.

It is a pleasure to be able to correspond with you. I hope that we may have an opportunity, at some future date, to discuss our mutual interests, either in your nation or in mine.

Sincerely yours,

151

B. R. RYAN  
Captain, U. S. Coast Guard  
Chief, Aids to Navigation Division  
By direction of the Commandant

Copy to:  
CAPT J. B. SPEAKER, JR. - Commander, Far East Section ✓  
Commander, 14th Coast Guard District (o) ✓

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WJ	AN
W. R. FEARN:cec	

4-19-66

683  
RCVD MAY 19 1966 OAN

# MARITIME SAFETY AGENCY

2-CHOME, KASUMIGASEKI, CHIYODA-KU, TOKYO, JAPAN



14 May, 1966

Captain B. R. RYAN  
Chief, Aids to Navigation Division  
Commandant  
U.S. Coast Guard  
Washington D.C.

Dear Captain Ryan:

I have received your letter of April 25 1966, concerning the new Loran-A rate in Northern Pacific Ocean.

Many aviation companies-JAL, SAS etc. and Japanese fishery companies request to strengthen the Loran-A service in Northern Pacific Ocean.

We are sure that in spite of existence of Loran-C and usable time limitation, it is not uneconomical to provide the new line of position in this area and so I am unable to agree with your opinion.

Japanese Government is seriously investigating to use the Navigation Satellite for providing the service in this area, but we have an intention of strengthening of the Loran-A service for our economical reason.

During the period from the 22 April up to the 27 April 1966, we observed the signals of Attu Lorna-A station to obtain the data for improving Loran-A service in Northern Pacific Ocean.

Fairly good results have been obtained during night as shown in the Inclusive 1.

Therefore, we are sure that it is possible to synchronize with Attu signals during night directly and to open a new Loran-A rate by using the cesium or rubidium frequency standard during daytime.

ACT	INFO	OAN	DIVISION
	4	CHIEF	<i>[Signature]</i>
	3	ASST	
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		A & V	
		PROJ	
5-1		ELEC 1	<i>[Signature]</i>
	2	ELEC 2	
		ELEC 3	
		PUB	
		N.M.	
		CHARTS	
		ALL	

Also, the results of calculation of the field-strength between these Loran-A stations are shown in Inclusion 2 and these results have almost perfectly agreed with the results of observation.

We would greatly appreciate receiving your opinion on the aforementioned matters.

Yours sincerely,



Hiroshi Kiyono  
Chief,  
Radio Navigation Aid Section

JUL 18 1966

Mr. Hiroshi Kiyono  
Chief, Radio Navigation Aid Section  
Maritime Safety Agency  
2-Chome, Kasumigaseki, Chiyoda-Ku  
Tokyo, Japan

Dear Mr. Kiyono:

Your letter of 14 May 1966 has been considered in detail. A Loran-A link between Attu Island and Ochi Ishi is technically feasible. Listed below are some possible methods of synchronization:

Accepting that sky waves are not very reliable indications of the state of synchronization of a rate and that the procedure for resolving the frequency difference between the master and slave atomic standards will pose a problem, possible methods for initiating a rate between Attu and Ochi Ishi that warrant investigation are as follows:

