MARIANA ISLANDS

677. MEDICAL ADVICE: Messages from masters of vessels will be referred to U.S. Naval medical authorities for diagnosis and reply. Services are free of charge.

6770. Guam (NPN).
Lat. 13°29'00"N., Long. 144°47'00"E.
FREQ.: 500 kc., A1.

HAWAIIAN ISLANDS

(See sec. 603)

6780. Honolulu (NMO).
FREQ.: 500 kc.

NEW BRITAIN

6790. Rabaul (VJZ).
Lat. 4°12'40"S., Long. 152°12'20"E.
FREQ.: 500 kc., A1, A2.
WATCH HOURS: 2000–1400.

NAURU

(See sec. 658)

6800. Nauru (VKT).
Lat. 0°32'00"S., Long. 166°55'00"E.
FREQ.: 500 kc., A1, A2.
WATCH HOURS: 0430–0500, 0830–0930, 2145–2230. Closed on Sundays and holidays.

FIJI ISLANDS

681. MEDICAL ADVICE: Messages should be in English, addressed to: "Radiomedical (name of station)."

6810. Suva (VRP).
Lat. 18°08'43"S., Long. 178°27'35"E.
FREQ.: 500 kc., A1, A2.

Amend rate to read:

	Rate	H.O. Pub. No.	Station	Location
60.	2H7	*221 (203)		Iwo Jima. Hachijo Jima.

Insert rate:

60.	2S0	*221 (233)		Hachijo Jima. Hasaki.

**New table in preparation.*

N.M. 31/66.

Page 10–9. Radio Spain (AOK) *delete and amend to read:*

Radio Londonderry, NST.

Time	*Frequencies*
0300–0400*	2634, 5052, 5167, 6487, 7535, 9318,
0700–0800	13110.
1100–1200*	
1500–1600	
1900–2000*	
2300–2400	

N.M. 31/66.

Chapter 7
Long Range Navigational Aids

LORAN-A (Standard Loran)

700. GENERAL

Loran-A is a hyperbolic system of radio navigation available throughout much of the ocean areas of the northern hemisphere. The word loran is an abbreviated form of the expression LOng RAnge Navigation. Except during very severe electrical disturbances, it is possible to receive useful loran positional information in all types of weather. The system employs synchronized pairs of radio transmitting stations, called rates, which broadcast pulsed signals with a constant time interval between them. Loran rates provide hyperbolic lines of position which are fixed relative to the earth's surface as are latitude and longitude lines. Loran lines of position can be crossed with each other or with sun lines, star lines, or other types of position lines to provide fixes.

Special loran receivers and appropriate loran charts and tables are required by mariners using loran information. These tables and charts are prepared on the basis of ground waves. Sky-wave readings are converted to equivalent ground-wave readings by applying the tabulated sky-wave correction.

The detailed operation and use of the loran installation, which is operated principally by the United States Coast Guard, is explained in H.O. Pub. No. 9, American Practical Navigation, 1958. The manufacturer's equipment manual should be consulted for operation of the particular loran set.

700B. PRINCIPLES OF OPERATION

(1) Radio signals consisting of short synchronized pulses are broadcast from a pair of special shore-based transmitting stations located at known geographical positions.

(2) These signals are received aboard ship by means of a specially designed radio receiver.

(3) The difference in time of arrival of the signals from the two stations is measured by the loran indicator, and in the case of new type sets a direct reading is shown on the time difference dials on the front panel of the receiver-indicator.

(4) This time difference is utilized to determine directly from special tables or charts a line of position on the earth's surface.

(5) Two or more lines of position, obtained from two or more pairs of transmitting stations, are crossed to obtain a loran fix.

Thus, loran is entirely different from radio direction finding, for it measures difference in time of arrival of radio waves rather than direction of arrival. Under good conditions a set of observations may be taken and a Loran-A fix determined from them in about two to five minutes.

700D. RANGE

Loran-A ground-wave signals are generally usable to about 650 to 900 miles from the transmitters during the day. The one-hop-E sky-wave signal is received at a maximum range of about 1250 to 1500 miles by night. Beyond this range, multihop-E or F waves may be received, but are not normally used for navigational purposes.

