

CHANGE NO. 16 TO H.O. PUB. 117B

24 June 1967
(Including N. M. 25, 1967)

RADIO NAVIGATIONAL AIDS

PACIFIC AND INDIAN OCEANS AREA

Published by the U. S. Naval Oceanographic Office under
the authority of the Secretary of the Navy.



United States
Government Printing Office
Washington: 1967

SUGGESTED PROCEDURE FOR USING THIS CHANGE

1. Remove wire fastener.
2. Separate "List of Effective Pages" from remaining Change Pages.
3. Check completeness of Change by comparing Change Pages with List of Effective Pages.
4. Using List of Effective Pages as a guide, insert each Change Page in its proper place in the book, first removing the obsolete page being replaced. Set obsolete pages temporarily aside.
5. From the obsolete pages previously set aside, transfer the Notice to Mariners dated later than the date of this Change to the corresponding replacement pages.
6. Record application of this Change on the Record Page in the front part of the book.
7. U.S. Naval ships not equipped with radio direction-finder capability are not required to maintain or correct Chapters I and II of H.O. Pub. Nos. 117A and 117B.

H. O. PUB. NO. 117B
RADIO NAVIGATIONAL AIDS

RECORD OF CHANGES TO H.O. PUB. NO. 117B

Change No.	Effective date	Inserted by:	Remarks
#4	5/23/64	<i>[Signature]</i>	
#5	8-22-64	<i>F. Pittsney</i>	
#6	11-21-64	<i>Long E. Pittsney</i>	
#7	4-1-64	<i>[Signature]</i>	
#8	4-24-65	<i>T. Pittsney</i>	
#9	8/28/65 12-27-65	<i>D. Fenley</i>	
#10	12-18-65	<i>M. Porey</i>	
NM 41-46	11/30/65	<i>Shadesworth</i>	
#12	8/17/66	<i>D. W. Hubbard</i>	
NM 33/66	25/9/66	<i>K. LaRose</i>	
#13	12-23-66	<i>C.B.L.</i>	
14	11-19-66	<i>GB</i>	
15	15 APR 1, 1967	<i>R.S.</i>	
16	24 June 1967	<i>v.l.</i>	

H. O. PUB. NO. 117B RADIO NAVIGATIONAL AIDS

RECORD OF NOTICE TO MARINERS CORRECTIONS

Corrective material affecting this publication will be published, as received, in a Section II "CORRECTIONS TO H.O. PUB. NO. 117B, RADIO NAVIGATIONAL AIDS" of Part II of the weekly Notice to Mariners.

In order that there may be no doubt concerning the date to which the book is corrected it is recommended that the navigator, or the assistant to whom this duty is delegated, use the following columns as a record, placing his initials against the number of each Notice as it is used.

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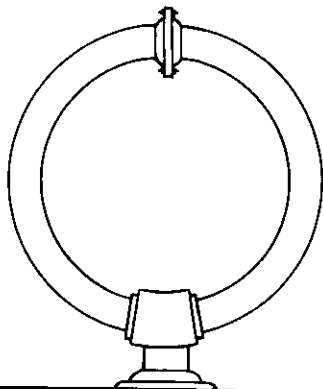
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Including N.M. 21/64
May 23, 1964

(Chg 4)

XIV



CAUTION

Plans for air defense of the Continental United States may require temporary suspension of the operations of certain electronic aids to navigation with little or no advance notice.

RADIO NAVIGATIONAL AIDS

PACIFIC AND INDIAN OCEANS AREA

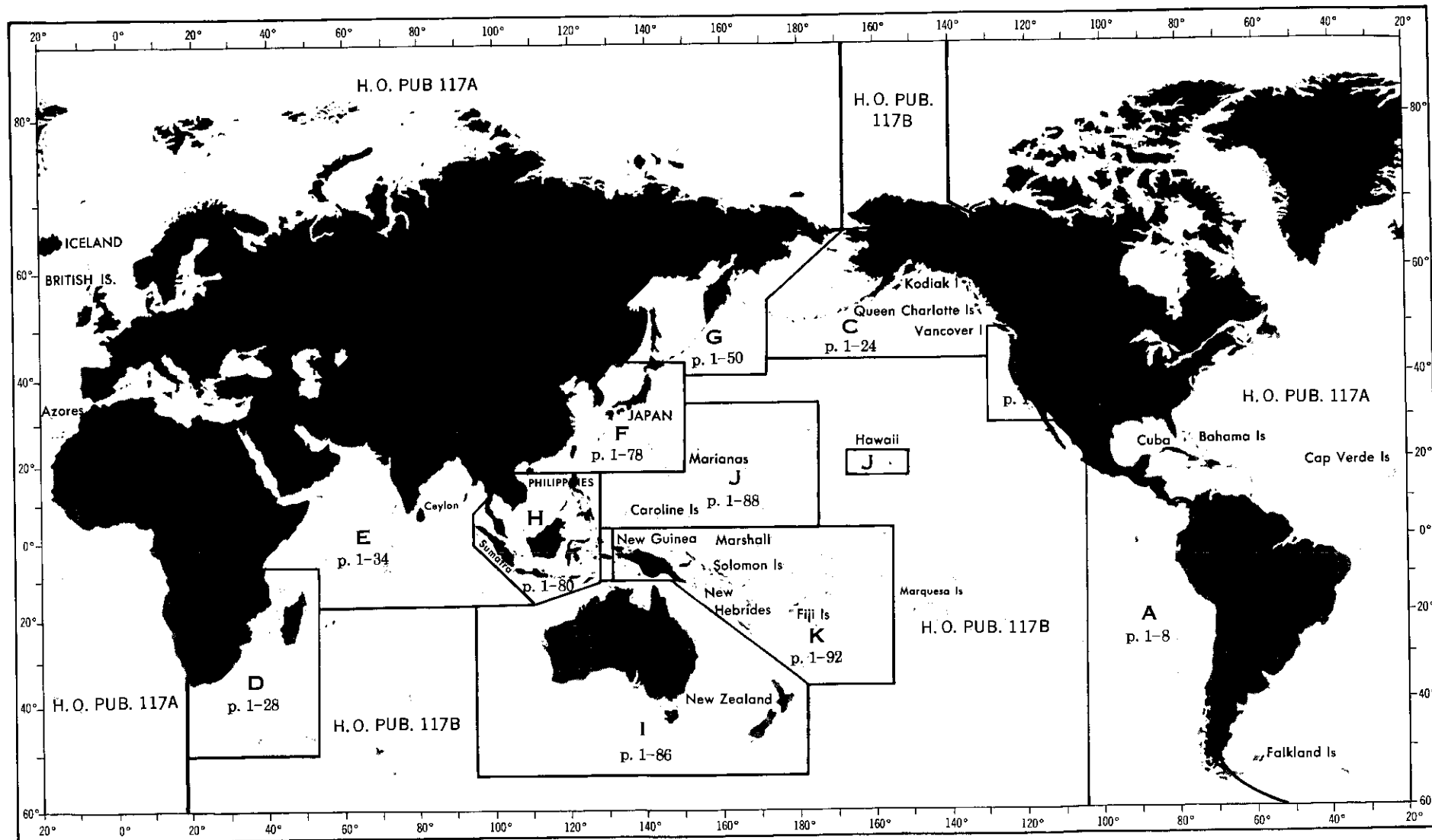
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the authority of the Secretary of the Navy.



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Each change50

AREA INDEX



H. O. PUB. NO. 117B
RADIO NAVIGATIONAL AIDS

PREFACE

This publication, H.O. Pub. No. 117B, Radio Navigational Aids, contains a list of radio stations throughout the Pacific and Indian Ocean Area which perform services of value to navigators upon the high seas and their adjacent waters, detailed and general information concerning such services, and international and various national regulations on the subject.

Information on radio weather broadcasts in this area are found in H.O. Pub. No. 118B, Radio Weather Aids, Pacific and Indian Oceans, which contains a section of plain language weather broadcasts entitled "Marine Broadcasts". These uncoded "Marine Broadcasts" may be used without special training in meteorology.

This publication is not intended to duplicate or replace the service documents with which ships must be provided in compliance with regulations of the International Telecommunication Union, Geneva, 1959.

The arrangement of the radio stations and the method of cross-referencing in this publication has no political significance.

The following papers and publications with subsequent supplements and notices were consulted in the preparation of this book:

Circular Letters of the International Hydrographic Bureau.

International Lists of Radiotelegraph Stations (Geneva) and Stations Performing Special Services.

International Telecommunication Union, Geneva, 1959.

International Conference on Safety of Life at Sea, London, 1948.

International Code of Signals, 1931.

Admiralty List of Radio Signals (British Hydrographic Department), Vols. I, II, and Vol. V.

Radio Aids to Marine Navigation, Pacific (Ottawa).

Radiosignaux (a l'usage des navigateurs) (Paris).

Radio service bulletins (U.S. Federal Communications Commission).

Light List (U.S. Coast Guard)

Lista de Fariois, Boias Lyminosas, Radiofarois, Sinais de Nevoerio (Lisboa).

List of Japanese Ship and Coastal Radio Stations (Tokyo).

Radio Ayudas a La Navegacion (Valparaiso).

Aeronautical Radio Facility Charts.

USAF/USN Flight Information Publication

Japanese Light List.

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RADIO NAVIGATIONAL AIDS

EXPLANATORY REMARKS

Arrangement of Publication.—The publication is divided into chapters according to the nature of the service performed by the radio stations. Each chapter contains, first, general information on the service rendered, and, second, the list of stations. The first numeral (hundreds digit) of section numbers of text and the first numeral (thousands digit) of station numbers correspond to the chapter number. In each chapter the stations are arranged, in general, in geographic order so that the mariner may readily determine which of several stations in his vicinity renders services most suited to his immediate needs. In the index to radio stations at the back of the volume, the stations are arranged alphabetically by name, and the nature of the services which they render is indicated by the thousands digit of the station number or numbers.

Terminology.—Except where otherwise stated, all times in this book are Greenwich mean times and are expressed in four-figure notation, the first two figures denoting the hour and the last two figures the minutes. The term "Greenwich mean time" means the civil mean time of the meridian of Greenwich, with the day starting at midnight and the time reckoned from 0000 to 2400.

Some stations do not transmit on certain days, such as Sundays and holidays; these days are determined by the local standard time at the stations. When they do transmit the times of transmission listed in this book are Greenwich mean times.

The positions of radio stations for which no coordinates are given in this publication may be found in the List of Coast Stations and Ship Stations published by the Bureau of the International Telecommunication Union.

All bearings are true and are measured in degrees clockwise from 0° (true north) to 360°. The sectors of radio direction-finder stations are given as looking from the station to seaward in accordance with international practice; the reverse of the method used in H.O. Light Lists for expressing the sectors of lights.

The frequencies of radio waves are expressed in kilocycles or megacycles and the type of wave may also be indicated.

When the term "plain language" is used in the description of the services rendered by a station it signifies that the service is in the language of the country controlling the station, unless the language is stated to be otherwise.

Errors and Omissions.—In the interest of safety of navigation, mariners and others are requested to notify the United States Naval Oceanographic Office, Washington, D.C. 20390, or any of its branch offices, of any errors which they may discover in this publication or of any additional matter which they believe should be included.

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Publications Abbreviations¹.—The following is a list of abbreviations frequently used in the text of this publication.

A0—Continuous wave.
A1—Continuous wave, unmodulated.
A2—Continuous wave, modulated at audible frequency.
A3—Continuous wave, modulated by voice or music.
F3—Continuous wave, frequency modulated by voice or music.
kc/s—Kilocycles (frequency).
kW—Kilowatts.
G.M.T.—Greenwich Mean Time.
Z.T.—Zone Time.
U.T.—Universal (G.M.T.) Time.
h.m.s.—Hours, minutes, seconds.
Lat.—Latitude.
Long.—Longitude.
min.—Minutes (time).
sec.—Seconds (time).
W—Watts.
Mc/s—Megacycles (frequency).
c/s—Cycles per second.
Gc/s—Gigacycles per second.

¹For abbreviations used in communication service see page 9-2.

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NOTICE

PROCEDURES FOR CORRECTING THIS PUBLICATION

In order to keep H.O. Pub. 117B corrected, consecutively numbered sets of loose-leaf pages called "Changes" are published at appropriate intervals by the U.S. Naval Oceanographic Office. The publication of each Change will be announced in the weekly Notice to Mariners. Between the date of the first Change and subsequent Changes, additional corrective material will be published as necessary in Section IV of the weekly Notice to Mariners. Such corrections should be cut out and pasted over the items being corrected.

Change pages must be inserted in accordance with the "List of Effective Pages" included in each Change. New change pages supersede the obsolete pages they replace, including interim corrections from the Notice to Mariners dated before the date of the Change. Corrections from the Notice to Mariners dated later than the Change must be transferred to the corresponding new change page.

Changes are not cumulative, i.e. Change No. 2 will not automatically supersede Change No. 1 etc., and each Change must be applied in numerical order as it is published. Individual change pages from any Change remain in effect until actually replaced by a corresponding change page from a later Change, regardless of the consecutive numbers of the Changes involved. The "List of Effective Pages" included with each Change, however, is cumulative and the "List" in the latest Change supersedes all previous "Lists". This simplifies the application of change pages from several Changes at once, as is the case when persons acquire this volume after more than one Change has been published. Only the "List" from the latest Change shows the pages that are still effective in each of the Changes on hand. Only these still effective pages need to be applied; the obsolete change pages can be immediately discarded.

A change becomes cancelled if all change pages are eventually replaced by later Changes. The List of Effective Pages of each Change lists previous Changes remaining in effect, and which are needed, either wholly or in part, to keep this volume corrected.

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LIST OF EFFECTIVE PAGES
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This volume with Change Nos. 10, 11, 12, 13, 14, 15, and 16 inserted is corrected through Notice to Mariners No. 25 of 1967.

This list supersedes any previous list. It lists each page that belongs in the publication and guides in the application of change pages. Only "odd" page numbers are listed. Their reverse sides, or "even" pages, are taken for granted unless otherwise noted.