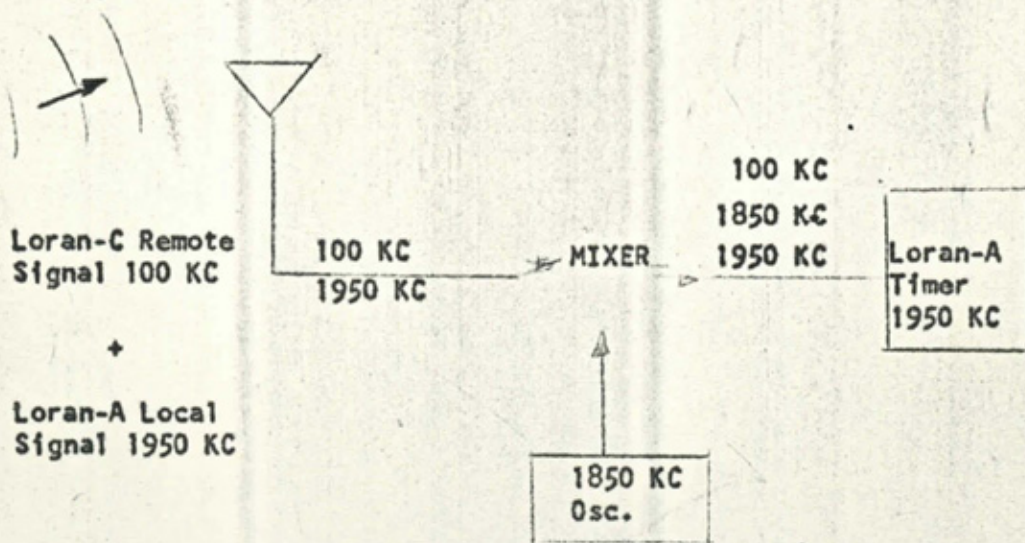
a. The Coast Guard furnish Attu with a simple single rate generator for rate 1L1. This rate generator to be driven by three frequency standards comparable to the Varian 4700D with sufficient back-up and combining/ comparing circuitry to insure that timer jumps will occur infrequently if at all. Rate L1 is proposed because the repetition rate is exactly twice the Loran-C repetition rate at Attu (SL2). This opens up the possibility of synchronizing the Loran-A transmission with those of Loran-C and, therefore, providing another means for monitoring and maintaining synchronization at the slave station (Ochi Ishi). Indicating and automatic synchronizing equipment will not be required at Attu because it will be a free-running master. Likewise, channel 1 is proposed so that no additional transmitting equipment at Attu would be required.

b. The station at Ochi Ishi be configured to operate in a dual role on rates 2S2 and 1L1 using frequency standards for 1L1 comparable to the Varian 4700D. After being initiated, synchronization would be maintained by the inherent accuracy of the standards. Periodic checks on the state of synchronization would be made using one or a combination of the following:

(1) Use of Loran-A Sky waves. As noted in your letter of 14 May, sky waves from Attu are available at Ochi Ishi several hours each day. Although this system is practical, it is felt that its use would degrade the capabilities of the atomic standards.

(2) Retrieval of the Loran-A ground wave signal at Ochi Ishi through some form of integration. Calculations indicate that the ground wave from Attu should be approximately 0.3uv/m at Ochi Ishi. The noise level at this station was calculated to be about 1.0uv/m during the period 0800 to 1200 daily. Two methods are known whereby the ground wave could be retrieved from this noise level. One is through the use of a recorder and seeker-censor unit as used in the modified AN/FPN-30 timer. The second and most economical is through the use of photographic integration. A time exposure (about 30 seconds) of the CRT presentation will result in a photograph showing the Loran-A signal and effectively eliminating the non-synchronous noise associated with it. This method has been used with good results to retrieve signals where the S/N ratio was of the order of 1:4. Use of Polaroid type equipment makes this method of retrieval rapid and relatively inexpensive.

(3) Comparison at Ochi Ishi between the remote Loran-C signal and the local Loran-A signal time difference, with the Loran A & C signals at Attu being synchronized. This would, of course, depend on the quantity and quality of the Loran-C signal from Attu at Ochi Ishi. If the signal strength at Ochi Ishi was adequate, a possible way of obtaining the aforementioned comparison is shown in the following block diagram.



Another possible method which would again depend upon the Loran A & C signals from Attu being synchronized as well as the Loran-C signal condition at Ochi Ishi is by the use of a Loran-C Precision Timing System with the capabilities of the Collins LR-201 system. This system utilizes a timing receiver which will track only one Loran-C signal and provides a synchronizing pulse coincident with the repetition of the signal from a single Loran-C station. Although this method would be more expensive, it is very possible that this system could be built-on to provide automatic synchronization of the proposed rate with accuracy comparable to standard Loran-A rates.



Coast Guard engineers are currently working on a project to develop a rate generator that would be useable at Attu. Rubidium Oscillators are also being evaluated for use with Loran-A.