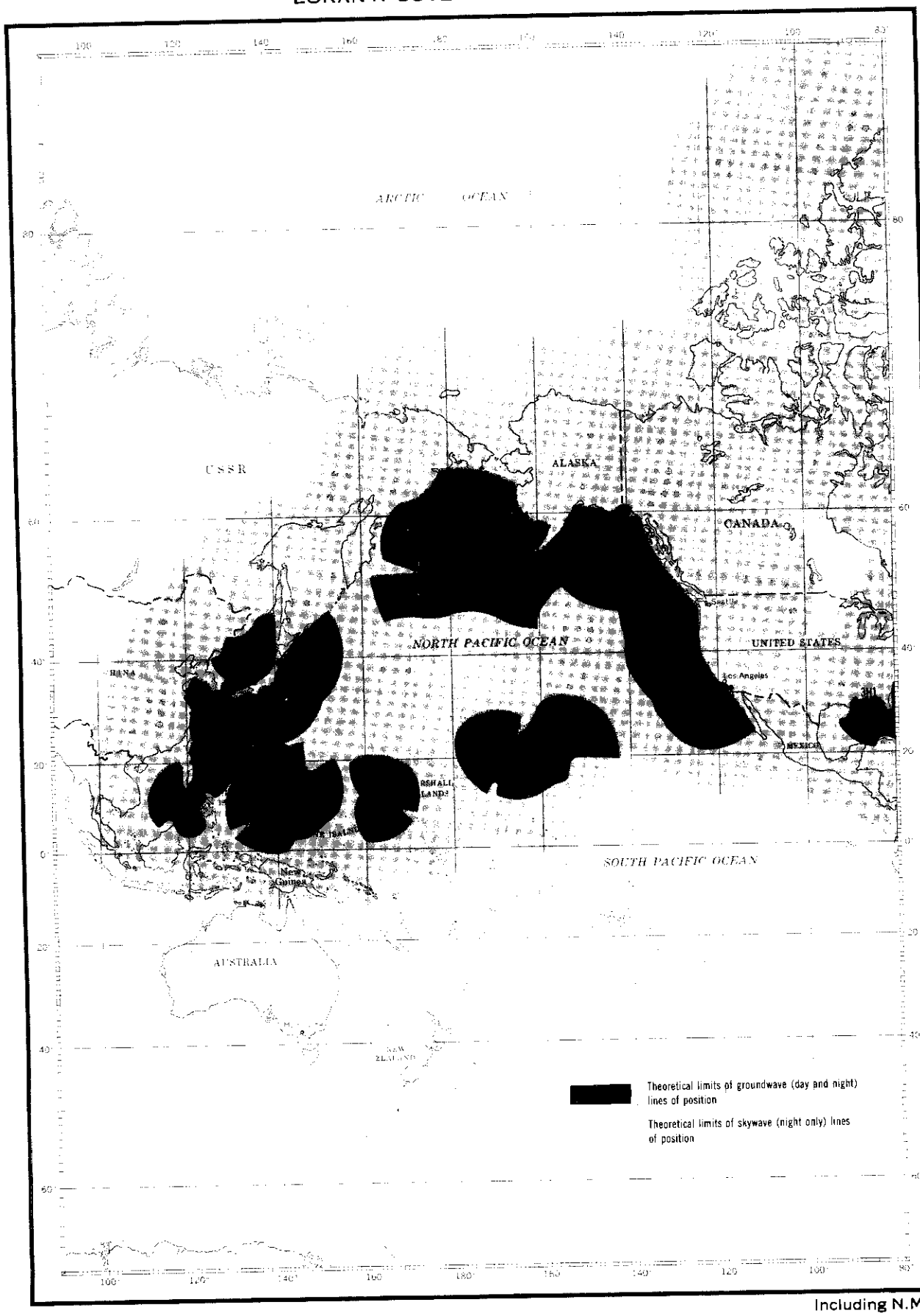
700F. UNRELIABLE TRANSMISSIONS

When transmitted Loran-A signals are known to be unreliable, either the master or slave signals, or both, are made to blink as a warning that the signals should not be used for navigational purposes. Blinking is accomplished by shifting the signal to the right and back about 1000 microseconds at intervals of 1 second in normal position and 1 second in the shifted position.

700H. LORAN—A COVERAGE

The accompanying chartlet shows day and night coverage of the various Loran-A rates. Since the chartlet may show rates which are no longer operative, or rates which are not yet in service, the mariner is advised to consult the weekly Notice to Mariners for changes in Loran-A service.

H.O. PUB. NO. 117B
RADIO NAVIGATIONAL AIDS
LORAN-A COVERAGE DIAGRAM



LORAN—A

7010. NORTH PACIFIC

Rate	H. O. Pub. No.	Station	Location (master station listed first)
1L6	221 (230)	Y B	Ocean Cape, Yakutat, Alaska. Biorka Island, Alaska.
1L7	221 (229)	Y K	Ocean Cape, Yakutat, Alaska. Spruce Cape, Kodiak Island, Alaska.
1L3	221 (228)	D S	Adak Island. Cape Sarichet, Alaska.
1L2	221 (227)	D L	Adak Island. Attu Island.

7020. CENTRAL PACIFIC

Rate	H. O. Pub. No.	Station	Location (master station listed first)
1L0	221 (211)	E W	Eniwetok Atoll. Wake Island.
1L1	221 (210)	E Y	Eniwetok Atoll. Kwajalein Atoll.
2L5	221 (213)	P K	Upolu Point, Hawaii. Makahuena Point, Kauai.
2L6	221 (209)	T M	Tern Island. Makahuena Point, Kauai.
2L7	221 (204)	T O	Tern Island. Johnston Island.

7030. SOUTH PACIFIC

Rate	H. O. Pub. No.	Station	Location (master station listed first)
2L1	221 (222)	Y A	Yap. Angaur.
2L2	221 (223)*	Y U	Yap. Guam (Orote Point)
2L3	221 (224)	A U	Saipan Guam (Orote Point)

7040. ASIATIC AREA

Rate	H. O. Pub. No.	Station	Location (master station listed first)
2H4	221 (205)	I A	Miyako Jima. Batan Island.
2H3	221 (206)	D A	Panay I., Catanduanes Island. Bantan Island.
1L6	221 (207)	L B	Naulo Point, Luzon. Talampulan Island, Calamian Group.
1L7	221 (208)	R B	Tarumpitao Point, Palawan. Talampulan Island, Calamian Group.

*Note: Consult weekly Notice to Mariners for availability dates of these publications.

7050. WEST COAST, U. S. A.

Rate	H. O. Pub. No.	Station	Location (master station listed first)
2H1	221 (232)	M P	San Mateo Point, Calif. Point Arguello, Calif.
2H2	221 (214)	A G	Point Arena, Calif. Point Arguello, Calif.
2H3	221 (215)	A B	Point Arena, Calif. Cape Blanco, Oregon.
2H4	221 (216)	W B	Point Grenville, Wash. Cape Blanco, Oregon.
2H5	221 (217)	W S	Point Grenville, Wash. Spring Island, Vancouver Island.

7060. JAPANESE AREA

2S3	221 (218)	C E	Niigata. Matsumae.
2S4	221 (219)	C F	Niigata. Miho Wan.
2S5	221 (220)	T F	Tsushima. Miho Wan.
2S6	221 (221)	N T	Nomaike. Tsushima.
2S7	221 (201)	N E	Nomaike. Gesashi, Okinawa.
2H5	221 (231)	I E	Miyako Jima. Gesashi, Okinawa.
2H6	221 (202)	K E	Iwo Jima. Gesashi, Okinawa.
2H7	221 (203)*	Y U	Iwo Jima. Hachijo Jima.
2S0	221 (233)*	A U	Hasaki. Hachijo Jima.
2S1	221 (225)	Y X	Okama Saki. Ottisi.
2S2	221 (226)	Y Z	Okama Saki. Hasaki.