Changes Required to Correct This Publication

Changes	Latest N. M. Used		Remarks
	No.	Date	
8	17	4/24/65	Canceled by Chg. 16 Canceled by Chg. 16
9	35	8/28/65	
10	51	12/18/65	Includes new index
11	6	2/5/66	
12	22	5/28/66	
13	37	9/10/66	
14	47	11/19/66	
15	15	4/15/67	
16	25	6/24/67	

Examples and Explanations of Listed Page Numbers

- 1-17 (Chg. 15) Change page from Change No. 15. It replaces Change No. 14 to page 1-17. Only "odd" pages are so designated, even when actual correction occurs on reverse side.
- 1-76a (Chg. 12) Additional page from Change No. 12. It is to be inserted after page 1-76. Pages 1-76b, 1-76c, etc., if applicable, follow in alphabetical order.
- 2-9(Rev. Blank)(Chg. 14) Page on which the reverse is blank.

To be correct through Change No. 16, this publication must contain the following pages:

- | | |
|-------------------------------|----------------------------|
| Title Page | IX Contents |
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Chapter 1

RADIOBEACONS

100. RADIO DIRECTION-FINDER SETS ON SHIPS

Radio direction-finder sets on board ship enable bearings to be taken of transmissions from other ships, aircraft, and shore stations, marine radiobeacons, and the coastal stations of the radio communication network. When located in the pilot house or on the navigating bridge, the direction-finder enables the navigating officer to obtain bearings himself without reference to others and without delay.

Due to the great value of radio bearings, particularly when visibility is poor and when sights of heavenly bodies cannot be obtained, the radio direction-finder on board ship deserves the same consideration and care as are given to the sextant and compass. It has the following characteristics in common with the two latter navigational instruments: the readings are subject to certain errors; these errors may be reduced by skillful and intelligent operation; the dangers of using erroneous readings may be greatly reduced by the intelligence and good judgment of the mariner. In order to acquire experienced judgment in the operation of the instrument, it is essential that the mariner himself use it as much as practicable.

Troubles from interference and weak signals are greatly reduced by the use of direction-finders of proper selectivity.

The bearings given by the set are relative bearings and the true bearings are obtained by applying the ship's heading to the bearings taken. On some ships the set is mounted over the ship's compass so as to permit the bearings to be read directly from the compass card. In either case the bearings must be corrected for radio deviation as shown by the calibration curve of the sets.

100A. Types of Radiobeacons

1. Directional radiobeacons which transmit radio waves in beams along fixed bearings.
2. Rotating radiobeacons by which a beam of radio waves is revolved in azimuth in a manner similar to the beam of light sent out by rotating lights. (See sec. 100H.)
3. Circular radiobeacons which send out waves of approximately uniform strength in all directions so that ships may take radio bearings of them by means of the ship's radio direction-finder sets. This is the most common type of radiobeacon.

To extend the usefulness of marine radiobeacons to ships and aircraft employing automatic radio direction-finders, U.S. marine radiobeacons on the Atlantic and Pacific Coasts have been modified to transmit a continuous carrier signal during the entire radiobeacon operating period with keyed modulation providing the characteristic signal. Unless a beat frequency oscillator is installed, the continuous carrier signals are not audible to the operator of an aural null direction-finder. A ten-second dash has been included in the characteristic of these radiobeacons, to enable the navigator using a conventional aural null direction-finder to refine his bearing. Vessels with direction-finders will be able to use the United States radiobeacons located on the Great Lakes, Atlantic and Pacific Coasts at any time in their assigned sequence.

100B. Aeronautical Radio Aids

Aeronautical radiobeacons and radio ranges are often used by navigators of marine craft in the same manner as marine radiobeacons for determining lines of positions. They are particularly useful along coasts where marine broadcast coverage is inadequate. Aeronautical aids situated inland become less trustworthy, so far as ships are concerned, when high land intervenes between them and the coast (see sec. 200A). They are established to be of primary usefulness to aircraft, and surface craft should use these aids with caution.

AERONAUTICAL RADIOBEACONS. Like marine radiobeacons, these aids broadcast a characteristic signal on a fixed frequency at specified times unless noted otherwise.

AERONAUTICAL RADIO RANGES. The signal system of a typical radio range is illustrated in the figure below. The four bearings, in this case 252° , 345° , 072° , and 165° , each mark the middle of a sector about 3° wide to the average ear in which the broadcast of the station is heard as a steady monotone. These sectors are commonly called range legs, and the monotone is formed by the interlocking or meshing of the "N" and "A" quadrant signals. Between the range legs are four

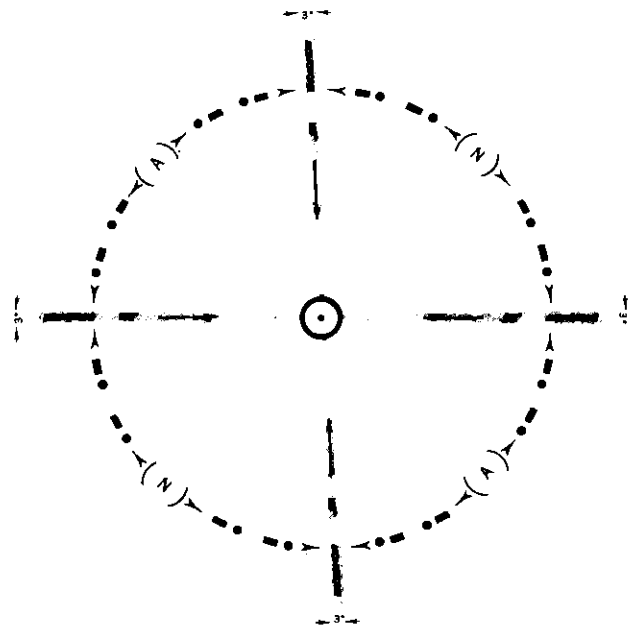


FIGURE 3. RADIO RANGE DIAGRAM

sectors, commonly called quadrants, in which, as the figure shows, either "N" or "A" is heard. In the U.S. system the letter "N" is always heard in that quadrant which contains the

(true) north point of the horizon. In practice, it will usually be found that in positions near the range legs, in what is sometimes called the "twilight" zones, the quadrant signal "A" or "N" will be heard simultaneously with the monotone.

The range signals are interrupted at intervals to permit broadcast of the identification signal. In aviation publications the range leg bearings are most often given as magnetic bearings toward the station; in this publication they are given as true bearings toward the station. Unless otherwise stated in the station details, aeronautical Radio Aids mentioned in this publication transmit continuously.

NOTE: Mariners are advised that changes to and deficiencies in aviation radio facilities may not always be made immediately available to maritime interests and the positions are approximate and may be listed to the nearest minute only.

100C. Obligations of Administrations Operating Radiobeacons

The obligations of nations and other administrations operating radiobeacons are given in Article 43 of the Radio Regulations of the International Telecommunication Union, Geneva, 1959. (See sec. 200B.)

100D. Accuracy of Bearings Taken Aboard Ship

No exact rules can be given as to the accuracy to be expected in radio bearings taken by a ship as the accuracy depends to a large extent upon the skill of the ship's operator, the condition of the ship's equipment, and the accuracy of the ship's calibration curve. Mariners are urged to obtain this information by taking frequent radio bearings when their ship's position is accurately known and by recording the results. Normally, United States radiobeacons are operated in a group of six, each station in a group using the same frequency and transmitting for one minute in its proper sequence, and operate during all periods, either sequenced or continuously, regardless of weather conditions.

SKILL OF OPERATOR: Skill in the operation of the radio direction-finder can be obtained only by practice and by observing the technical instructions for the set in question. For these reasons the operator should carefully study the instructions issued with the set and should practice taking bearings frequently.

OPERATOR'S ERROR: As the operator obtains bearings by revolving the direction-finder coil until the signal disappears or becomes a minimum, the operator can tell by the size of the arc of silence or of minimum strength approximately how accurately he has taken the bearing. For instance if the minimum is broad and the residual signal covers about 10° with equal strength, it is doubtful if the bearing can be accurately estimated. On the other hand, if a sharp minimum can be obtained, the operator can determine the bearing to within a half of a degree.

CAUTION: This error is in addition to those due to other causes.

In this connection it should be noted that a properly operating and correctly adjusted direction-finder should in no case produce other than a point or arc of absolute silence. That is, there should be no "residual" signal at the point or arc of observation. The sharpness and completeness of the arc of silence are the best indications of a properly operating direction-finder, and their absence is the best indication of the presence of "night effect."

SUNRISE, SUNSET, OR NIGHT EFFECT: Bearings obtained from about half an hour before sunset to about half an hour after sunrise may be subject to errors due to night effect. On some nights this effect is more pronounced than on others and the effect is usually greatest during the hours of twilight. Night effect may be detected by a broadening of the arc of minimum signals and by a fluctuation in the strength of the signals. It may also be indicated by difficulty in obtaining a minimum or by a rapidly shifting minimum. It is sometimes accompanied by an actual shift in the direction of the bearings. If it is essential to obtain a bearing when the night effect is pronounced, several bearings should be taken over a short period of time and an average taken of them.

SHIP'S COMPASS: The ship's compass must be read at the instant that the bearing is taken or an error may be introduced equal to the amount that the ship has yawed in the interval between taking the bearing and reading the compass. Any error in the ship's compass must be applied to the bearing.

RECIPROCAL BEARINGS: In some direction-finder sets, the operator cannot tell from which side of the ship the signals are coming. With these sets the operator should correct both bearings for their respective deviations and give both corrected bearings to the person who is plotting the bearings on the chart. If the mariner is in doubt as to the side of the ship from which the bearings are coming, he can usually solve this difficulty by having another bearing taken after the ship has steamed a short distance and noting in which direction the bearing is changing.

CALIBRATION: It is essential that the radio direction-finder be accurately calibrated in order that the bearings may be corrected for deviation. While the bearings are being taken other radio antennas on board must be in the same condition as they were when the calibration was made; movable parts of the ship's superstructure such as booms, davits, wire rigging, etc., must be secured in the positions which they occupied when the direction-finder was calibrated. Unusual cargoes such as large quantities of metals and extraordinary conditions of loading may cause errors.

The direction-finder should be recalibrated after any changes have been made in the set or its surroundings (this includes alterations to or changes in position of antennas, wire rigging, boat davits, booms, etc.), whenever there is reason to believe that the previous calibration has become inaccurate, and also at periodic intervals.

The calibration must be made on approximately the same frequency or frequencies as will be used to take bearings because the deviation for several frequencies is not likely to be the same. It is believed that one calibration curve is satisfactory for the normal radiobeacon frequency (285 to 329 kc.); but the instructions issued by the manufacturer of the particular direction-finder in question should be studied in this connection.

To facilitate the calibration of ship's direction-finders, special arrangements have been made by some services for operation of their radiobeacons at times other than their published schedules. Information as to the arrangements made by the United States stations in this respect is as follows:

Sequenced radiobeacons cannot broadcast at any time other than on their assigned operating minute for the purpose of enabling vessels to calibrate their radio direction finders without causing interference. Special radio direction finder calibration transmitters of short range are operated at certain localities to

provide continuous calibration service. These stations with information as to position, frequency, characteristic, etc., are listed in Chapter I.

The position given for the antenna is the point from which the radiobeacon signal is emitted.

If it is not practicable to determine the time of calibration sufficiently in advance to contact the district commander, request may be made directly to the stations by means of telephone, telegraph, or a whistle signal consisting of three long blasts followed by three short blasts, this whistle signal to be repeated until it is acknowledged by the station through the starting of the transmitter. The same group of signals should be sounded at the termination of calibration.

If attention of station personnel is not attracted by the whistle signals, hoist the international code signal, J over K, to indicate request for radio direction finder calibration.

The work of the station personnel is not confined to standing watch and there may be times when the whistle request for calibration is not immediately heard, due to the noise from operating station machinery, etc. Usually, a repeated signal not too far from the station will attract attention.

"COMPENSATED" RADIO DIRECTION-FINDERS: Many radio direction-finders are "compensated" and no calibration chart or curve is used. Attention is invited to the fact that such compensation is just as vulnerable as the calibration data due to changes made in the set or its surroundings.

CHECKING THE CALIBRATION: The calibration of compensation should be checked frequently by taking bearings when the ship's position is accurately known and the results should be recorded for future reference.

CALIBRATION RADIOBEACONS: In the United States and certain other areas special radiobeacons, primarily for calibrating shipboard direction-finders, are in operation. These radiobeacons transmit either continuously during scheduled hours or upon request, as indicated in station details.

COASTAL REFRACTION (OR LAND EFFECT): Errors may be expected in the case of radio bearings taken by ships so located that the line of observation to the radiobeacon passes over land or along the shore line. However, many observations seem to indicate that such errors are negligible when the observing vessel is well out from the shore. Bearings secured entirely over water areas are to be preferred since "land effect" is thus eliminated. Bearings taken at sunset and sunrise are likely to be erratic, and observations taken at these hours should therefore be repeated and checked as may be feasible.

PROGRAM BROADCASTING STATIONS: Before taking bearings on a station broadcasting entertainment programs, a mariner should consider that its frequency may differ widely from the frequency for which his set is calibrated, that the published location of the station may be that of its studio and not that of its transmitting antenna, that if the station is synchronized with other stations it may be impossible to tell on which station the bearing was taken and that as the majority of these stations are inland the coastal refraction may be excessive.

100E. Station Details

FREQUENCY: The frequency listed is that used by the station in transmitting its "Characteristic Signal." Calling frequencies, if any, will be given under "remarks".

RANGE: In this book the range of radiobeacons is only approximate and is given merely to assist mariners in planning their voyages and to inform them which of several radiobeacons they will probably hear first. Frequently, when conditions for radio reception are good, radiobeacons may be heard at greater distances than indicated. The mariner who is at a greater distance than the range indicated should attempt to obtain bearings when necessary, and not assume that the radiobeacon will be unheard beyond its indicated range.

GROUP SEQUENCE: Selected radiobeacons are grouped together on the same operating frequency and are assigned a specific sequence of transmission within this group. This reduces station interference and unnecessary retuning.

ANTENNA LEAD-IN: Included in the details of many radiobeacons located at or near light stations is a statement of the distance and bearing of the radiobeacon transmitting antenna from the light tower. Use should be made of this information when calibrating the ship's direction-finding equipment (*see sec. 100D.*) by means of simultaneous visual and radio bearings.

100F. Plotting Radio Bearings

The procedure for converting radio (great circle) bearings as received by direction-finder equipment aboard ship is identical with that used in converting radio bearings supplied by direction-finder stations on shore and is described in section 200D "Plotting Radio Bearings."