It is hoped that the above information will be helpful to you. If your Government wishes to seriously consider the possibility of establishing a 1L1 rate between Attu and Ochi Ishi, it is suggested that representatives of your agency meet with Coast Guard representatives at an early date, in order to discuss the matter in depth.

Sincerely yours,



S. E. TAYLOR  
Captain, U. S. Coast Guard  
Acting Chief, Aids to Navigation Division  
By direction of the Commandant

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RCVD AUG 31 1966 OAN

**MARITIME SAFETY AGENCY**

2-CHOME, KASUMIGASEKI, CHIYODA-KU, TOKYO, JAPAN



Captain S. E. Taylor  
Acting Chief, Aids to Navigation  
Division  
U. S. Coast Guard  
Washington, D. C. 20226  
U. S. A.

ACT	INFO	OAN	DIVISION
	4	CHIEF	<i>[Signature]</i>
		ASST	
August 22	1966	PLAN	
		A & V	
		PROJ	
5-1		ELEC 1	<i>[Signature]</i>
2		ELEC 2	<i>[Signature]</i>
3		ELEC 3	<i>[Signature]</i>
		PIB	
		N.M.	
		CHARTS	
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Dear Captain Taylor:

Thank you for your letter of 18 July 1966, in which you made an invaluable suggestion for a new Loran A link between Ochiishi, Hokkaido and Attu Island.

It is earnestly hoped that this new rate be established as early as possible. With reference to your suggestion in the last paragraph of your letter, we are agreeable to hold a meeting between representatives of both sides to discuss the matter. I must, however, inform you that we are bound to use 2L1 as the new rate between Ochiishi and Attu Island, because 1850 KC is the only frequency allocated to Japan under the international scheme.

By the time the proposed new rate is inaugurated, we would like to install two additional transmitters having the same capability as T-138 type transmitters at our Ochiishi Loran A station (2S1-Slave) and Okamasaki Station (2S1-Master) respectively, so that the effective scope of this 2S1 rate may be extended to cover a wider area.


We would appreciate your sending us detailed technical information on each of the following matters;

- a. Data concerning Varian 4700D.
- b. Method by which to recover the ground wave out of noise level;
  - b-1 Method by which to use a recorder and seeker-censor unit for the modified AN/FPN-30 timer.
  - b-2 Data concerning integration by photographs.
- c. Data relative to Loran C precision timing system which has the same capacity as Collins L 201 system.

We would appreciate it if you would let us have the above mentioned information at your earliest convenience, to enable us to study it and base the discussion at the proposed meeting on the result of such study.

It is our hope that the meeting be held in Tokyo in October or November this year. We would also like to be advised of your view on this matter.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Hiroshi Kiyono", with a long horizontal flourish extending to the right.

Hiroshi Kiyono  
Chief  
Radio Navigation Aid Section

SEP 28 1966

Mr. Hiroshi Kiyono  
Chief, Radio Navigation Aid Section  
Maritime Safety Agency  
2-Chome, Kasumigaseki, Chiyoda-Ku  
Tokyo, Japan

Dear Mr. Kiyono:

Your letter of 22 August 1966 requested certain Loran technical information. We believe the enclosed pamphlets will provide most of the answers you seek.

Enclosures (1) and (2) are reproductions of the manufacturer's technical publication on the Rubidium Vapor Frequency Standard V-4700A and the Loran-C Precision Timing System LR-201.

Enclosure (3) is the manufacturer's brochure on another Loran-C Precision Timing System. The Coast Guard is presently evaluating this company's LORCHRON, Model LFT-502 equipment. However, all other available technical information on this equipment is copyrighted and cannot be reproduced without written consent of the Aerospace Research, Inc. You may possibly obtain technical data by writing the company at the address shown on the enclosed brochure.

Enclosure (4) is the Technical Manual for the Modified AN/FPN -30 Loran-A Timer. This will supply the information requested on the method by which the seeker-censor unit is used with the recorder to recover the ground wave out of a high noise level.