*New table in preparation.

LORAN - C

720. GENERAL

The Loran-C navigation system is a long baseline, hyperbolic, area coverage system, employing time difference measurements of signals received by the navigator from at least three ground transmitting stations. It is basically a Loran-A (Standard Loran) system with improvements, some of which are:

(1) Low-frequency transmissions (100 kcs) give extended range over both land and sea at all altitudes.

(2) Pulse envelope measurement allows "coarse" time difference measurements, and measurement of the radio-frequency cycle phase provides an accurate "fine" time difference measurement.

(3) Automatic instrumentation can provide continuous position indication in time difference measurement. Automatic search as well as automatic tracking can be provided.

(4) The use of pulse groups increases average power. Phase coding of the multipulsed groups allows station identification and discrimination between groundwave and various skywaves.

Most of the Loran-C repetition rates are compatible with the Loran-A system and for these rates, Loran-A receivers can be modified to permit reception of 100-kilocycle signals for envelope matching of the signals in the conventional Loran-A manner. To make all of the rates compatible, requires more extensive modification of present Loran-A receiving equipment. In any case, it must be remembered that Loran-A receivers do not incorporate the capability of measuring "fine" time differences as Loran-C receivers do, and as a result, less accuracy is obtained. Loran-A/C receivers capable of receiving both Loran-A and Loran-C signals are available. Envelope and cycle techniques are used in Loran-C receivers capable of utilizing the maximum accuracy of the Loran-C system. In general, high accuracy Loran-C receivers can be set for automatic operation which continuously and simultaneously tracks and displays time difference readings for two Loran-C master-slave pairs operating on the same rate.

Appropriate Loran-C charts and tables are required by ships using Loran-C information. Loran-C chart coverage is shown in H.O. Pub. No. 1–N, Catalog of Nautical Charts and Publications, Introduction, Part II. The Loran-C table series begins with H.O. Puh. No. 221 (1001). The publication number, pertinent suffix, and station pair will fully identify the table for requisitioning purposes. General information on the Loran-C system is provided in each Loran-C table. The manufacturer's equipment manual should be consulted for operation of the particular Loran-C set.

720B. PRINCIPLES OF OPERATION

The Loran-C system is a sophisticated extension of the fundamental concepts of the Loran-A system. Loran-C operates in the band centered around a carrier frequency of 100 kilocycles with a spectrum contained within the band of 90 to 110 kilocycles. The slave stations in a particular Loran-C network transmit eight pulses to a group on a specific group repetition rate. For visual identification, the master station transmits a ninth pulse in its group. Station identification in automatic search operation is accomplished by phase coding the master and slave groups. Phase coding has the following objectives:

(1) When used with the pulse repetition rate, the phase code aids in signal identification.

(2) Some protection against interference from outside sources is provided by phase coded pulses.

(3) The phase coded pulses reduce contamination of the groundwave of pulses transmitted following skywaves from preceding pulses.

720D. RANGE

Loran-C groundwave coverage extends to approximately 1200 nautical miles. During periods of good propagation, this range may be greater, and during periods of high noise and interference, it may be less. However, based on current noise and interference information, it is considered that 1200 nautical miles is a reasonable estimate of the reliable groundwave range of Loran-C signals radiated from a station of 300 kilowatts peak pulse power.

The well-known skywave "splitting" so common and useful in Loran-A does not occur from a practical standpoint at the Loran-C frequency of 100 kilocycles. Usable first-hop E-layer skywaves have been observed during both daylight and darkness to ranges of as much as 2300 nautical miles. Second-hop waves have been observed as far away as 3400 nautical miles.

Multihop skywaves have been monitored solidly out to ranges of 3435 nautical miles with every indication that useful signals are available for some distance beyond. An almost complete darkness path between the user and the transmitting station is required for stable, nighttime, multihop operation. At the present time, the use of multihop skywaves is not recommended for a high-accuracy navigation tool.

Skywave accuracy is dependent upon stability of the ionosphere. As a general rule, expected first-hop E-layer skywave stability is approximatoly plus or minus one microsecond and is usable for general navigation.

720F. UNRELIABLE TRANSMISSIONS

The accuracy of Loran-C depends upon the transmitting stations keeping their signals correctly timed or synchronized. When synchronization of the transmitters is lost, the ninth pulse of the master station blinks, or shifts back and forth. Equipment instruction books describe the exact manner in which blink is shown by the set in use.

If the error in synchronization exceeds the tolerable limits for more than one minute, then the proper ninth pulse code or blinking procedures are initiated. These limits are usually set at ± 3.0 microseconds for the envelope and something over ± 0.15 microsecond for the phase.

When a synchronization discrepancy exists, the master station and/or one or more slave stations will alter their normal pattern of transmission to warn the users and the other station of the pair that the system is temporarily unusable. The warning is in accordance with the ninth pulse code procedure and the slave blink procedure.

720H. LORAN–C COVERAGE

The accompanying chartlet shows day and night coverage of some Loran-C rates. Since the chartlet may show rates which are no longer operative, or rates which are not yet in service, the mariner is advised to consult the weekly Notice to Mariners for changes in Loran-C service.

LORAN - C

Bering Sea

Pair	Pub. No.	Sta. Ltr.	Location (master station listed first)
SL2-X	221 (2001)*	R A	Pribilof Is. Sitkinak I., Alaska
SL2-Y	221 (2002)	R U	Pribilof Is. Attu I., Aleutians
SL2-Z	221 (2005)*	R B	Pribilof Is. Point Clarence, Alaska

Central Pacific

SH4-X	221 (2003)*	D O	Sand Is. Upolu Point, Hawaii
SH4-Y	221 (2004)*	D K	Sand Is. Kure Is.