100G. Synchronization for Distance Finding

At some radiobeacon stations, sound signals, either submarine or air or both, are synchronized with the radiobeacon signals for distance finding. Ordinarily, the sound signals do not operate during the transmission period of the radio signal in clear weather. The methods in use employ, as a rule, distinctive signals to indicate the point of synchronization, and make use, for determining distance, of the lag of signals traveling through air or water as compared to the practically instantaneous travel of the radio signals.

In the case of some sound signals, a series of short radio dashes is transmitted at intervals following the synchronizing point, so that by counting the number of short dashes heard after the distinctive radio signal, and before hearing the corresponding distinctive sound signal, the observer obtains his distance, in miles equal to the number of dashes counted, from the sound signal apparatus unless stated otherwise.

In the case of other signals, the observer notes the number of seconds intervening between the reception of the distinctive radio signal and the corresponding sound signal and uses a factor to determine distance in miles as follows:

Submarine signals, multiply the observed number of seconds by 0.8 or divide by 1.25 for distance in nautical miles.

Air signals, multiply the observed number of seconds by 0.18 or divide by 5.5. For more approximate results or for statute miles, multiply the observed number of seconds by 0.2 or divide by 5.

Table for finding distance

Interval in seconds	Distance in nautical miles from sound signal source	
	Air	Submarine
1	0.18	0.8
2	.36	1.6
3	.54	2.4
4	.72	3.2
5	.90	4.0
6	1.08	4.8
7	1.26	5.6
8	1.44	6.4
9	1.62	7.2
10	1.80	8.0
20	3.60	16.0
30	5.40	24.0
40	7.20	
50	9.00	
60	10.80	

REMARKS: Average speed of sound travel in water is 1 nautical mile in $1\frac{1}{4}$ seconds.

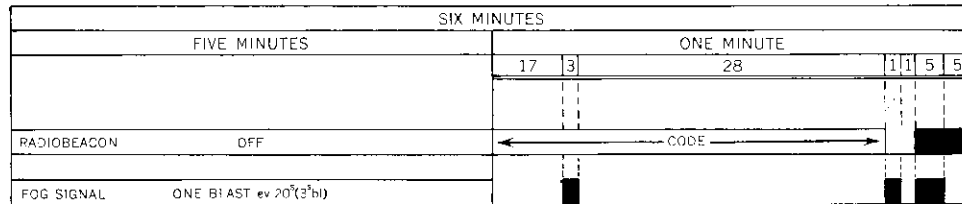
The speed of sound travel is influenced by a number of conditions making it impracticable to state a factor that will give exact results under all conditions. The results obtained by the methods described may be accepted as being accurate to within 10 percent of the distance.

Methods of synchronizing the signals vary and are described or illustrated in official announcements regarding them. It is essential to carefully note the point of synchronization used so no error will be made by taking time on the wrong signal or the wrong part of the signal.

In observing air signals it is usually sufficient to use a watch with a second hand, although a stop watch is helpful. For submarine signals where the interval is shorter and a time error correspondingly more important, it is essential that a stop watch or other timing device be used. Where the radiobeacon and submarine signals are not received at the same point on the vessel, means of instant communication between two observers should be available or synchronized stop watches provided for each.

Ships not equipped with a DF receiver can take advantage of the distance-finding feature of a radiobeacon station if equipped with a radio-receiver capable of receiving the transmission. In the case of obtaining distance from a radiobeacon station which is synchronized with a submarine sound signal, the ship must also be equipped with a device for picking up submarine sound signals.

An example of the synchronized signals of United States distance finding stations on the Great Lakes, Atlantic and Pacific Coasts appears below:



The beginning of the ten-second radio dash and the beginning of the five-second fog blast are synchronized.

NOTE The observer may take the time from hearing the first part of the long radio dash to the instant of observing the corresponding long blast of the fog signal.

100H. Rotating Loop Radiobeacon

MODE OF OPERATION: (1) The radiobeacon consists of a rotating loop transmitter having directional properties by which an observer can obtain his bearing from the beacon without the use of a direction-finder. Any ordinary receiving set capable of being tuned to the radiobeacon frequency may be used. The only other equipment required is a reliable stop watch or chronograph with a sweep second hand. Stop watches and clocks with dials graduated in degrees may be used, from which bearings may also be read off directly without any mathematical calculation.

(2) During each revolution of the beacon, the signals received by an observer will rise and fall in intensity, passing through a maximum and a minimum twice each minute. The positions of minimum intensity, which occur at intervals of thirty seconds from one another, are very sharp and can be accurately observed. These are, therefore, used for navigation purposes.

The beacon may be regarded as having a line or beam of minimum intensity which rotates at a uniform speed of 360° in 1 minute (i.e. 6° in 1 second) based on the true meridian as a starting point. Therefore, if the observer can (a) identify the beacon and (b) measure the number of seconds which this minimum beam takes to reach his position starting from the true meridian, this number multiplied by six will give his true bearing from the beacon or its reciprocal.

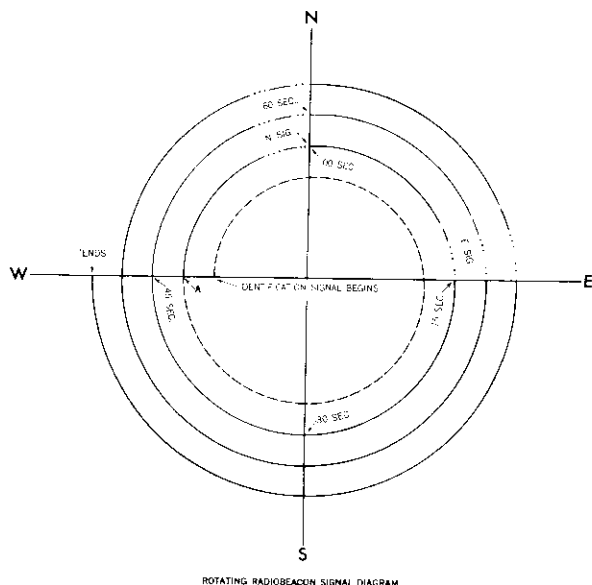
The signals which enable the beacon to be identified and the bearing to be calculated are described in the following paragraphs:

Signals transmitted by the beacon: Each transmission from the beacon lasts for 4 minutes; the beacon is then silent for 8 minutes, and automatically starts again at the end of the silent period. Each transmission consists of two parts: (a) the identification signal of the station set at a slow speed for the first

minute, commencing when the minimum beam is true east and west and followed by a long dash of about 12 seconds' duration; (b) the signal group commencing when the minimum beam is approaching the true meridian, and consisting of (i) the north starting signal, which is the letter V followed by two dots (•••• ••); (ii) a long dash of about 12 seconds' duration; (iii) the east starting signal, which is the letter B followed by two dots (•••• ••); and (iv) a long dash for about 42 seconds.

The navigation signals are repeated during the remainder of the transmission and signals cease when the minimum beam is in the east and west position.

A diagram showing the signals used and brief directions for taking bearings is given below.



INSTRUCTIONS FOR TAKING BEARINGS

- (i) Set stop watch to zero.
 - (ii) Listen for identification signal.
 - (iii) When the first long dash begins (at A on diagram above) get ready for the "north signal."
 - (iv) After the "north signal", start stop watch exactly at beginning of long dash (see "00 seconds" on diagram above) counting one-two with the two preceding dots, and 3 for the start of the stop watch.
 - (v) Listen for minimum and note its exact time by stop watch.
- NOTE: If stop watch is graduated in degrees note exact angle, which is the bearing.
- (vi) Multiply the number of seconds by 6° for bearing.
 - (vii) Determine whether bearing is direct or reciprocal.
 - (viii) If the "north signal" is faint use the "east signal", but add 090° to final bearing.

Particular attention is directed to the following:

- (a) The stop watch must be started exactly at the beginning of the long dash for each series of observations.
- (b) The time of occurrence of the minimum must be read to the nearest fifth of a second.

- (c) The bearing obtained will be either the direct bearing or its reciprocal.
- (d) When using the east signal add 090° to obtain bearings from true north.
- (e) The beacon is set up on the true meridian, and no correction is required for magnetic variation.
- (f) No quadrantal error arises, and no corrections are necessary except as in (c) and (d) above. (A correction must, of course, be made for convergency; this should be applied as if the beacon were a shore radio direction-finder station.)
- (g) A comparatively large error of bearing may occur due to inaccuracy in the stop watch, and to obviate this, observers should check their stop watches on the beacon station before taking bearings. This can easily be done by checking the stop watch time of the complete revolution of the beacon transmission and any error found can then be allowed for.

1001. Caution

Due to many factors which enter into the transmission and reception of radio signals, an observer cannot practically estimate his distance from a radiobeacon either by the strength of the signals received or by the time at which the signals were first heard. Mariners should give this fact careful consideration in approaching radiobeacons. *In using radio bearings in approaching lightships it is important that the courses be set at all times to pass safely clear; the risk of collision can be avoided by ensuring that the radio bearing does not remain constant.*

1000.	Chabunco (Punta Arenas) Aeronautical Radiobeacon. FREQ.: 305 kc/s CHARACTERISTIC SIGNAL: R (●■■●). HOURS OF TRANSMISSION: Sunrise to sunset.	53°00' S., 70°50' W.
1006.	Punta Corona Light Station. FREQ.: 290 kc/s, A0, A2. CHARACTERISTIC SIGNAL: CONA (■■●■■● ■■■■ ■●■■)..... Silent..... Period..... HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) In clear weather during first half hour after odd hour.	41°47'05" S., 73°53'20" W. POWER: 400 watts. Seconds 4.1 1.9 6.0
1010.	Isla Quiriquina (Bahia Concepcion). FREQ.: 312 kc/s, A0, A2. CHARACTERISTIC SIGNAL: QINA (■■■■■ ●● ■●■■■■)..... Silent..... 9 repetitions of above signal..... Period..... HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) In clear weather during first half hour of every 4th hour, commencing at 0000. REMARKS: At other times request for service may be made by contacting the Naval Radio Station, Talcahuano.	36°36'35" S., 73°02'47" W. POWER: 400 watts. Seconds 3.5 2.5 54.0 60.0 (1 min.)
1011.	Constitucion Aeronautical Radiobeacon. FREQ.: 340 kc/s CHARACTERISTIC SIGNAL: CTN (■■■■● ■■■■●). HOURS OF TRANSMISSION: Sunrise to sunset.	35°20' S., 72°25' W. POWER: 1,000 watts.
1012.	Santo Domingo Aeronautical Radiobeacon. FREQ.: 355 kc/s CHARACTERISTIC SIGNAL: SNO (●●● ■■■■■■■■■■).	33°39' S., 71°38' W. POWER: 1,000 watts.
1016.	Punta Angeles (Valparaiso) Light Station. FREQ.: 295 kc/s, A0, A2. CHARACTERISTIC SIGNAL: VASO (●●■■■ ■■■■■■■■■■)..... Silent..... 9 repetitions of above signal..... Period..... HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) Clear weather, during the first 30 minute period every 2 hours commencing at 0000. REMARKS: Continuous carrier. (See sec. 100A.)	33°01'05" S., 71°38'36" W. POWER: 400 watts. Seconds 3.9 2.1 54.0 60.0 (1 min.)
1018.	Quintero Aeronautical Radiobeacon. FREQ.: 384 kc/s CHARACTERISTIC SIGNAL: ERO (●■■■■■■■■■). HOURS OF TRANSMISSION: Sunrise to sunset.	32°44' S., 71°30' W. POWER: 1,000 watts.
1022.	Antofagasta Aeronautical Radiobeacon. FREQ.: 305 kc/s CHARACTERISTIC SIGNAL: R (●■■●).	23°26' S., 70°27' W. POWER: 50 watts.