In regard to data concerning integration by photographs for use in recovery of the ground wave pulse out of a high noise level, the most comprehensive data available comes from an article in July-August 1966 edition of "Frequency" magazine by J. G. Laughlin, Jr. of Engineering Electronics Company, Santa Ana, California. This data is for the use of photographic integration of Loran-C pulses. By photographing the image of a Loran-C signal on a triggered oscilloscope, it was found that non-coherent noise could be largely eliminated allowing usable pulses to be received 2500 miles from the Loran-C transmitter. When photographing a single pulse, sweep speeds ranging from 10 to 50 micro-seconds per centimeter were used. The required exposure time was not critical. Satisfactory photos of nighttime skywaves at a 12.5 pulse per second rate have been obtained using exposure times of 30 to 120 seconds (375 to 1500 sweeps), while at a 1 pulse per second rate, exposures of 3 to 10 minutes (180 to 600 sweeps) have produced satisfactory images. Loran-C nighttime skywave signals were photographed with good readability in the presence of atmospheric noise peaks having amplitudes ten times the Loran-C pulse peak amplitude.

There is no record of the Coast Guard investigating the photographic integration method precisely for the proposed purpose. However, it was used successfully in a Loran-A skywave investigation entailing elimination of all rates other than the one of interest from the pictures.

In accordance with your request, we would like to send a group of Coast Guard officers to Tokyo to discuss this matter more fully. The preferred date of the meeting with your engineers is Wednesday, 2 November 1966.. If this date is satisfactory to you, please let us know as soon as possible.

Sincerely, yours,

*BR*

B. R. RYAN  
Captain, U. S. Coast Guard  
Chief, Aids to Navigation Division  
By direction of the Commandant

- Encl: (1) V-4700A Rubidium Vapor Frequency Standard Technical Information ✓  
(2) Loran-C Precision Timing System Description ✓  
(3) Brochure on Precision Timing System Description ✓  
(4) Supplement to Technical Manual CG-273-15 for Modified Loran Timer Set AN/FPN-30 ✓

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RCVD OCT 11 1966 OAN

## MARITIME SAFETY AGENCY

2-CHOME, KASUMIGASEKI, CHIYODA-KU, TOKYO, JAPAN



Captain B. R. Ryan  
Chief, Aids to Navigation  
Division  
COMMANDANT (OAN-3)  
U. S. Coast Guard  
Washington, D. C. 20226

5 October 1966

ACT	INFO	OAN	DIVISION
		CHIEF	
		ASST	
		PLAN	
		A & V	
		PROJ	
		ELEC 1	
		ELEC 2	
		ELEC 3	
		ENG	
		HEAT	
		QUARTS	
		ALL	

Dear Captain Ryan:

I have received your letter of 28 September 1966. Your thoughtfulness in furnishing this office with technical information on various matters concerning Loran is greatly appreciated.

In your letter it was suggested that a group of Coast Guard officers be sent to Tokyo to meet MSA technical officers on Wednesday, 2 November 1966 to discuss the proposed Loran A rate between Attu Island and Ochiishi. We are very pleased to learn that and your proposal is most welcome. However, 1 November is our anniversary day commemorating the establishment of the first lighthouse in Japan, and on 2 November we have some more events in connection with the Lighthouse Day. Since 3 November is a national holiday in Japan (Culture Day), it is proposed that the meeting be had, if possible, on or after 4 November.

I would like to be advised of the date of meeting, number of the Coast Guard officers to be present at the meeting, and also of how long they will be able to stay in Tokyo.

It is proposed that the following matters be discussed at this meeting:

- a. Reliability and method of the system using the Rubidium frequency standard.
- b. Augmentation of the transmitting power of Japanese 2S1 rate (Ochiishi -- Okamazaki).
- c. Future trend of Long Range Navigation aids.

We will prepare the following data for our meeting:

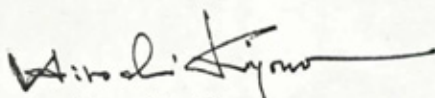
- a. Economical effects of the Attu -- Ochiishi rate and the effects on rescue activities of the same rate.
- b. Data obtained at Ochiishi from the observation of signals from Attu Loran Station.