Northwest Pacific

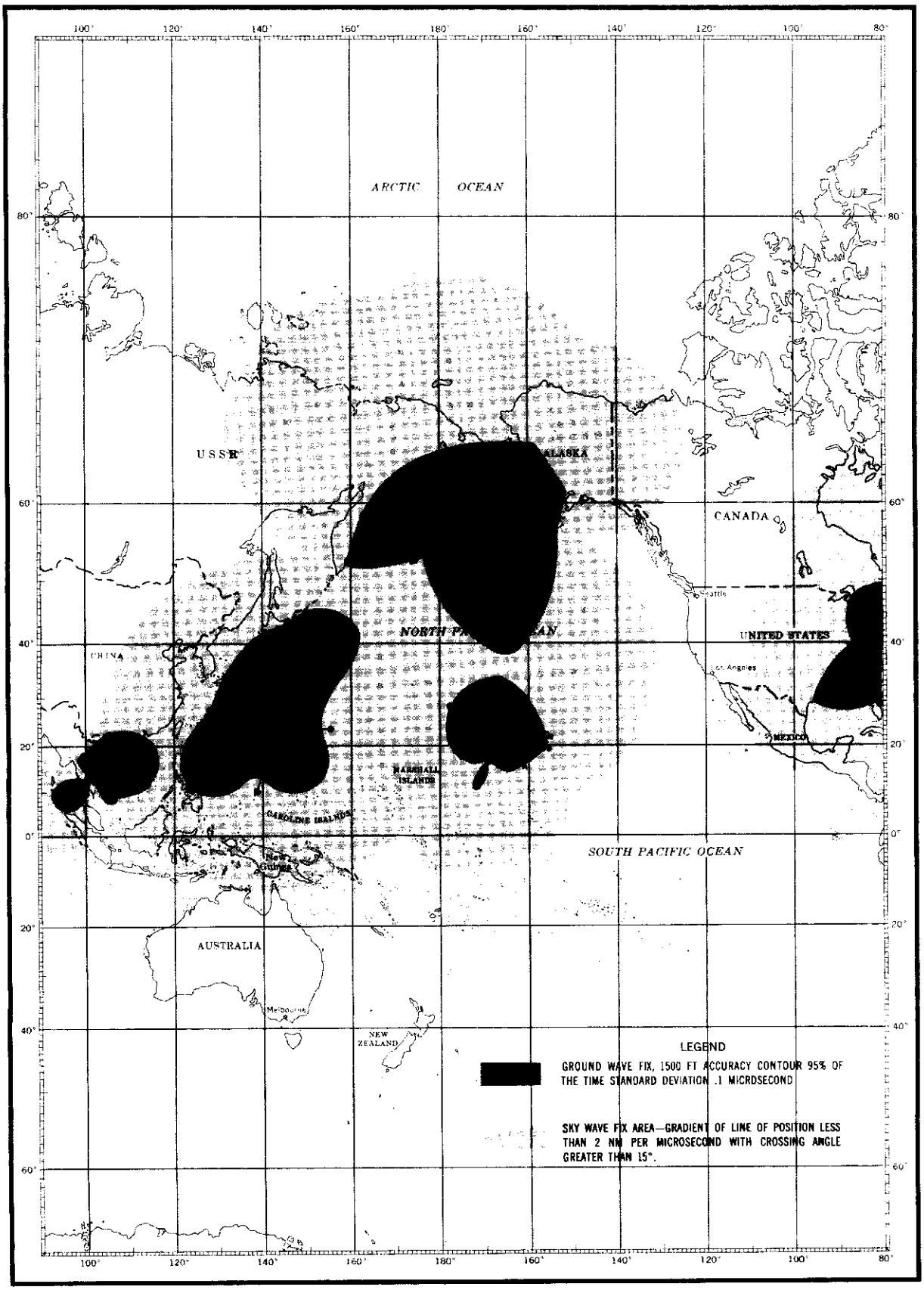
SS3-W	221 (2006)*	L Q	Iwo Jima Marcus Island
SS3-X	221 (2007)*	L H	Iwo Jima Hokkaido, Japan
SS3-Y	221 (2008)*	L O	Iwo Jima Okinawa
SS3-Z	221 (2009)*	L K	Iwo Jima Yap Island

Southeast Asia

S3-X	221 (2010)*	P G	Sattahip, Thailand. Lampang, Thailand.
S3-Y	221 (2011)*	P N	Sattahip, Thailand. Con Son, South Vietnam.

* Note: Consult weekly Notice to Mariners for availability dates of these publications.

LORAN-C COVERAGE DIAGRAM



CONSOLAN

760. GENERAL

Consolan is essentially a long range navigational aid. There is no special Consolan equipment required. Signals may be received on any low frequency receiver, or any other receiver covering the frequency range and equipped with a beat frequency oscillator. If a loop antenna is used, best results will be obtained in case of severe static by placing the loop near the maximum signal position. If a communications receiver is used the CW (BFO) beat frequency oscillator position should be employed without (AVC) automatic volume control.

The Consolan System employs a pattern of alternating dot sectors and dash sectors separated by the equisignal. The width of the sectors is about 12° average, but differs slightly, being smallest on the normal to the line of the towers. (See figure 2). Dependent upon the observer's position with respect to the station, various combinations of dots, dashes, and equisignals will be heard. As the pattern rotates, the predominant dot or dash signals will blend into a continuous tone which is the equisignal. The total number of dots and dashes transmitted during a 30-second dot/dash period is 60. (See figure 1). The exact change from dots to dashes (or vice-versa) is masked by the equisignal and one or more dots or dashes are lost. The number of lost dots or dashes is obtained by subtracting from 60 the total observed count of dots and dashes. One half of the lost characters are assumed to be dots and the other half dashes.