PERU

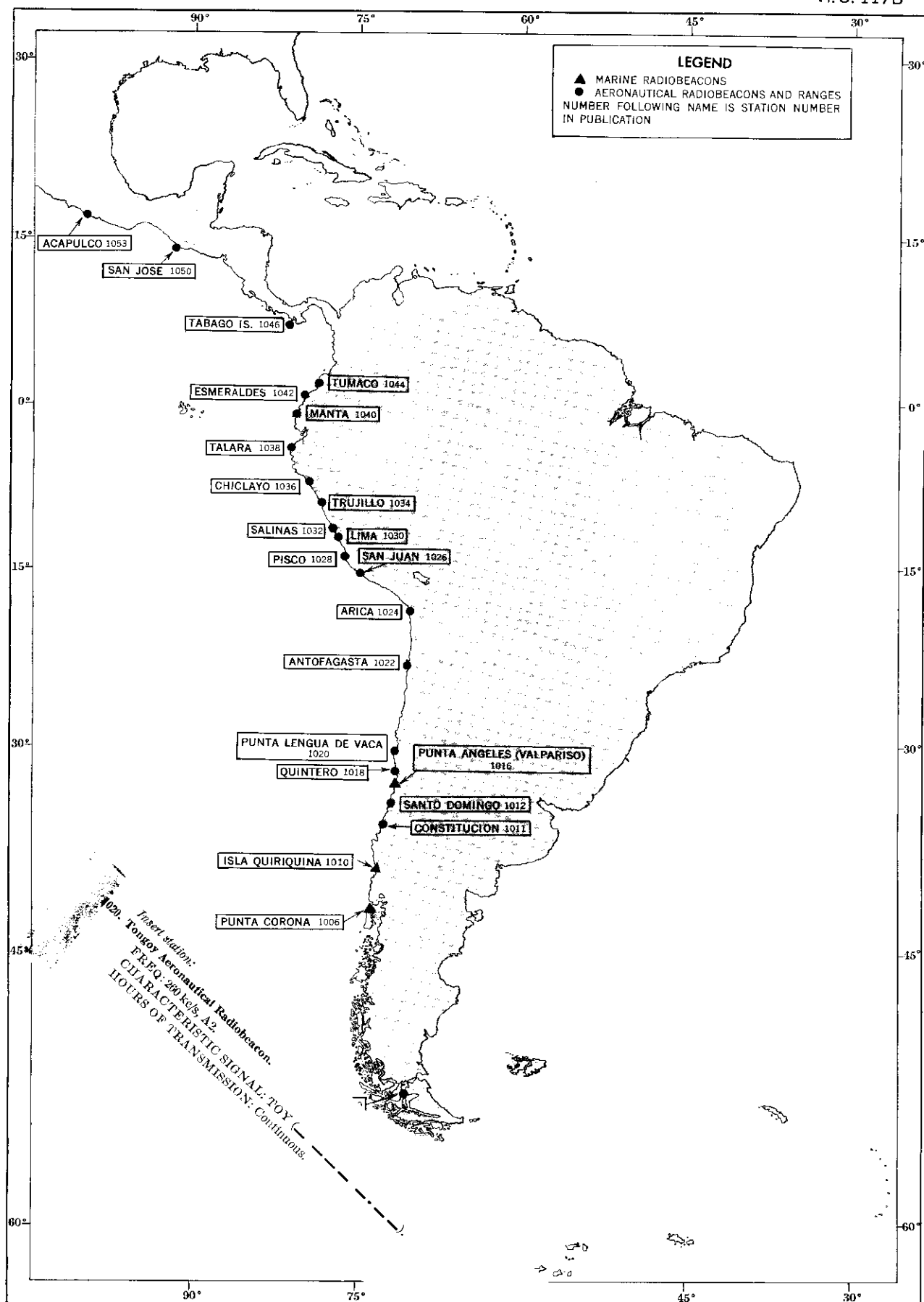
1024. Arica Aeronautical Radiobeacon.
FREQ.: 340 kc/s
CHARACTERISTIC SIGNAL: ARI (● ■ ■ ● ● ●).
18° 22' S., 70° 20' W.
POWER: 1,000 watts.
1026. San Juan Aeronautical Radiobeacon.
FREQ.: 395 kc/s
CHARACTERISTIC SIGNAL: SJN (● ● ● ■ ■ ■ ■ ■ ●).
15° 21' S., 75° 10' W.
POWER: 1,000 watts.
1028. Pisco Aeronautical Radiobeacon.
FREQ.: 355 kc/s
CHARACTERISTIC SIGNAL: SCO (● ● ● ■ ■ ● ● ■ ■ ■ ■).
13° 45' S., 76° 14' W.
POWER: 500 watts.
1030. Lima (Callao) Aeronautical Radiobeacon.
FREQ.: 335 kc/s
CHARACTERISTIC SIGNAL: LIM (● ■ ■ ● ● ● ■ ■ ■).
12° 06' S., 77° 05' W., 77° 05' W.,
POWER: 1,000 watts.
38/67.
1032. Salinas Aeronautical Radiobeacon.
FREQ.: 390 kc/s
CHARACTERISTIC SIGNAL: SLS (● ● ● ■ ■ ● ● ● ●).
11° 18' S., 77° 35' W.
1034. Trujillo Aeronautical Radiobeacon.
FREQ.: 290 kc/s
CHARACTERISTIC SIGNAL: TRJ (● ● ● ■ ■ ■ ■ ■ ● ● ●).
8° 05' S., 79° 07' W.
POWER: 500 watts.
1036. Chicla Aeronautical Radiobeacon.
FREQ.: 370 kc/s
CHARACTERISTIC SIGNAL: JCH (● ● ● ■ ■ ■ ■ ■ ● ● ●).
6° 47' S., 79° 50' W.
POWER: 750 watts.
1038. Lima (Callao) Aeronautical Radiobeacon.
FREQ.: 370 kc/s
CHARACTERISTIC SIGNAL: TYL (■ ■ ■ ■ ■ ● ● ● ● ●).
4° 34' S., 81° 15' W.
POWER: 500 watts.
1030. Lima (Callao) Aeronautical Radiobeacon.
Amend CHARACTERISTIC SIGNAL to read:
CHARACTERISTIC SIGNAL: JCH (● ● ● ■ ■ ■ ■ ■ ● ● ●).
SIGNAL: HIC (● ● ● ● ● ■ ■ ■ ■ ■ ● ● ●).

ECUADOR

1040. Manta Aeronautical Radiobeacon.
FREQ.: 300 kc/s
CHARACTERISTIC SIGNAL: MNT (■ ■ ■ ■ ■ ● ■ ■ ■).
HOURS OF TRANSMISSION: 1200-2300Z Mon-Fri., 1200-2000Z Sat.
0° 57' S., 80° 41' W.
POWER: 500 watts.
1042. Esmeraldas Aeronautical Radiobeacon.
FREQ.: 385 kc/s
CHARACTERISTIC SIGNAL: ESM (● ● ● ■ ■ ■ ■ ■).
0° 59' N., 79° 40' W.
POWER: 750 watts.

COLOMBIA

1044. Tumaco Aeronautical Radiobeacon.
FREQ.: 355 kc/s
CHARACTERISTIC SIGNAL: TCO (■ ■ ■ ■ ■ ● ● ● ■ ■ ■ ■ ■).
HOURS OF TRANSMISSION: 1100 to 2300Z.
1° 49' N., 78° 45' W.
POWER: 1,000 watts.



(Chg 11)

(Face p. 1-8)

30°17'48"S

PANAMA CANAL ZONE—Pacific Coast

1046. **Taboga Island Aeronautical Radiobeacon.** 8° 47' N., 79° 34' W.
FREQ.: 311 kc/s
POWER: 2,500 watts.
CHARACTERISTIC SIGNAL: TBG (■ ■■■■■ ■■■■).

GUATEMALA

1050. **Ixtapa Aeronautical Radiobeacon.** 13° 57' N., 90° 44' W.
FREQ.: 400 kc/s
POWER: 400 watts.
CHARACTERISTIC SIGNAL: IZP (● ■■■■■ ●■■■).

MEXICO

1053. **Acapulco Aeronautical Radiobeacon.** 16° 45' N., 99° 45' W.
FREQ.: 292 kc/s
POWER: 1,000 watts.
CHARACTERISTIC SIGNAL: ACA (● ■■■■■ ●■■■).

1054. **Mazatlan Aeronautical Radiobeacon.** 23° 14' N., 106° 25' W.
FREQ.: 285 kc/s
POWER: 1,200 watts.
CHARACTERISTIC SIGNAL: MZT (■ ■■■■■ ■■■■).

1056. **Los Mochis Aeronautical Radiobeacon.** 25° 48' N., 108° 58' W.
FREQ.: 227 kc/s
POWER: 1,200 watts.
CHARACTERISTIC SIGNAL: LMM (● ■■■■■ ■■■■).

1058. **Punta Penasco Aeronautical Radiobeacon.** 31° 19' N., 113° 32' W.
FREQ.: 318 kc/s
POWER: 1,200 watts.
CHARACTERISTIC SIGNAL: PPE (● ■■■■■ ●■■■ ●).

- 1058.5. **Estero de Punta Banda (Directional).** 31° 46' 55" N., 116° 37' 18" W.
FREQ.: 305 kc/s, A2.
RANGE: 12 miles.
CHARACTERISTIC SIGNAL: ENES (● ■■■■■ ●■■■■).
To southward of the bearing line, 124° towards radiobeacon, ES (● ■■■■■) will be heard stronger than EN (● ■■■■■); to northward of this line EN will be stronger. On the bearing line both signals will be heard equally.
Dashes — North of bearing ■■■■■ — ■■■■■ — ■■■■■ — etc.
On bearing ■■■■■ ■■■■■ ■■■■■ etc. (Beam width 5°.)
South of bearing — ■■■■■ — ■■■■■ — ■■■■■ etc.
HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) Clear weather, none by day, continuous at night.

1059. **Islas Todos Santos.** 31° 48' 50" N., 116° 48' 45" W.
FREQ.: 292 kc/s, A2.
RANGE: 200 miles.
CHARACTERISTIC SIGNAL:

	Seconds
TS (■ ■■■■■) 2 times	6
18 dashes	16
Long dash	24
TS (■ ■■■■■) 2 times	6
Silent	8

Period 60 (1 min.)
SYNCHRONIZATION: The radiobeacon signal and air fog signal, TS (■ ■■■■■), are synchronized for distance-finding. (See sec. 100G.) The first blast of the nautophone begins simultaneously with the group of 18 dashes. Distance from the station is given by the number of dashes received before the first blast of the nautophone is heard. Each dash corresponds to a distance of 1/6 mile.
HOURS OF TRANSMISSION: Continuous.

All U.S. Marine Radiobeacons are equipped with a continuous carrier (see sec. 100A).

- Change No. 16, Including N. M. 25/67.**

- 1076. Long Beach Harbor Light Station Marker Radiobeacon, Calif.** **33°43'23"N., 118°11'10"W.**
 FREQ.: 296 kc/s Low power, for local use only.
 CHARACTERISTIC SIGNAL: Seconds
 A series of 0.5 second dashes 13.5
 Silent 1.5
 Period 15.0
 HOURS OF TRANSMISSION: Continuous.
- 1078. Los Angeles Harbor Light Station Calibration Radiobeacon.** **33°42'30"N., 118°15'02"W.**
 FREQ.: 480 kc/s, A2. RANGE: 10 miles.
 CHARACTERISTIC SIGNAL: Seconds
 M2 (■ ■ ■ ● ■ ■ ■) twice 10
 Long dash 20
 Period 30 (½ min.)
 HOURS OF TRANSMISSION: Upon prior request to Commander, 11th Coast Guard District.
- 1080. Marina del Rey Marker Radiobeacon.** **33°57'50"N., 118°27'28"W.**
 FREQ.: 289 kc/s Low power, for local use only.
 CHARACTERISTIC SIGNAL: Seconds
 A series of 0.5 second dashes 13.5
 Silent 1.5
 Period 15.0
 HOURS OF TRANSMISSION: Continuous.
- 1082. Los Angeles Aeronautical Radiobeacon, Calif.** **33°56'50"N., 118°18'39"W.**
 FREQ.: 332 kc/s RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: LAX (● ■ ■ ■ ● ■ ■ ■ ■ ■).
- 1084. Anacapa Island Light Station Marker Radiobeacon, Calif.** **34°00.9'N., 119°21.5'W.**
 FREQ.: 323 kc/s Low power, for local use only.
 CHARACTERISTIC SIGNAL: Seconds
 A series of 0.5 second dashes 13.5
 Silent 1.5
 Period 15.0
 HOURS OF TRANSMISSION: Continuous.
- 1086. Santa Barbara Marker Radiobeacon.** **34°24.4'N., 119°41.6'W.**
 FREQ.: 294 kc/s Low power, for local use only.
 CHARACTERISTIC SIGNAL: Seconds
 A series of 0.5 second dashes 13.5
 Silent 1.5
 Period 15.0
 HOURS OF TRANSMISSION: Continuous.

RADIOBEACONS

H. O. PUB. NO. 117B
RADIO NAVIGATIONAL AIDS

1090.	San Luis Obispo Light Station, Calif.	35°09.6' N., 120°45.6' W.
1091.	Point Sur Light Station, Calif.	36°18.4' N., 121°54.0' W.
1092.	Pigeon Point Light Station, Calif.	37°10.9' N., 122°23.9' W.
1093.	San Francisco Lightship, Calif. (NNCS).	37°45.0' N., 122°41.5' W.
1094.	Point Arena Light Station, Calif.	38°57.3' N., 123°44.5' W.
1095.	Blunts Reef Lightship, Calif. (NNCB).	40°26.4' N., 124°30.3' W.

FREQ.: 320 kc/s, A2.	Minutes
CHARACTERISTIC	1
Silent	5
Period	6

NAME	CHARACTERISTIC	GROUP SEQUENCE	RANGE (MILES)
San Luis Obispo	Q (■ ■ ■ ● ■) Long dash	VI	14
Point Sur	P (● ■ ■ ■ ●) Long dash	V	70
Pigeon Point	Z (■ ■ ■ ● ●) Long dash	IV	70
San Francisco* L/S	M (■ ■ ■ ■) Long dash	III	70
Point Arena	G (■ ■ ■ ●) Long dash	II	70
Blunts Reef L/S	RT (● ■ ■ ● ■) Long dash	I	100

HOURS OF TRANSMISSION: Continuous.

NOTE: *Radio bearings taken within 0.5 mile of Golden Gate Bridge are unreliable.

1098.	Marro Bay West Breakwater Light Station Marker Radiobeacon, Calif.	35°21'46"N., 120°52'08"W.
	FREQ.: 296 kc/s.	Low power, for local use only.
	ANTENNA LEAD-IN: At Lighthouse.	
	CHARACTERISTIC SIGNAL:	Seconds
	A series of 0.5 second dashes	13.5
	Silent	1.5
	Period	15.0
	HOURS OF TRANSMISSION: Continuous.	
	REMARKS: Unreliable east of 306° to the shore.	

1100.	Point Pinos Light Station Marker Radiobeacon, Calif.	36°38'02"N., 121°55'58"W.
	FREQ.: 290 kc/s, A2.	Low power, for local use only.
	ANTENNA LEAD-IN: At lighthouse.	
	CHARACTERISTIC SIGNAL:	Seconds
	A series of 0.5 second dashes	13.5
	Silent	1.5
	Period	15.0
	HOURS OF TRANSMISSION: Continuous.	

1102.	Farallon Light Station, Calif.	37°42' N., 123°00' W.
	FREQ.: 314 kc/s	RANGE: 150 miles.
	CHARACTERISTIC SIGNAL:	Seconds
	F (● ● ■ ■ ●)	50
	Long dash	10
	Period	60 (1 min.)
	HOURS OF TRANSMISSION: Continuous.	

1104. **Bonita Point Light Station Marker Radiobeacon, Calif.** **37°48'55"N., 122°31'45"W.**
 FREQ.: 296 kc/s, A2. Low power, for local use only.
 CHARACTERISTIC SIGNAL: Seconds
 A series of 0.5 second dashes 13.5
 Silent 1.5
 Period 15.0
 HOURS OF TRANSMISSION: Continuous.
1106. **Point Blunt Light Station Calibration Radiobeacon, Calif.** **37°51'10"N., 122°25'04"W.**
 FREQ.: 288 or 480 kc/s, A2. RANGE: 10 miles.
 CHARACTERISTIC SIGNAL: Seconds
 N2 (■●●●■) twice 10
 Long dash 20
 Period 30 (½ min.)
 HOURS OF TRANSMISSION: Upon request to Commander 12th Coast Guard District with the use of the following additional signals; (a) Ready to calibrate: International Code flags J over K and (whistle) 3 long blasts followed by 3 short blasts. (b) Change frequency to 480 kc.; 3 long blasts followed by 1 short blast. (c) Calibration completed; 3 long blasts followed by 3 short blasts.
 REMARKS: Vessels are requested to calibrate during daylight hours and to be sure to signal the station when calibration is completed.
1108. **Point Reyes Light Station Marker Radiobeacon, Calif.** **37°59'45"N., 123°01'20"W.**
 FREQ.: 292 kc/s Low power, for local use only.
 CHARACTERISTIC SIGNAL: Seconds
 A series of 0.5 second dashes 13.5
 Silent 1.5
 Period 15.0
 HOURS OF TRANSMISSION: Continuous.
1110. **Humboldt Bay Marker Radiobeacon, Calif.** **40°45'54"N., 124°13'54"W.**
 FREQ.: 300 kc/s Low power, for local use only.
 CHARACTERISTIC SIGNAL: Seconds
 A series of 0.5 second dashes 13.5
 Silent 1.5
 Period 15.0
 HOURS OF TRANSMISSION: Continuous.
1112. **St. George Reef Light Station Marker Radiobeacon, Calif.** **41°50'13"N., 124°22'27"W.**
 FREQ.: 310 kc/s Low power, for local use only.
 CHARACTERISTIC SIGNAL: Seconds
 A series of 0.5 second dashes 10.5
 Silent 4.5
 Period 15.0
 HOURS OF TRANSMISSION: Continuous.