If there are any additional data you want us to prepare, please inform us at your earliest convenience.

ltr to Captain B. R. Ryan, USCG, Washington, D. C. from Mr. Kiyono

I hope that the proposed matter will be fully discussed between the technical officers of our two organizations and look forward to the day of meeting.

Yours sincerely,

A handwritten signature in dark ink, appearing to read "Hiroshi Kiyono", with a long horizontal flourish extending to the right.

Hiroshi Kiyono  
Chief  
Radio Navigation Aid Section  
Navigation Aid Division



TREASURY DEPARTMENT  
UNITED STATES COAST GUARD

Address reply to:  
COMMANDANT (OAN-3)  
U.S. COAST GUARD  
WASHINGTON, D.C. 20226

2 DEC 1966

• From: Commandant  
To: Commander, Seventeenth Coast Guard District  
  
Subj: Report of meeting with Japanese MSA concerning Loran-A link with Attu  
  
Ref: (a) Commandant (OAN) letter dated October 19, 1966

1. Coast Guard representatives met with representatives of the Japanese MSA on 4 November 1966 to discuss the technical and operational aspects of a possible Loran-A link between Attu Island, Alaska and Ochiishi, Hokkaido, Japan. Various methods of control and synchronization were discussed, and it was agreed that both Coast Guard and MSA would conduct further studies and meet again in Tokyo in May or June 1967 to continue our feasibility study.
2. EEC Wildwood, N. J. has been tasked to produce a monitor program for LORSTA Attu. The complete program, along with any necessary test equipment, will be forwarded to you as soon as it is ready.
3. In the event that our tests confirm feasibility of the proposed new Loran-A rate, it would be desirable to have a member of your staff accompany the Commandant's party to Tokyo for the next meeting with MSA. Details of this meeting will be worked out at a later date.
4. Due to the uncertain status of this proposal, it was agreed jointly by the MSA and Coast Guard representatives that no press releases would be made at this time.

F. V. HELMER  
Chief, Office of Operations





CCGD 17

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OFFICE  
DISTRICT COMMANDER  
1ST DISTRICT

11153/831

MAR 1 0 1967

Mr. Hiroshi Kiyono  
Chief, Radio Navigation Aids Section  
Maritime Safety Agency  
2-Chome, Kasumigesaki, Chiyoda-Ku  
Tokyo, Japan

Dear Mr. Kiyono:

Reference is made to the USCG-MSA meeting hold in Tokyo on 4 November 1966 regarding the proposed new Loran-A rate between Ochi-Ishi and Attu. At that time, the Coast Guard indicated its intent to gather field strength measurements of the Ochi-Ishi Loran-A signal at Attu.

As presently planned, we will perform field strength measurements at Attu for a short interval during April 1967. Primarily, the purpose of this program will be to determine the existence of measurable Ochi-Ishi Loran-A signals at Attu and measure field strength of these signals.

If these measurements are successful, a technique will be developed and implemented to measure and record variations in sky wave delay of Ochi-Ishi Loran-A signals and to measure and record field strength of these signals. Special techniques will be required to perform this latter program. For example, atomic oscillators may be required at Ochi-Ishi and at Attu. Since Ochi-Ishi is a slave to Okamasaki, it may be preferable to furnish an atomic oscillator to Okamasaki instead of Ochi-Ishi and make all measurements using the Okamasaki Loran-A signals. To do this, it must be assumed that measurements of the Okamasaki signals will be representative of the Ochi-Ishi measurements. This assumption is reasonable. Assistance of your Government may be desired to implement this portion of the program.

This is a fairly ambitious program, but the Coast Guard considers it to be worthwhile. It is clear that the program can not be completed in time for the proposed second technical meeting to be held during May-June 1967. Therefore, it is recommended that this meeting be indefinitely postponed, possibly to be scheduled for fall 1967.

The Coast Guard will keep MSA informed of developments in this project. If any further details of the project are desired, the Coast Guard will furnish them on request, insofar as they are known.

Sincerely yours,

G.C. FLEMING, CAPT., USCG  
Chief, Electronics Engineering Division  
By direction of the Commandant