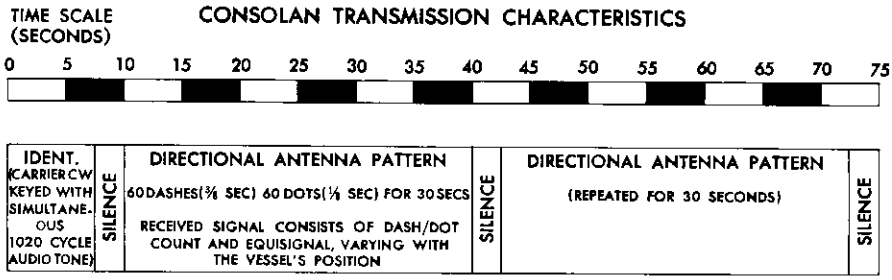


FIGURE 1

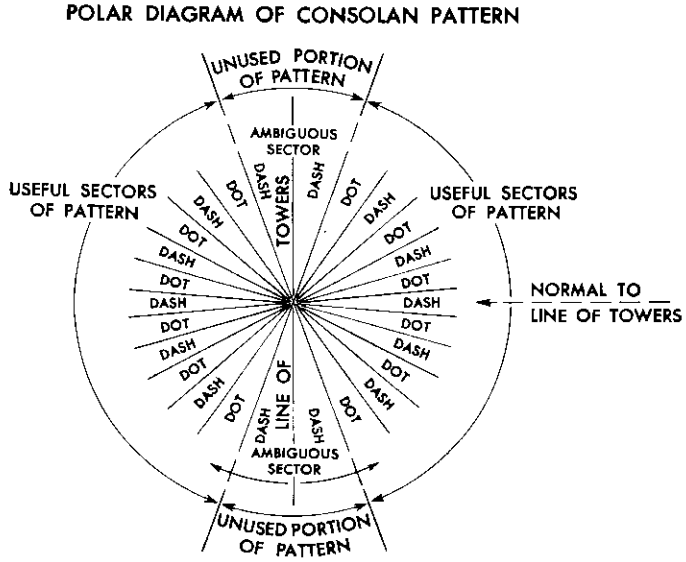


FIGURE 2

760B. RANGE AND ACCURACY

The system, basically a CW system in respect to both identification and navigational system transmissions, is usable with beat frequency oscillator (BFO) CW reception to long ranges. With experience, operators can determine the number of dots and dashes with good accuracy under adverse conditions of signal and noise when voice communications will be unintelligible. Range therefore, depends on such variables as noise, ground conductivity, ionospheric conditions, frequency and power of the ground stations, and the ability of the operator. Greatest range is achieved over sea-water paths. Narrow-ban receivers provide a high operational range. In general, Consolan stations on or about 190 kcs can be expected to provide service over sea-water from 1000 to 1400 miles or more. The system is not usable within 50 miles of the stations.

The greatest accuracy is obtained on a line normal (at a 90° angle) to the line of towers and the useful portion of the pattern is the sector of 140° broadside to the antennas. The pattern off the ends of the line of towers (plus or minus 20°) is considered unsuitable for bearing information purposes. The general accuracy of Consolan bearings is 0.3° average during the daytime and 0.7° average during the nighttime.

760D. PROCEDURE TO OBTAIN A BEARING

To obtain a Consolan Bearing the desired Consolan Station is tuned using the DF receiver or a communications receiver with the (BFO) beat frequency oscillator turned ON and the (AVC) automatic volume control turned OFF. The station is identified by the Morse Code identification signal. Immediately following one of the 2.5 seconds silent periods the operator must count the dots or dashes received until the equisignal is heard, then continue counting the dashes or dots, respectively, until the next silent period is reached. Add the two counts together which will produce a figure less than 60. The unheard dots and dashes were lost in the equisignal zone and may be determined by subtracting the total heard from 60. ONE HALF of the remainder is then added to the dots or dashes which were heard first immediately following the silent period.

EXAMPLE:	Dots (heard first) counted	15
	Dashes counted	39
	Total	54
	Equisignal	6 (60–54)
	Total dots (15 plus 3)	18
	Total dashes (39 plus 3)	42

NOTE.—Use Table 7600.2 when the dots precede the equisignal; use Table 7600.3 when the dashes precede the equisignal.

As the dots are heard first, the observer is, therefore, located on the line represented by 18 dots after the end of the silent period. This total count has been identified as a "dot" count. If the transmission should begin with the equisignal or partial equisignal, care should be exercised in interpretation of the signal count. For instance, the 3 dot example (Figure 3) shows a condition where the beginning 3 dots were masked by the equisignal yet the count is a "dot" count. Should an instance of this kind result in interpretation as a "dash" count, reference to the conversion table would yield a bearing of such great discrepancy that it would be readily recognized as an error. The 60 dot count and the 60 dash count (shown in figure 3) are repetitive exceptions to the rule. Fortunately this condition holds the probability of infrequent occurence and even so, if it should result in misinterpretation of 59 instead of a 60 dash count, the error in the resulting bearing derived from the tables would be less than ½°.

Ambiguous signal counts occur in alternate dot/dash sectors. It is necessary therefore, to determine the sector by known approximate position, maps, charts, dead reckoning, or direction finding. Practical experience indicates that the possibility of using the wrong sector is rather small but care should be taken. A direction finder check will usually suffice to identify the proper sector.

Reference to Consolan Table for the particular station being received, the dot/dash signal count converts to the true bearing of the observer's position from the station. Consolan charts give the location of the station, the "zero" line (through the towers) and the normals (90° to the zero line). A line of position therefore, may be readily plotted. The intersection of two bearings or LOP will give an accurate indication of position. The Mercator bearing from the station is obtained by entering the conversion talbe with the difference of longitude and latitude of the observer, interpolating if necessary, and applying the resulting correction to the true bearing according to the rules given. See tables for individual stations.

760F. CAUTIONS

At night, always take a series of readings, particularly when 300 to 700 miles from the station. Wide variation in successive counts is an indication of sky-wave/ground-wave interference. These bearings should be handled with great caution or disregarded.