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1115.	Cape Blanco Light Station, Oreg.	42°50.2' N., 124°33.8' W.
1116.	Cape Arago Light Station, Oreg.	43°20.5' N., 124°22.4' W.
1117.	Yaquina Head Light Station, Oreg.	44°40.6' N., 124°04.7' W.
1118.	Columbia River Lightship, Oreg.	46°11.1' N., 124°11.0' W.
1119.	Cape Disappointment Light Station, Wash.	46°16.6' N., 124°03.1' W.
1120.	Willapa Bay Light Station, Wash.	46°44.1' N., 124°04.6' W.

FREQ.: 304 kc/s, A2.	Minutes
CHARACTERISTIC	1
Silent	5
Period	6

NAME	CHARACTERISTIC	GROUP SEQUENCE	RANGE (MILES)
Cape Arago	Y (●●●●) Long dash	I	50
Columbia River L/S	Z (●●●●) Long dash	II	100
Willapa Bay	UT (●●●●) Long dash	III	20
Cape Disappointment	O (●●●●) Long dash	IV	20
Cape Blanco	OE (●●●●) Long dash	V	200
Yaquina Head	W (●●●●) Long dash	VI	50

HOURS OF TRANSMISSION: Continuous.

1125.	Grays Harbor Light Station, Wash.	46°54.4' N., 124°07.1' W.
1126.	Destruction Island Light Station, Wash.	47°40.5' N., 124°29.1' W.
1127.	Umatilla Reef Lightship, Wash.	48°10.0' N., 124°50.4' W.
1128.	Cape Flattery, Wash.	48°23.5' N., 124°44.1' W.
1129.	Amphitrite Point Light Station, Canada.	48°55' 15" N., 125°32' 24" W.
1130.	Carmanah, Canada.	48°36' 43" N., 124°45' 01" W.

FREQ.: 288 kc/s, A2.	Minutes
CHARACTERISTIC	1
Silent	5
Period	6

NAME	CHARACTERISTIC	GROUP SEQUENCE	RANGE (MILES)
Cape Flattery	P (●●●●) Long dash	I	150
Umatilla Reef L/S	R (●●●●) Long dash	II	100
Carmanah*	D (●●●●) 3 times	III	35
Amphitrite Point*	A (●●●●) 3 times	IV	50
Destruction Island	RT (●●●●) Long dash	V	100
Grays Harbor	OT (●●●●) Long dash	VI	50

HOURS OF TRANSMISSION: Continuous..

NOTE: *Continuous carrier (see sec. 100A).

1133.	James Island Light Station Marker Radiobeacon, Wash.	47°54' 18" N., 124°38' 46" W.
	FREQ.: 300 kc/s	Low power, for local use only.
	CHARACTERISTIC SIGNAL:	Seconds
	A series of 0.5 second dashes	13.5
	Silent	1.5
	Period	15.0
	REMARKS: Continuous carrier (see sec. 100A).	

1135.	Neah Bay Aeronautical Radiobeacon, Wash.	48°21' N., 124°33' W.
	FREQ.: 391 kc/s	RANGE: 100 miles.
	CHARACTERISTIC SIGNAL: EBY (● ●●●● ●●●●●).	

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RADIOBEACONS

1137. **Ediz Hook Light Station, Wash.** 48°08'25"N., 123°24'04"W.
 FREQ.: 322 kc/s RANGE: 20 miles.
 CHARACTERISTIC SIGNAL:
 K (■●■■)..... Seconds
 Long dash..... 50
 Period..... 10
 HOURS OF TRANSMISSION: Continuous. 60 (1 min.)

1140. **New Dungeness Light Station, Wash.** 48°10'54"N., 123°06'30"W.
 1141. **Smith Island Light Station, Wash.** 48°19.2'N., 122°50.7'W.
 1142. **Point Wilson Light Station, Wash.** 48°08.7'N., 122°45.2'W.
 1143. **West Point Light Station, Wash.** 47°39'42"N., 122°26'06"W.
 1144. **Race Rocks Light Station, Canada.** 48°17'54"N., 123°31'50"W.

FREQ.: 314 kc/s, A2. Minutes
 CHARACTERISTIC..... 1
 Silent..... 5
 Period..... 6

NAME	CHARACTERISTIC	GROUP SEQUENCE	RANGE (MILES)
West Point	C (■●■■●) Long dash	I	20
Point Wilson	Q (■●■■●) Long dash	II	30
Smith Island	G (■●■■●) Long dash	III	20
Race Rocks*	J (●■■■■) 3 times	IV	40
New Dungeness	U (●■■■) Long dash	V	30

HOURS OF TRANSMISSION: Continuous.
 NOTE: *Continuous carrier (see sec. 100A).

1147. **Alki Point Light Station Calibration Radiobeacon, Wash.** 47°34'35"N., 122°25'10"W.
 FREQ.: 300 kc/s, 480 kc/s, A2. RANGE: 10 miles.
 ANTENNA LEAD-IN: On station.
 CHARACTERISTIC SIGNAL:
 02 (■■■■■ ●■■■■■)..... Seconds
 Long dash..... 10
 Period..... 20
 HOURS OF TRANSMISSION: During daylight hours and only on advance request to Commander, 13th Coast Guard District, Seattle. (See sec. 100D.) 30 (½ min.)

1150. **Patos Island Light Station, Wash.** 48°47.4'N., 122°58.2'W.
 1151. **Sand Heads Light Station, Canada.** 49°06'22"N., 123°18'06"W.
 1152. **Point Atkinson Light Station, Canada.** 49°19'51"N., 123°15'49"W.

FREQ.: 296 kc/s, A2. Minutes
 CHARACTERISTIC..... 1
 Silent..... 5
 Period..... 6

NAME	CHARACTERISTIC	GROUP SEQUENCE	RANGE (MILES)
Point Atkinson**	V (●■■■■) 3 times	II	30
Sand Heads**	G (■●■■●) 3 times	V	20
Patos Island	K (■■■■■) Long dash	VI	20

HOURS OF TRANSMISSION: Continuous.

NOTE: *Continuous carrier (see sec. 100A).

**Continuous carrier (see sec. 100A). Calibration service on 320 kc/s, characteristic signal T (■■■), on request through Vancouver Radio (V.R.N.).

Q. 288 kc/s, A2.
CHARACTERISTIC
Silent.
CHYFVLEBISLIG
FREQ.: 288 kc/s, A2.
CHARACTERISTIC
Silent.

47°18.3' N., 124°16.5' W.
Minutes
1
5
6

Period.....
NAME CHARACTERISTIC GROUP SEQUENCE RANGE (MILES)
Point Grenville X (---) Long dash V 100
HOURS OF TRANSMISSION: Continuous 46/67

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CANADA

1155. Tofino. 49°02'54"N., 125°42'16"W.
FREQ.: 359 kc/s, A2. RANGE: 50 miles.
CHARACTERISTIC SIGNAL: AZ (●■ ■■■●●).
HOURS OF TRANSMISSION: Continuous.
NOTE: Continuous carrier (see sec. 100A).
CAUTION: Bearing error could result from coastal refraction.
1157. Cape Beale Light Station Marker Radiobeacon. 48°47'12"N., 125°12'51"W.
FREQ.: 310 kc/s, A2. RANGE: 10 miles.
CHARACTERISTIC SIGNAL: Seconds
A series of 0.5 second dashes 13.5
Silent 1.5
Period 15.0
HOURS OF TRANSMISSION: Continuous.
NOTE: Continuous carrier. (See sec. 100A.)
1160. Albert Head Calibration Radiobeacon. 48°23'13"N., 123°28'36"W.
FREQ.: 300 kc/s
CHARACTERISTIC SIGNAL: T (■).
HOURS OF TRANSMISSION: On request through Victoria Marine Radio (VAK).
1162. Active Pass. 48°52'26"N., 123°17'23"W.
FREQ.: 378 kc/s RANGE: 25 miles.
CHARACTERISTIC SIGNAL: AP (●■ ■■■●).
HOURS OF TRANSMISSION: Continuous.
NOTE: Continuous carrier (see sec. 100A).
CAUTION: Bearing error could result from coastal refraction.
1164. Comox Aeronautical Radio Range. 49°45'N., 124°58'W.
FREQ.: 400 kc/s RANGE: 100 miles.
CHARACTERISTIC SIGNAL: QQ (■■■● ■■■■■).
1166. Estevan Point. 49°22'59"N., 126°32'30"W.
FREQ.: 374 kc/s, A2. RANGE: 100 miles.
CHARACTERISTIC SIGNAL: EP (● ■■■■).
HOURS OF TRANSMISSION: Continuous.
NOTE: Continuous carrier (See sec. 100A).
- 1166.5. Lennard Island Light Station. 49°06'38"N., 125°55'20"W.
1167. Quatsino Light Station. 50°26'26"N., 128°02'27"W.
1168. Cape Scott. 50°47'08"N., 128°25'45"W.
1169. Pine Island. 50°58'33"N., 127°43'35"W.
1170. Egg Island. 51°14'58"N., 127°49'57"W.

FREQ.: 318 kc/s Minutes
CHARACTERISTIC 1
Silent 5
Period 6
NAME CHARACTERISTIC GROUP SEQUENCE RANGE (MILES)

Lennard Island K (■■■■) I 30
Quatsino B (■■■■) 3 times II 50
Cape Scott F (■■■■) 3 times III 100
Pine Island P (■■■■) 2 times IV 40

1172. **Port Hardy Aeronautical Radio Range.** 50°42' N., 127°26' W.
FREQ.: 242 kc/s RANGE: 100 miles.
CHARACTERISTIC SIGNAL: ZT (■ ■ ■ ● ■).

1174. **Cape St. James Light Station.** 51°56' 10" N., 131°00' 52" W.
FREQ.: 292 kc/s, A2. RANGE: 100 miles.
CHARACTERISTIC SIGNAL: C (■ ● ■ ■ ●) 3 times, followed by 3 long dashes.
HOURS OF TRANSMISSION: Continuous.
NOTE: Continuous carrier. (See sec. 100A.)

1177. **McInnes Island Light Station.** 52°15' 42" N., 128°43' 18" W.
1178. **Bonnilla Island.** 53°29' 34" N., 130°38' 15" W.
1179. **Langara Island Light Station.** 54°15' 23" N., 133°03' 30" W.
1180. **Triple Island Light Station.** 54°17' 35" N., 130°52' 50" W.
1181. **Tree Point Light Station, Alaska.** 54°48.2' N., 130°55.9' W.
1182. **Mary Island Light Station, Alaska.** 55°06.0' N., 131°10.9' W.

FREQ.: 308 kc/s, A2. Minutes
CHARACTERISTIC 1
Silent 5
Period 6

NAME	CHARACTERISTIC	GROUP SEQUENCE	RANGE (MILES)
Langara Island*	H (● ● ● ●) 3 times	I	60
Triple Island*	O (■ ■ ■ ■) 3 times	II	50
Bonnilla Island*	L (● ● ● ●) 3 times	III	60
Tree Point	P (● ■ ■ ■) Long dash	IV	60
Mary Island	M (■ ■ ■) Long dash	V	20
McInnes Island*	N (■ ●) 3 times	VI	70

HOURS OF TRANSMISSION: Continuous.
NOTE: *Continuous carrier (see sec. 100A).

1185. **Ethelda Bay.** 53°03' 05" N., 129°41' 12" W.
FREQ.: 302 kc/s, A2. RANGE: 125 miles.
CHARACTERISTIC SIGNAL: TC (■ ■ ■ ● ● ●).
HOURS OF TRANSMISSION: Continuous.
NOTE: Continuous carrier (see sec. 100A).

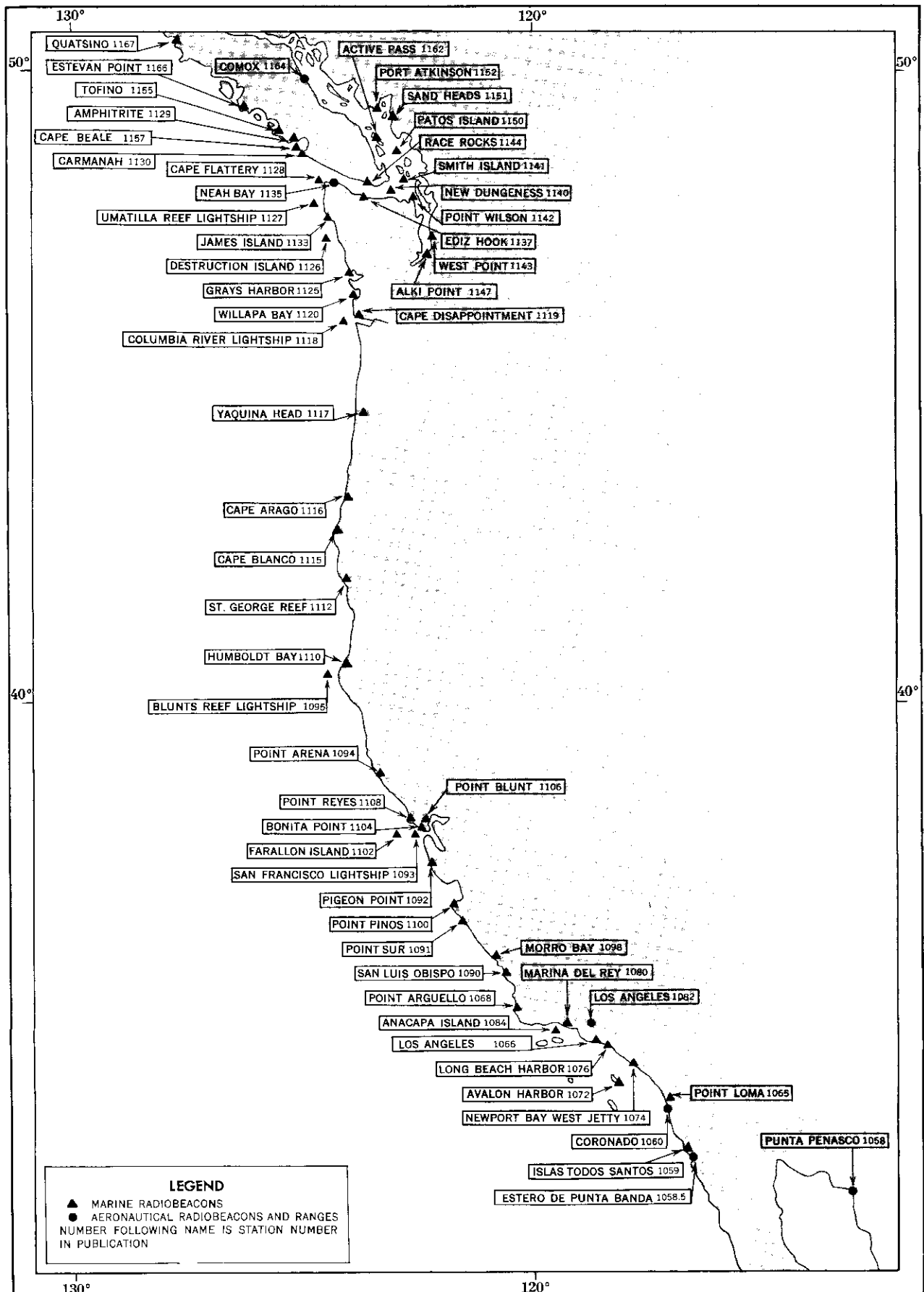
1187. **Sandspit Aeronautical Radio Range.** 53°12' N., 131°47' W.
FREQ.: 368 kc/s RANGE: 100 miles.
CHARACTERISTIC SIGNAL: ZP (■ ■ ■ ● ■ ■ ■ ●).

1190. **Lawn Point Marine and Aeronautical Radiobeacon.** 53°25' 24" N., 131°54' 49" W.
FREQ.: 385 kc/s RANGE: 45 miles.
CHARACTERISTIC SIGNAL: LZ (● ■ ■ ● ■ ■ ■ ● ●).
NOTE: Continuous carrier (see sec. 100A).

1192. **Prince Rupert.** 54°18' 20" N., 130°27' 25" W.
FREQ.: 350 kc/s RANGE: 50 miles.
CHARACTERISTIC SIGNAL: P (● ■ ■ ■ ●).
HOURS OF TRANSMISSION: Continuous.
NOTE: Continuous carrier (see sec. 100A).

ALASKA

1194. **Guard Island Light Station.** 55°26.7' N., 131°52.7' W.
 FREQ.: 324 kc/s, A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 J (●■■■■) 50
 Long dash 10
 Period 60 (1 min.)
 HOURS OF TRANSMISSION: Continuous.
 REMARKS: Continuous carrier (see sec. 100A).
1196. **Guard Island Light Calibration Radiobeacon.** 55°26'47" N., 131°52'45" W.
 FREQ.: 294 kc/s, 480 kc/s, A2.
 CHARACTERISTIC SIGNAL: Seconds
 Q2 (■■■●■■■■●■■■■) twice 10
 Long dash 20
 Period 30 (½ min.)
 HOURS OF TRANSMISSION: On prior request to Commander, 17th Coast Guard District, Juneau, Alaska.
1198. **Cape Decision Light Station.** 56°00.1' N., 134°08.1' W.
 FREQ.: 318 kc/s, A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 UT (●■■■■) 50
 Long dash 10
 Period 60 (1 min.)
 HOURS OF TRANSMISSION: Continuous.
 REMARKS: Continuous carrier (see sec. 100A).
1200. **Sitka (Biorka I.) Aeronautical Radio Range.** 56°51' N., 135°32' W.
 FREQ.: 344 kc/s. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: SIT (●●● ●● ■■■).
1202. **Five Fingers Light Station.** 57°16.3' N., 133°37.8' W.
 FREQ.: 295 kc/s, A2. RANGE: 60 miles.
 CHARACTERISTIC SIGNAL: Seconds
 O (■■■■●●) 50
 Long dash 10
 Period 60 (1 min.)
 HOURS OF TRANSMISSION: Continuous.
 REMARKS: Continuous carrier (see sec. 100A).
1204. **Eldred Rock Light Station.** 58°58.3' N., 135°13.2' W.
 FREQ.: 308 kc/s, A2. RANGE: 20 miles.
 CHARACTERISTIC SIGNAL: Seconds
 L (●■■■■●●) 50
 Long dash 10
 Period 60 (1 min.)
 HOURS OF TRANSMISSION: Continuous.
 REMARKS: Continuous carrier (see sec. 100A).



1206. **Point Retreat Light Station.** 58°24.7' N., 134°57.2' W.
FREQ.: 314 kc/s, A2. RANGE: 50 miles.
CHARACTERISTIC SIGNAL: Seconds
Q (■●●●) 50
Long dash 10
Period 60 (1 min.)
HOURS OF TRANSMISSION: Continuous.
REMARKS: Continuous carrier (see sec. 100A).
1208. **Sisters Island Aeronautical Radiobeacon.** 58°10' N., 135°15' W.
FREQ.: 391 kc/s RANGE: 50 miles.
CHARACTERISTIC SIGNAL: SSR (●●● ●●● ●■●).
1210. **Gustavus Aeronautical Radio Range.** 58°28' N., 135°45' W.
FREQ.: 236 kc/s RANGE: 100 miles.
CHARACTERISTIC SIGNAL: GST (■●●● ●●● ■).
1212. **Cape Spencer Light Station.** 58°12.0' N., 136°38.3' W.
FREQ.: 286 kc/s, A2. RANGE: 200 miles.
CHARACTERISTIC SIGNAL: Seconds
T (■) 50
Long dash 10
Period 60 (1 min.)
HOURS OF TRANSMISSION: Continuous.
REMARKS: Continuous carrier (see sec. 100A).
1214. **Yakutat Aeronautical Radio Range.** 59°33' N., 139°44' W.
FREQ.: 385 kc/s RANGE: 100 miles.
CHARACTERISTIC SIGNAL: YK (■●●■ ■●●■).
1216. **Yakataga Aeronautical Radio Range.** 60°05' N., 142°30' W.
FREQ.: 209 kc/s, A2. RANGE: 50 miles.
CHARACTERISTIC SIGNAL: CYT (■●●● ■●●■ ■).
1218. **Cape St. Elias Light Station.** 59°47.8' N., 144°36.2' W.
FREQ.: 298 kc/s, A2. RANGE: 150 miles.
ANTENNA LEAD-IN: 80 feet 344° from light tower.
CHARACTERISTIC SIGNAL: Seconds
O (■●■) 50
Long dash 10
Period 60 (1 min.)
HOURS OF TRANSMISSION: Continuous.
1220. **Hinchinbrook Aeronautical Radio Range.** 60°24' N., 146°05' W.
FREQ.: 362 kc/s RANGE: 100 miles.
CHARACTERISTIC SIGNAL: HBK (●●●● ■●●● ■●■).

1222.	Cape Hinchinbrook Light Station. FREQ.: 292 kc/s, A2. CHARACTERISTIC SIGNAL: W (●■■■) Long dash Period HOURS OF TRANSMISSION: Continuous.	60°14'18"N., 146°38'48"W. RANGE: 75 miles. Seconds 50 10 60 (1 min.)
1224.	Middleton Island Aeronautical Radiobeacon. FREQ.: 260 kc/s CHARACTERISTIC SIGNAL: MDO (■■■ ■■■● ■■■■).	59°28'N., 146°18'W.
1226.	Anchorage Aeronautical Radio Range. FREQ.: 338 kc/s CHARACTERISTIC SIGNAL: AC (●■■ ■■■●●).	61°08'N., 149°57'W. RANGE: 100 miles.
1228.	Shuyak Island Aeronautical Radiobeacon. FREQ.: 212 kc/s CHARACTERISTIC SIGNAL: SHY (●●● ●●● ■■■■).	58°38'N., 152°21'W. POWER: 400 watts.
1230.	Kodiak Aeronautical Radio Range. FREQ.: 394 kc/s CHARACTERISTIC SIGNAL: NHB (■■● ●●● ■■■■).	57°47'N., 152°19'W. RANGE: 100 miles.
1232.	King Salmon Aeronautical Radio Range. FREQ.: 400 kc/s CHARACTERISTIC SIGNAL: KG (■■■ ■■■●).	58°42'N., 156°41'W. RANGE: 100 miles.
1234.	Cold Bay Aeronautical Radio Range. FREQ.: 341 kc/s CHARACTERISTIC SIGNAL: CO (■■■● ■■■■).	55°15'N., 162°45'W. RANGE: 100 miles.
1236.	Scotch Cap. FREQ.: 300 kc/s, A2. CHARACTERISTIC SIGNAL: Z (■■■●●) Long dash Period HOURS OF TRANSMISSION: Continuous.	54°23'48"N., 164°44'30"W. RANGE: 100 miles. Seconds 50 10 60 (1 min.)
1238.	Cape Sarichef Light Station. FREQ.: 290 kc/s, A2. CHARACTERISTIC SIGNAL: OT (■■■■) Long dash Period HOURS OF TRANSMISSION: Continuous.	54°36.0'N., 164°55.7'W. RANGE: 100 miles. Seconds 50 10 60 (1 min.)

1240.	St. Paul Island. FREQ.: 314 kc., A2. CHARACTERISTIC SIGNAL: K (■●■)..... Long dash..... Period..... HOURS OF TRANSMISSION: Continuous. REMARKS: Operated by the Fish and Wildlife Service.	57°09'30"N., 170°13'36"W. RANGE: 150 miles. Seconds 50 10 60 (1 min.)
1242.	Cape Romanzof Aeronautical Radiobeacon. FREQ.: 275 kc. CHARACTERISTIC SIGNAL: CZF (■●■● ■●■● ●●■●).	61°48'45"N., 165°59'00"W.
1244.	Unalakleet Aeronautical Radio Range. FREQ.: 382 kc. CHARACTERISTIC SIGNAL: UN (●●■ ■●).	63°52'N., 160°43'W. RANGE: 100 miles.
1246.	Moses Point Aeronautical Radio Range. FREQ.: 263 kc. CHARACTERISTIC SIGNAL: MO (■■ ■■■■).	64°41'N., 162°10'W. RANGE: 50 miles.
1248.	Nome Aeronautical Radio Range. FREQ.: 239 kc. CHARACTERISTIC SIGNAL: OE (■■■ ■●).	64°30'N., 165°19'W. RANGE: 100 miles.
1250.	Kotzebue Aeronautical Radiobeacon. FREQ.: 356 kc. CHARACTERISTIC SIGNAL: OTZ (■■■ ■■■●●).	66°53'44"N., 162°34'22"W. RANGE: 50 miles.
1252.	Point Lay Aeronautical Radiobeacon. FREQ.: 251 kc. CHARACTERISTIC SIGNAL: PIZ (●■■● ● ■■■●).	69°44'N., 163°01'W.
1254.	Wainwright Aeronautical Radiobeacon. FREQ.: 266 kc. CHARACTERISTIC SIGNAL: AIN (●■ ● ■●).	70°36'N., 159°52'W.
1256.	Point Barrow Aeronautical Radiobeacon. FREQ.: 281 kc. CHARACTERISTIC SIGNAL: PBA (●■■● ■■■● ●■).	71°19'N., 156°38'W.
1258.	Lonely Aeronautical Radiobeacon. FREQ.: 316 kc. CHARACTERISTIC SIGNAL: LNI (●■■● ■● ●●).	70°55'N., 153°15'W.
1260.	Oliktok Aeronautical Radiobeacon. FREQ.: 329 kc. CHARACTERISTIC SIGNAL: OLI (■■■ ●■■● ●●).	70°30'N., 149°53'W.
1262.	Floxman Island Aeronautical Radiobeacon. FREQ.: 275 kc. CHARACTERISTIC SIGNAL: FXM (●■■● ■■■■ ■■).	70°11'N., 146°50'W.