EXAMPLES OF KEYING CYCLES RECEIVED

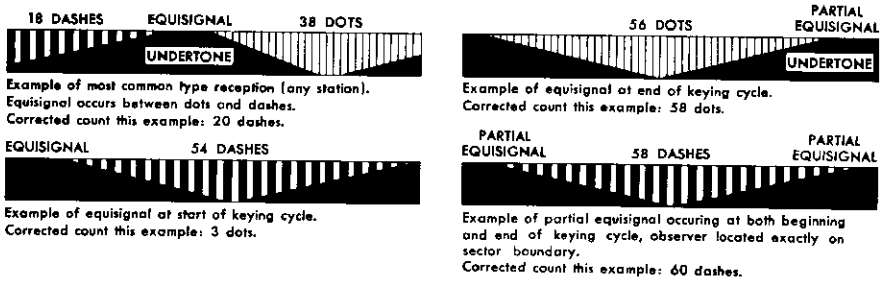


FIGURE 3

7600. San Francisco (SFI). **38°12'13"N., 122°34'08"W.**

FREQ.: 192 kc.
CHARACTERISTIC SIGNAL: 7.5 seconds call signal, 2.5 seconds silent, 30 seconds keying cycle (See Fig. 1).
HOURS OF TRANSMISSION: Continuous.

7600.1. San Francisco Consolan Station—Conversion Table

Difference of longitude	Latitude of Observer																		
	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°
0°	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0	0°.0
5°	1°.1	1°.2	1°.2	1°.3	1°.3	1°.4	1°.4	1°.4	1°.7	1°.7	1°.7	1°.7	1°.7	1°.7	1°.7	1°.7	1°.6	1°.5	0°.0
10°	2°.3	2°.4	2°.5	2°.6	2°.7	2°.7	2°.8	3°.0	3°.2	3°.3	3°.4	3°.4	3°.4	3°.4	3°.4	3°.4	3°.2	3°.0	0°.0
15°	3°.4	3°.6	3°.7	3°.9	4°.0	4°.2	4°.3	4°.5	4°.7	4°.9	5°.0	5°.1	5°.1	5°.1	5°.1	5°.0	4°.9	4°.4	0°.0
20°	4°.6	4°.8	5°.0	5°.2	5°.4	5°.6	5°.8	6°.1	6°.3	6°.5	6°.7	6°.7	6°.8	6°.8	6°.8	6°.7	6°.5	5°.9	0°.0
25°	5°.7	6°.0	6°.3	6°.6	6°.9	7°.1	7°.4	7°.6	7°.9	8°.1	8°.3	8°.4	8°.5	8°.6	8°.5	8°.4	8°.1	7°.4	0°.0
30°	6°.9	7°.3	7°.6	8°.0	8°.3	8°.6	8°.9	9°.2	9°.5	9°.8	10°.0	10°.1	10°.3	10°.3	10°.3	10°.1	9°.7	8°.9	0°.0
35°	8°.2	8°.6	9°.0	9°.4	9°.8	10°.1	10°.5	10°.8	11°.1	11°.4	11°.7	11°.9	12°.0	12°.0	12°.0	11°.8	11°.4	10°.4	0°.0
40°	9°.4	9°.9	10°.4	10°.8	11°.3	11°.7	12°.1	12°.5	12°.8	13°.1	13°.4	13°.6	13°.7	13°.8	13°.8	13°.5	13°.0	11°.9	0°.0
45°	10°.7	11°.3	11°.8	12°.3	12°.8	13°.3	13°.7	14°.1	14°.5	14°.8	15°.1	15°.4	15°.5	15°.6	15°.5	15°.3	14°.7	13°.3	0°.0
50°	12°.0	12°.7	13°.3	13°.8	14°.4	14°.9	15°.4	15°.8	16°.2	16°.6	16°.9	17°.2	17°.3	17°.4	17°.3	17°.0	16°.3	14°.8	0°.0
55°	13°.4	14°.1	14°.8	15°.4	16°.0	16°.5	17°.1	17°.6	18°.0	18°.4	18°.7	19°.0	19°.2	19°.2	19°.1	18°.8	18°.0	16°.3	0°.0
60°	14°.8	15°.6	16°.3	17°.0	17°.6	18°.3	18°.8	19°.3	19°.8	20°.2	20°.6	20°.9	21°.0	21°.1	20°.9	20°.5	19°.7	17°.8	0°.0
65°	16°.3	17°.1	17°.9	18°.7	19°.4	20°.0	20°.6	21°.2	21°.7	22°.1	22°.5	22°.8	22°.9	22°.9	22°.8	22°.3	21°.4	19°.3	0°.0
70°	17°.8	18°.7	19°.6	20°.4	21°.1	21°.8	22°.5	23°.1	23°.6	24°.0	24°.4	24°.7	24°.9	24°.9	24°.6	24°.1	23°.0	20°.8	0°.0
75°	19°.3	20°.4	21°.3	22°.2	23°.0	23°.7	24°.4	25°.0	25°.6	26°.0	26°.4	26°.7	26°.8	26°.8	26°.5	25°.9	24°.7	22°.3	0°.0
80°	21°.0	22°.1	23°.1	24°.0	24°.9	25°.7	26°.4	27°.1	27°.6	28°.1	28°.5	28°.7	28°.8	28°.8	28°.5	27°.8	26°.5	23°.8	0°.0
85°	22°.7	23°.9	25°.0	26°.0	26°.9	27°.7	28°.5	29°.2	29°.7	30°.2	30°.6	30°.8	30°.9	30°.8	30°.4	29°.6	28°.2	25°.3	0°.0
90°	24°.6	25°.8	27°.0	28°.1	29°.0	29°.9	30°.7	31°.3	31°.9	32°.4	32°.8	33°.0	33°.0	32°.8	32°.4	31°.5	29°.9	28°.8	0°.0

Corrections to be *added* to the true bearing to obtain the Mercator bearing when the observer is to the East of the station and *subtracted* when the observer is to the West of the station.