RADIOBEACONS

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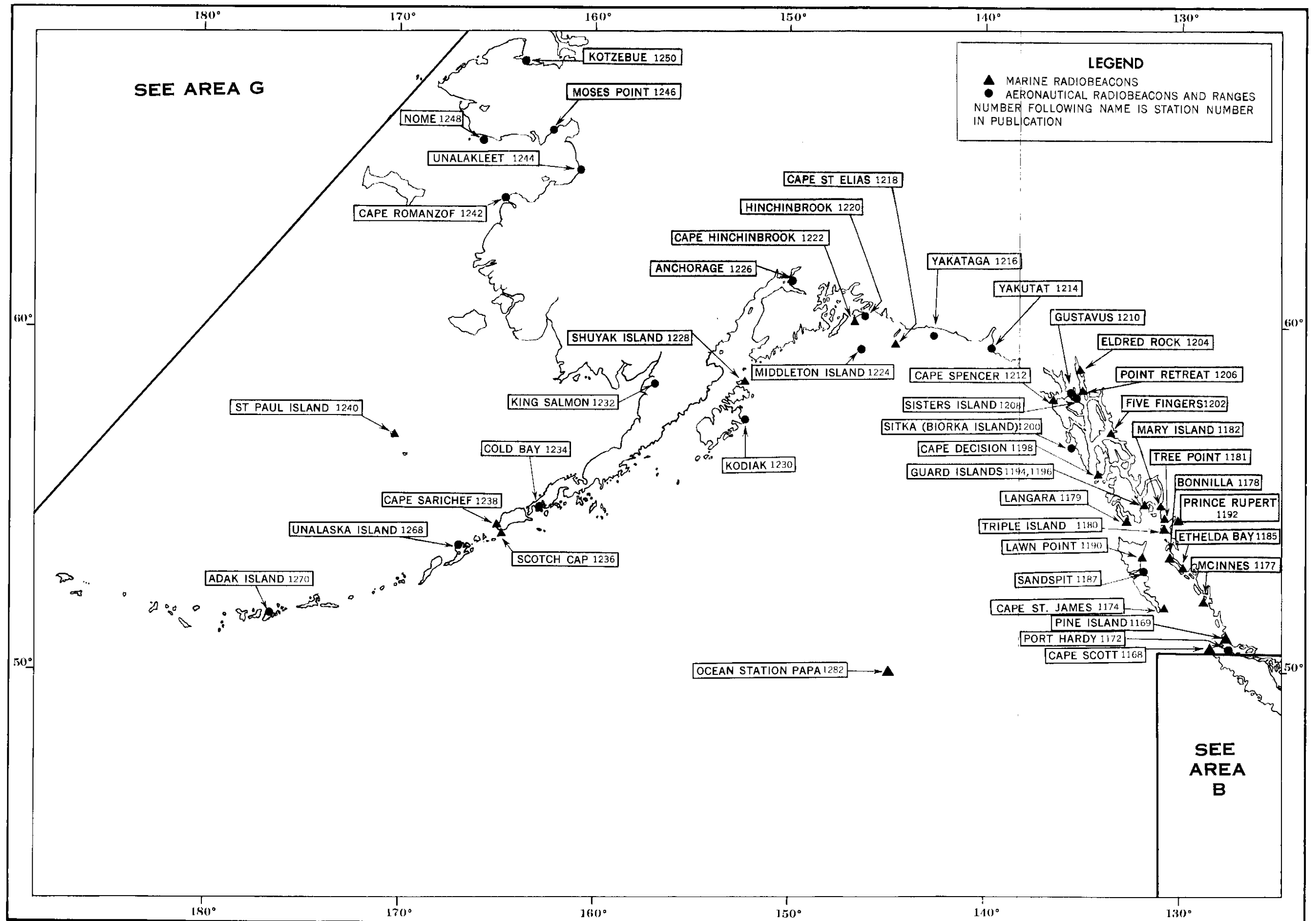
1264. **Barter Island Aeronautical Radiobeacon.** 70° 07' 53" N., 143° 38' 34" W.
FREQ.: 308 kc.
CHARACTERISTIC SIGNAL: BTI (■●●● ■ ●●).

1266. **Komakuk Aeronautical Radiobeacon (Canada).** 69° 35' N., 140° 11' W.
FREQ.: 388 kc.
CHARACTERISTIC SIGNAL: AJ (●■ ■■■■).

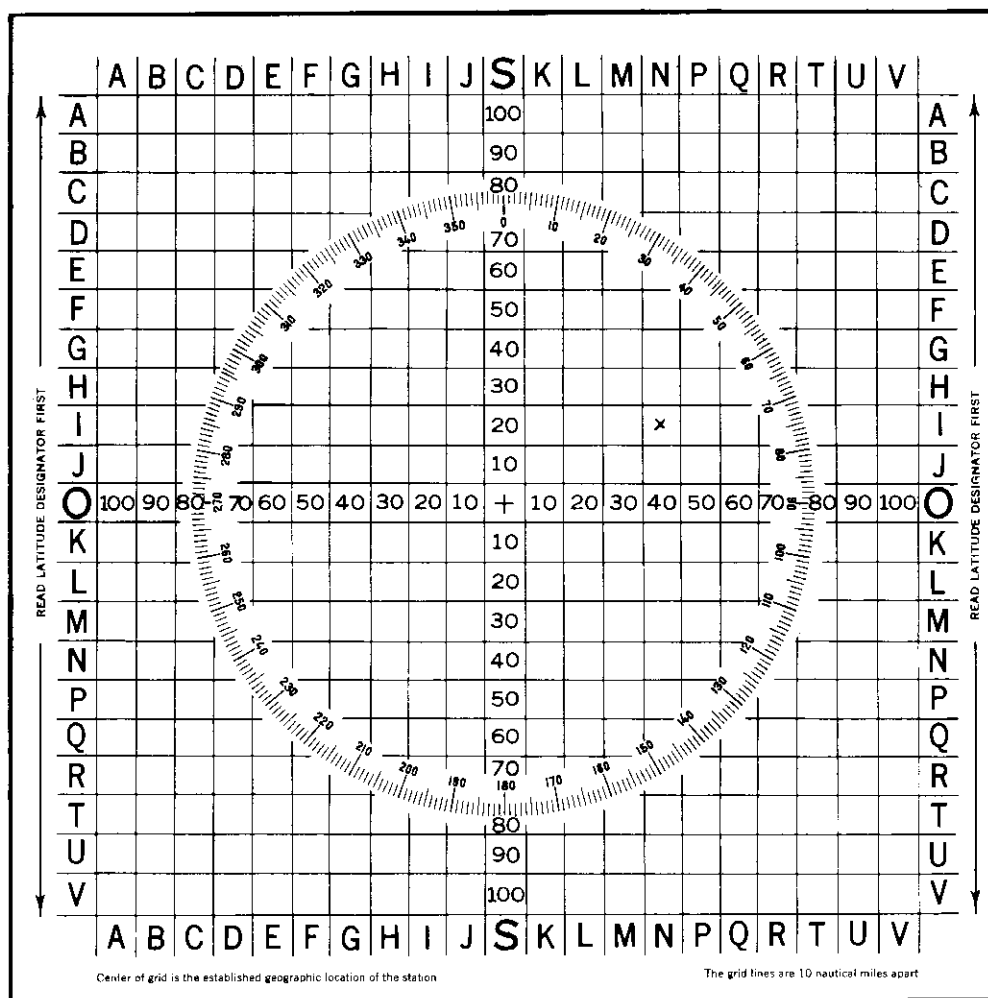
ALEUTIAN ISLANDS

1268. **Driftwood Bay (Unalaska Island) Aeronautical Radiobeacon.** 53° 58' N., 166° 54' W.
FREQ.: 245 kc.
CHARACTERISTIC SIGNAL: DFB (■●● ●●■ ■●●●).

1270. **Adak Island Aeronautical Radio Range.** 51° 55' N., 176° 34' W.
FREQ.: 347 kc.
CHARACTERISTIC SIGNAL: NUD (■● ●●■ ■●●).



POSITION-INDICATING GRID SYSTEM
OCEAN STATION VESSELS



The center of the grid is the geographic position assigned to the station. If the ship is on station, i.e., within the 10-mile square at the center, the last two letters of the signal are "OS", the latitude and longitude designators, respectively. If the ship is off the station but on the grid, the latitude and longitude designators of whatever square the ship is in are transmitted as the last 2 letters of the signal. *The latitude designator is always given first.* The center of each grid square

should be considered the location of the station vessel for all computations, thus giving a maximum error of $7\frac{1}{2}$ miles and an average probable error of $2\frac{1}{2}$ miles.

EXAMPLE:-Assuming we are dealing with Station "N", and the ship's actual location is at the point marked X on the grid above, the station's signal would be "YNIN". It is also evident that the station vessel bears 64° true 45 miles from its assigned position.

OCEAN STATION VESSELS

Ocean Station Vessels are maintained in the vicinity of assigned positions in the North Pacific Ocean in accordance with an agreement between the United States and Canada. These ships supply meteorological information to their respective national weather services and act as limited navigational aids to ships and aircraft including scheduled medium frequency radio-beacon transmissions. All stations guard 500 kc. continuously and in addition United States Ocean Station Vessels guard the international distress voice frequency 2182 kcs., the international aeronautical emergency frequency 121.5 mcs. (voice), air-surface VHF working frequency 126.7 mcs. (voice), air-surface UHF working frequency 272.7 mcs. (voice), and the international survival craft frequency 243 mcs. (voice). The frequency 500 kcs. should normally be used by merchant vessels calling the Ocean Station Vessels. The collective call for any and all U.S. Ocean Station Vessels in the Pacific is NDLZ.

Normally, the station vessels remain on station within a 10-mile square, the center of which is the geographic position assigned to the station.

The signal transmitted by the radiobeacon is a continuous carrier wave with identifying letters superimposed on it. The signal consists of four letters; the first 2 letters comprise the characteristic signal of the station listed; the last 2 indicate its position within the 10-mile square and are obtained from the accompanying grid.

The emission of the radiobeacon has a high degree of vertical polarization which may enable a surface vessel to obtain a good bearing at distances in excess of 200 miles. If the regular beacon equipment breaks down the same service as described above will be given except that a ship's communication transmitter will be used. The ship's transmitter gives an interrupted tone-modulated signal in place of the continuous carrier wave, and in this case the identifying signal is followed by a 20-second dash in order to provide service for automatic direction finders. If a station vessel is off the grid completely, such as when on a distress mission, no beacon service will be given except when requested for homing purposes. In this event, the station's international radio call will be used as the identifying signal.

Caution to all shipmasters.—Avoidance of collision with Ocean Station Vessels.—Instances have been reported of vessels "homing" on beacon transmissions of these ships on station. This practice creates a grave danger of collision. Vessels occupying ocean stations may be drifting with engines on standby. Standby in this instance means that the vessel is not able to maneuver because propulsion power is not immediately available to the bridge. Therefore, all precautions to avoid collision must be observed. The beacon transmissions may be used by surface ships to determine positions and should be used to avoid collision with the transmitting vessel.

1280. Ocean Station Vessel November (4YN). United States.**30°00'N., 140°00'W.**

FREQ.: 335 kc.

CHARACTERISTIC SIGNAL: YN (—●—●—●—●) plus 2-position letters. (See page 1-26.)

HOURS OF TRANSMISSION: Five minute periods, commencing at 05, 20, 35, and 50 minutes past each hour and on request.

1282. Ocean Station Vessel Papa (4YP). Canada.**50°00'N., 145°00'W.**

FREQ.: 388 kc., A2.

CHARACTERISTIC SIGNAL: YP (—●—●—●—●) plus 2-position letters. (See page 1-26.)

HOURS OF TRANSMISSION: Continuous.

1284. Ocean Station Vessel Victor (4YV). United States.**34°00'N., 164°00'E.**

FREQ.: 391 kc., A2.

CHARACTERISTIC SIGNAL: YV (—●—●—●—●) plus 2-position letters. (See page 1-26.)

HOURS OF TRANSMISSION: Five minute periods, commencing at 05, 20, 35, and 50 minutes past each hour, and on request.

REPUBLIC OF SOUTH AFRICA

SOUTH AFRICAN MARINE RADIOBEACONS maintain continuous service when visibility at the station is 3 miles or less. Masters of vessels navigating in fog outside this 3 mile range may request, by radio, the continuous operation of a radiobeacon. No charge will be made for this service.

1286. Cape Agulhas Light Station. **34°49'47"S., 20°00'45"E.**
 FREQ.: 298.8 kc., A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 ZUY (—●●● ●●● —●●●) 4
 Silent 2
 Long dash 20
 Silent 4
 Period 30
 HOURS OF TRANSMISSION: Continuous.

1288. Cape St. Blaize Light Station. **34°11'10"S., 22°09'25"E.**
 FREQ.: 291.9 kc., A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 ZRF (—●●● ●●● ●●●) 4
 Silent 5
 Long dash 20
 Silent 1
 Period 30
 HOURS OF TRANSMISSION: (a) Low visibility continuous. (b) Clear weather from 15–20 and 45–50 minutes past each hour.

1290. George Aeronautical Radiobeacon. **33°58'S., 22°26'E.**
 FREQ.: 260 kc., A2. POWER: 2 kw.
 CHARACTERISTIC SIGNAL: GG (—●● —●●).

1291. Cape St. Francis Light Station. **34°12'45"S., 24°50'12"E.**
 FREQ.: 285 kc., A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 ZUM (—●●● ●●● —●●●) 3 times 23
 Silent 1
 Long dash 20
 Silent 1
 Period 45
 HOURS OF TRANSMISSION: Continuous.

1292. Cape Recife Light Station. **34°01'40"S., 25°42'04"E.**
 FREQ.: 308.0 kc., A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 ZTY (—●●● —●●● —●●●) 4
 Silent 2
 Long dash 20
 Silent 4
 Period 30
 HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) Clear weather, from 20–25 and 50–55 minutes past each hour.

1294. Hood Point. **33°02'26"S., 27°53'57"E.**
 FREQ.: 289.6 kc., A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 ZSY (—●●● ●●● —●●●) 4
 Silent 2
 Long dash 20
 Silent 4
 Period 30
 HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) Clear weather, from 00–05 and 30–35 minutes past each hour.

1295. Mbashe Point. **32°14' S., 28°55' E. (approx.).**
 FREQ.: 301.1 kc., A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 ZRE (—●●● ●●● ●) 4
 Silent 2
 Long dash 20
 Silent 4
 Period 30
 HOURS OF TRANSMISSION: Continuous.

1296. Port St. Johns (Cape Hermes Light Station) Aeronautical Radiobeacon. **31°38' S., 29°33' E.**
 FREQ.: 315 kc. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: PJ (●—●● ●—●—●). POWER: 300 watts.
 HOURS OF TRANSMISSION: 0400-1900 daily.