7600.2. San Francisco Consolan Station–Dot Sectors

Count of Dots	True bearing from station											
0	2. 1	25. 6	45. 3	64. 4	85. 3	115. 1	164. 8	194. 7	215. 6	234. 7	254. 4	277. 9
1	1. 9	25. 5	45. 1	64. 3	85. 1	114. 7	165. 2	194. 9	215. 7	234. 9	254. 6	278. 2
2	1. 7	25. 3	44. 9	64. 1	85. 0	114. 4	165. 5	195. 0	215. 9	235. 1	254. 8	278. 4
3	1. 4	25. 1	44. 8	64. 0	84. 8	114. 1	165. 8	195. 2	216. 1	235. 3	255. 0	278. 7
4	1. 2	24. 9	44. 7	63. 8	84. 6	113. 7	166. 2	195. 4	216. 2	235. 4	255. 2	278. 9
5	0. 9	24. 8	44. 5	63. 7	84. 5	113. 4	166. 5	195. 6	216. 3	235. 6	255. 4	279. 2
6	0. 7	24. 6	44. 4	63. 5	84. 4	113. 1	166. 8	195. 8	216. 5	235. 7	255. 5	279. 4
7	0. 5	24. 4	44. 2	63. 3	84. 2	112. 7	167. 2	196. 0	216. 7	235. 9	255. 7	279. 7
8	0. 3	24. 2	44. 1	63. 2	84. 0	112. 4	167. 5	196. 2	216. 9	236. 1	255. 9	279.9
9	0. 1	24. 0	43.9	63. 0	83. 8	112. 1	167. 8	196. 5	217. 0	236. 2	256. 1	280. 2
10	359.8	23. 8	43.7	62. 8	83. 6	111. 8	168. 2	196. 6	217. 1	236. 4	256. 2	280. 4
11	359.5	23. 7	43. 5	62. 6	83. 4	111. 4	168. 5	196. 8	217. 3	236. 5	256. 4	280. 7
12	359.2	23. 5	43. 3	62. 4	83. 2	111. 1	168. 8	197. 0	217. 5	236. 7	256. 6	280. 9
13	358.9	23. 3	43. 1	62. 2	83. 0	110. 7	169. 2	197. 2	217. 7	236. 9	256. 7	281. 2
14	358.6	23. 1	42. 9	62. 1	82. 8	110. 4	169. 5	197. 4	217. 9	237. 0	256. 9	281. 4
15	358.3	22. 9	42. 7	61. 9	82. 6	110. 1	169. 8	197. 6	218. 0	237. 2	257. 1	281. 7
16	358.0	22. 8	42. 6	61. 7	82. 4	109. 8	170. 2	197. 8	218. 1	237. 3	257. 3	281. 9
17	357. 8	22. 6	42. 4	61. 5	82. 2	109. 4	170. 5	198. 0	218. 3	237. 5	257. 5	282. 2
18	357. 6	22. 4	42. 3	61. 4	82. 0	109. 1	170. 8	198. 2	218. 5	237. 7	257. 6	282. 4
19	357. 3	22. 2	42. 2	61. 2	81. 8	108. 8	171. 2	198. 4	218. 7	237. 8	257. 8	282. 7
20	357. 1	22. 1	42. 1	61. 1	81. 6	108. 6	171. 5	198. 5	218. 9	238. 0	258. 0	283. 0
21	356. 9	21. 9	41. 9	60.19	81. 4	108. 2	171. 8	198. 7	219. 0	238. 1	258. 2	283. 4
22	356. 6	21. 7	41. 7	60. 7	81. 2	107. 9	172. 2	198. 9	219. 1	238. 3	258. 4	283. 6
23	356. 3	21. 5	41. 5	60. 6	81. 0	107. 5	172. 5	199. 1	219. 3	238. 5	258. 5	283. 8
24	356. 1	21. 3	41. 4	60. 4	80. 8	107. 2	172. 8	199. 2	219. 5	238. 7	258. 7	284. 0
25	355. 8	21. 1	41. 2	60. 3	80. 6	106. 9	173. 2	199. 4	219. 7	238. 8	258. 9	284. 3
26	355. 5	20. 9	41. 1	60. 1	80. 4	106. 5	173. 5	199. 6	219. 9	239. 0	259. 1	284. 5
27	355. 3	20. 8	40. 9	59. 9	80. 2	106. 2	173. 8	199. 8	220. 0	239. 1	259. 3	284. 7
28	355. 1	20. 6	40. 8	59. 8	80. 0	106. 0	174. 1	200. 0	220. 2	239. 3	259. 4	285. 0
29	354. 8	20. 4	40. 6	59. 6	79. 8	105. 7	174. 4	200. 2	220. 4	239. 4	259. 6	285. 2
30	354. 6	20. 3	40. 5	59. 5	79. 7	105. 4	174. 6	200. 3	220. 5	239. 5	259. 7	285. 4
31	354. 3	20. 2	40. 4	59. 4	79. 5	105. 1	174. 9	200. 5	220. 6	239. 6	259. 9	285. 8
32	354. 0	20. 0	40. 2	59. 2	79. 3	104. 9	175. 1	200. 6	220. 8	239. 8	260. 1	286. 1
33	353. 7	19. 8	40. 0	59. 1	79. 2	104. 6	175. 4	200. 8	220. 9	239. 9	260.3	286. 5
34	353. 4	19. 6	39. 9	59. 0	79. 1	104. 4	175. 6	201. 0	221. 1	240. 1	260. 5	286. 9
35	353. 1	19. 4	39. 7	58. 8	78. 9	104. 1	175. 9	201.3	221. 3	240. 3	260. 7	287. 2
36	352. 8	19. 2	39. 5	58. 6	78. 7	103. 9	176. 1	201. 4	221. 5	240. 5	260. 9	287. 6
37	352. 5	19. 1	39. 4	58. 5	78. 5	103. 7	176. 4	201. 6	221. 7	240. 7	261. 1	287. 9
38	352. 2	18. 9	39. 2	58. 3	78. 3	103. 5	176. 6	201. 8	221. 9	240. 9	261. 3	288. 3
39	351. 8	18. 7	39. 0	58. 1	78. 2	103. 2	176. 9	202. 0	222. 1	241. 1	261. 5	288. 6
40	351. 5	18. 4	38. 8	57. 9	78. 0	103. 0	177. 1	202. 3	222. 3	241. 2	261. 8	288. 9
41	351. 2	18. 3	38. 7	57. 8	77. 8	102. 7	177. 4	202. 5	222. 5	241. 4	262. 0	289. 3
42	350. 9	18. 2	38. 5	57. 7	77. 6	102. 4	177. 6	202. 7	222. 7	241. 5	262. 2	289. 6
43	350. 6	18. 0	38. 3	57. 5	77. 5	102. 2	177. 9	202. 9	222. 9	241. 7	262. 4	289. 9
44	350. 3	17. 8	38. 2	57. 3	77. 3	101. 9	178. 1	203. 1	223. 1	241. 8	262. 6	290. 2
45	350. 0	17. 6	38. 0	57. 2	77. 1	101. 6	178. 4	203. 2	223. 2	242. 0	262. 8	290. 5
46	349. 7	17. 4	37. 8	57. 0	76. 9	101. 4	178. 6	203. 4	223. 4	242. 1	262. 9	290. 8
47	349. 3	17. 2	37. 7	56. 9	76. 8	101. 1	178. 9	203. 6	223. 5	242. 3	263. 0	291. 1
48	349. 0	17. 0	37. 5	56. 7	76. 6	100. 9	179. 1	203. 7	223. 6	242. 5	263. 2	291. 4
49	348. 6	16. 8	37. 4	56. 6	76. 4	100. 6	179. 4	203. 9	223. 7	242. 7	263. 4	291. 7
50	348. 3	16. 6	37. 2	56. 3	76. 2	100. 5	179. 6	204. 1	223. 9	242. 8	263. 6	292. 1
51	347. 9	16. 4	37. 1	56. 2	76. 0	100. 2	179. 9	204. 3	224. 0	242.9	263. 8	292. 4
52	347. 6	16. 2	37. 0	56. 1	75. 9	100. 0	180. 1	204. 5	224. 2	243. 1	264. 0	292. 7
53	347. 3	16. 0	36. 8	55. 9	75. 7	99. 7	180. 4	204. 6	224. 3	243. 2	264. 1	293. 0
54	347. 0	15. 8	36. 7	55. 7	75. 5	99. 4	180. 6	204. 8	224. 4	243. 4	264. 3	293. 3
55	346. 7	15. 6	36. 5	55. 6	75. 3	99. 1	180. 9	204. 9	224. 5	243. 6	264. 5	293. 6
56	346. 4	15. 4	36. 3	55. 4	75. 1	98. 9	181. 1	205. 0	224. 7	243. 8	264. 6	293. 9
57	346. 0	15. 2	36. 1	55. 2	75. 0	98. 6	181. 4	205. 1	224. 8	243. 9	264. 8	294. 3
58	345. 7	15. 0	36. 0	55. 0	74. 8	98. 4	181. 6	205. 3	225. 0	244. 1	265. 0	294. 6
59	345. 3	14. 9	35. 8	54. 9	74. 6	98. 1	181. 9	205. 5	225. 1	244. 3	265. 1	294. 9
60	344. 9	14. 7	35. 6	54. 7	74. 4	97. 9	182. 1	205. 6	225. 3	244. 4	265. 3	295. 1