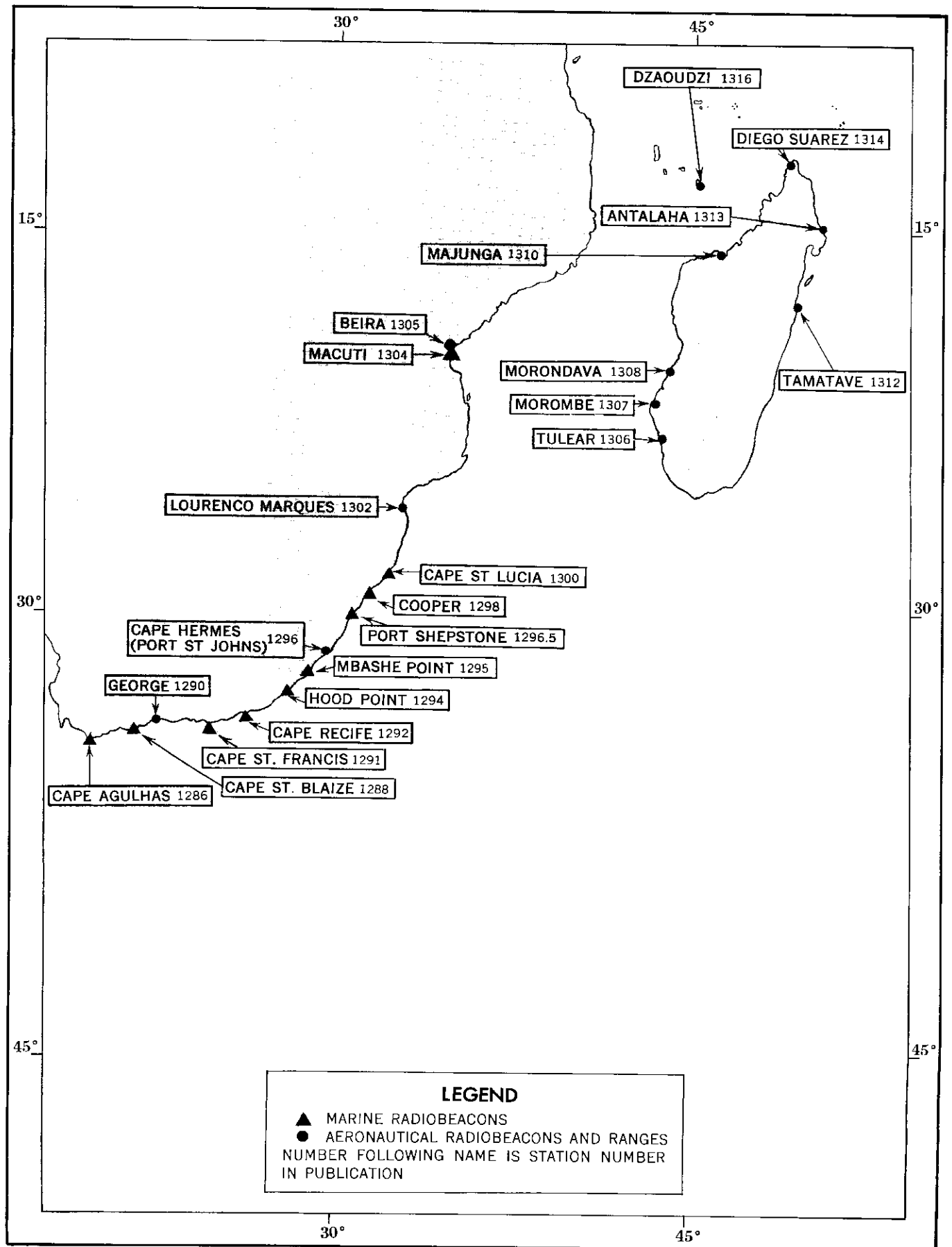
1296.5 Port Shepstone Light Station. **30°44'30" S., 30°27'33" E.**
 FREQ.: 294.2 kc., A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 ZTD (—●●● —●●●) 5
 Silent 4
 Long dash 20
 Silent 1
 Period 30
 HOURS OF TRANSMISSION: Continuous.

1298. Cooper Light Station. **29°56'07" S., 31°00'19" E.**
 FREQ.: 305.7 kc., A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 ZUT (—●●● ●●● —) 4
 Silent 2
 Long dash 20
 Silent 4
 Period 30
 HOURS OF TRANSMISSION: Continuous.

1300. Cape St. Lucia Light Station. **28°31'08" S., 32°23'50" E.**
 FREQ.: 285 kc., A2. RANGE: 100 miles.
 CHARACTERISTIC SIGNAL: Seconds
 ZUQ (—●●● ●●● —●●●) 4
 Silent 2
 Long dash 20
 Silent 4
 Period 30
 HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) Clear weather, from 00-05 and 30-35 minutes past each hour.

MOZAMBIQUE

1302. Lourenco Marques Aeronautical Radiobeacon. **25°52' S., 32°36' E.**
 FREQ.: 343 kc., AD, A2. POWER: 2 kw.
 CHARACTERISTIC SIGNAL: LM (●—●● —●—).



1304. **Macuti Light Station.** 19°50.7'S., 34°53.9'E. (approx.).
 FREQ.: 302 kc., A1. RANGE: 150 miles.
 CHARACTERISTIC SIGNAL:

	Seconds
MC (— — — — —) 3 times	9
Silent	1
Long dash	26
Silent	6
2 repetitions of above signal group	84
Silent	234
Period	360 (6 min.)

 HOURS OF TRANSMISSION: (a) Low visibility, continuous commencing on the hour. (b) Clear weather, at 06, 12, 36, and 42 minutes past each hour.

1305. **Beira Aeronautical Radiobeacon.** 19°46'S., 34°51'E.
 FREQ.: 327 kc., A0, A2.
 CHARACTERISTIC SIGNAL: BR (— — — — —).

MALAGASY REPUBLIC

1306. **Tulear Aeronautical Radiobeacon.** 23°23'S., 43°43'E.
 FREQ.: 367 kc., A1. POWER: 1 kilowatt.
 CHARACTERISTIC SIGNAL: 5SQ (— — — — —).
 HOURS OF TRANSMISSION: 0300-1200 and on request.

1307. **Morambe Aeronautical Radiobeacon.** 21°45'S., 43°22'E.
 FREQ.: 334 kcs.
 CHARACTERISTIC SIGNAL: MBE (— — — — —).

1308. **Morondava Aeronautical Radiobeacon.** 20°17'S., 44°19'E.
 FREQ.: 397 kc., A1. POWER: 1 kilowatt.
 CHARACTERISTIC SIGNAL: 5SV (— — — — —).
 HOURS OF TRANSMISSION: 0300-1200 and on request.

1310. **Majunga Aeronautical Radiobeacon.** 15°40'S., 46°21'E.
 FREQ.: 326 kc., A1. POWER: 1 kilowatt.
 CHARACTERISTIC SIGNAL: 5SJ (— — — — —).
 HOURS OF TRANSMISSION: 0200-1500 and on request.

1312. **Tamatave Aeronautical Radiobeacon.** 18°08'S., 49°25'E.
 FREQ.: 358 kc., A1 A2. POWER: 2 kilowatts.
 CHARACTERISTIC SIGNAL: 5SM (— — — — —).
 HOURS OF TRANSMISSION: On request.

1313. **Antalaha Aeronautical Radiobeacon.** 15°00'S., 50°19'E.
 FREQ.: 321 kc., A1.
 CHARACTERISTIC SIGNAL: AH (— — — — —).
 HOURS OF TRANSMISSION: 0200-1200 and on request.

1314. **Diego Suarez Aeronautical Radiobeacon.** 12°17'S., 49°16'E.
 FREQ.: 347 kc., A1. POWER: 3.2 kilowatts.
 CHARACTERISTIC SIGNAL: 5SO (— — — — —).
 HOURS OF TRANSMISSION: 0200-1400 and on request.

COMORO ISLANDS

1316. **Dzaoudzi (Pamanzi) Aeronautical Radiobeacon.** 12°48' S., 45°17' E.
 FREQ.: 270 kc., A1. POWER: 700 watts.
 CHARACTERISTIC SIGNAL: FJO (••••• ••••• •••••).
 HOURS OF TRANSMISSION: On request.

TANZANIA

1318. **Dar es Salaam Aeronautical Radiobeacon.** 6°52' S., 39°11' E.
 FREQ.: 361 kc., A0, A2. POWER: 900 watts.
 CHARACTERISTIC SIGNAL: DR (••• ••••).

KENYA

1320. **Ras Serani Radiobeacon.** 4°04' 15" S., 39°40' 44" E. (approx.).
 FREQ.: 289.6 kc., A0, A2. POWER: 20 watts.
 CHARACTERISTIC SIGNAL:

	Seconds
KL (••••• •••••) 6 times-----	22.50
Long dash-----	22.50
KL (••••• •••••) 8 times-----	30.00
Long dash-----	22.50
KL (••••• •••••) 3 times-----	11.25
Long dash-----	11.25
Period-----	120.00 (2 mins.)

 HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) Clear weather, from 10-14, 30-34, and 50-54 minutes past each hour.
 REMARKS: Calibration service is available on request to Mombasa (SZF).

SOMALI REPUBLIC

1324. **Mogadiscio Aeronautical Radiobeacon.** 2°01' N., 45°19' E.
 FREQ.: 261 kc., A1. POWER: 1 kilowatt.
 CHARACTERISTIC SIGNAL: 6 OM (••••• ••••• •••••).
 HOURS OF TRANSMISSION: Sunrise to sunset.

FRENCH SOMALILAND

1326. **Djibouti Aeronautical Radiobeacon.** 11°32' N., 43°10' E.
 FREQ.: 297 kc., A1. POWER: 1 kilowatt.
 CHARACTERISTIC SIGNAL: FKP (••••• ••••• •••••).

ETHIOPIA

1328. **Assab Aeronautical Radiobeacon.** 13°04' N., 42°38' E.
 FREQ.: 345 kc., A2.
 CHARACTERISTIC SIGNAL: SB (••• •••••).
 HOURS OF TRANSMISSION: 0400-1500.
1329. **Massawa Aeronautical Radiobeacon.** 15°37' N., 39°27' E.
 FREQ.: 215 kc., A2. RANGE: 50 miles.
 CHARACTERISTIC SIGNAL: MS (••• ••••).
 HOURS OF TRANSMISSION: 0400-1500.

JORDAN

- 1329.7. Aqaba Aeronautical Radiobeacon 29° 30' N., 34° 59' E.
POWER: 3000 watts.
FREQ.: 290 kcs, A0, A2.
CHARACTERISTIC SIGNAL: JYQ (•— — — — — •— — — — —).

ARABIAN PENINSULA

1330. Jeddah Aeronautical Radiobeacon. 21° 32' N., 39° 12' E.
FREQ.: 375 kc., A1.
CHARACTERISTIC SIGNAL: JD (•— — — — — •••).
HOURS OF TRANSMISSION: Sunrise to sunset.
1332. Khormaksar (Aden) Aeronautical Radiobeacon. 12° 50' N., 45° 03' E.
POWER: 500 watts.
FREQ.: 400 kc., A0, A2.
CHARACTERISTIC SIGNAL: KR (—• — — •••).
NOTE: Unreliable.
1334. Riyan Aeronautical Radiobeacon. 14° 39' N., 49° 20' E.
POWER: 300 watts.
FREQ.: 375 kc., A0, A2.
CHARACTERISTIC SIGNAL: RI (••• — — ••).
1336. Salalah Aeronautical Radiobeacon. 17° 03' N., 54° 06' E.
POWER: 300 watts.
FREQ.: 367 kc. A0, A2.
CHARACTERISTIC SIGNAL: SA (••• — —).
1338. Masirah Island Aeronautical Radiobeacon. 20° 40' N., 58° 54' E.
POWER: 2,500 watts.
FREQ.: 343 kc., A0, A2.
CHARACTERISTIC SIGNAL: MR (— — — — •••).
1340. Azalba Aeronautical Radiobeacon. 23° 36' N., 58° 22' E.
FREQ.: 326 kc., A0, A2.
CHARACTERISTIC SIGNAL: OA (— — — — ••).
HOURS OF TRANSMISSION: On request.
1342. Little Quoin Island (At entrance Persian Gulf). 26° 28' 30" N., 56° 32' 18" E.
RANGE: 200 miles.
Seconds
FREQ.: 289.5 kc., A2.
CHARACTERISTIC SIGNAL:
QI (— — — — ••) 8 times 27
Long dash 20
QI (— — — — ••) 2 times 7
Silent 306
Period 360 (6 min.).
HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) Clear weather, at 20 and 50 minutes past each hour.
1344. Sharjah Aeronautical Radiobeacon. 25° 22' N., 55° 24' E.
POWER: 1.5 kilowatts.
FREQ.: 282 kc.
CHARACTERISTIC SIGNAL: SJ (••• — — — — —).
1346. Das Island Aeronautical Radiobeacon. 25° 10' N., 52° 54' E.
POWER: 80 watts.
FREQ.: 366 kc., A1.
CHARACTERISTIC SIGNAL: ID (•• — — ••).

1348. Doha Aeronautical Radiobeacon. 25°16' N., 51°34' E.
FREQ.: 377 kc., A0, A2.
CHARACTERISTIC SIGNAL: BD (—••• —••).
1350. Bahrain Aeronautical Radiobeacon. 26°16' N., 50°38' E.
FREQ.: 352 kc., A0, A2. POWER: 2,000 watts.
CHARACTERISTIC SIGNAL: BI (—••• ••).
1352. Dhahran Aeronautical Radiobeacon. 26°14' N., 50°10' E.
FREQ.: 270 kc., A0, A2. POWER: 150 watts.
CHARACTERISTIC SIGNAL: DH (—•• ••••).
1354. Ra's at Tannurah Aeronautical Radiobeacon. 26°40' N., 50°10' E.
FREQ.: 335 kc., A0, A2. POWER: 150 watts.
CHARACTERISTIC SIGNAL: RT (••• —).
1356. Mina al Ahmadi. 29°04.2' N., 48°08.5' E. (approx.).
FREQ.: 312.6 kc., A0, A2. RANGE: 15 miles.
CHARACTERISTIC SIGNAL: Seconds
9KU (—••••• •••••) 3 times 20
Long dash 20
2 repetitions of above signal 80
Period 120 (2 mins.)
HOURS OF TRANSMISSION: At 00, 20, and 40 minutes past each hour.
1358. Al Kuwayt Aeronautical Radiobeacon. 29°13' N., 48°00' E.
FREQ.: 379 kc., A0, A2.
CHARACTERISTIC SIGNAL: KWS (—•• •—•• •••).

PAKISTAN—West

1360. Jiwani Aeronautical Radiobeacon. 25°05' N., 61°49' E.
FREQ.: 330 kc., A0, A2. POWER: 300 watts.
CHARACTERISTIC SIGNAL: JI (•—•—• ••).
1362. Mauripur Aeronautical Radiobeacon. 24°56' N., 66°56' E.
FREQ.: 354 kc., A2. POWER: 2 kw.
CHARACTERISTIC SIGNAL: MP (—•• •—•••).
1364. Karachi Aeronautical Radiobeacon. 24°54' N., 67°10' E.
FREQ.: 271 kc., A0, A2. POWER: 3 kw.
CHARACTERISTIC SIGNAL: KC (—•• —••••).

INDIA

1366. Okha. 22°28'31" N., 69°04'06" E.
FREQ.: 296 kc., A2.
CHARACTERISTIC SIGNAL: Seconds
VUR (••••• •••••) 5 times 25
Long dash 25
VUR (••••• •••••) 2 times 10
Silent 180
Period 240 (4 min.)
HOURS OF TRANSMISSION: (a) Low visibility, continuous. (b) Clear weather, 3 emissions of characteristic signal commencing at 15 and 47 minutes past each hour.