7600.3. San Francisco Consolan Station–Dash Sectors

Count of Dashes	True bearing from station													
0	344.9	14.7	35.6	54.7	74.4	97.9			182.1	205.6	225.3	244.4	265.3	295.1
1	344.5	14.5	35.4	54.6	74.2	97.6			182.4	205.7	225.5	244.6	265.5	295.5
2	344.1	14.3	35.2	54.5	74.1	97.4			182.6	205.9	225.7	244.8	265.7	295.9
3	343.7	14.1	35.0	54.3	73.9	97.2			182.8	206.1	225.8	245.0	265.9	296.3
4	343.3	13.9	34.9	54.1	73.7	97.0			183.1	206.3	226.0	245.1	265.1	296.7
5	342.9	13.7	34.7	54.0	73.5	96.8			183.3	206.4	226.2	245.3	266.3	297.1
6	342.5	13.5	34.5	53.8	73.4	96.6			183.5	206.6	226.4	245.5	266.5	297.5
7	342.1	13.3	34.4	53.7	73.2	96.4			183.7	206.8	226.5	245.6	266.7	297.9
8	341.7	13.1	34.2	53.5	73.0	96.1			184.0	207.0	226.6	245.8	266.9	298.3
9	341.3	12.9	34.0	53.3	72.9	95.9			184.2	207.2	226.8	246.0	267.1	298.7
10	340.9	12.8	33.9	53.2	72.7	95.7			184.5	207.3	227.0	246.1	267.3	299.2
11	340.4	12.5	33.7	53.0	72.6	95.5			184.7	207.5	227.1	246.3	267.5	299.7
12	339.9	12.3	33.5	52.9	72.4	95.4			184.9	207.7	227.3	246.5	267.7	300.3
13	339.4	12.1	33.4	52.7	72.2	95.2			185.2	207.8	227.5	246.6	267.9	300.7
14	338.9	11.9	33.2	52.5	72.0	94.9			185.4	208.0	227.7	246.8	268.1	301.2
15	338.4	11.7	33.0	52.4	71.8	94.7			185.6	208.1	227.8	247.0	268.3	301.8
16	337.8	11.5	32.9	52.2	71.6	94.5			185.8	208.3	228.0	247.1	268.5	302.4
17	337.2	11.3	32.7	52.1	71.5	94.2			186.0	208.5	228.1	247.3	268.7	303.0
18	336.6	11.1	32.5	51.9	71.3	94.0			186.2	208.7	228.2	247.5	268.9	303.6
19	336.0	10.9	32.4	51.8	71.2	93.8			186.4	208.9	228.4	247.7	269.1	304.0
20	335.2	10.7	32.2	51.6	71.0	93.5			186.6	209.0	228.6	247.8	269.3	304.8
21	334.4	10.5	32.0	51.4	70.8	93.2			186.9	209.2	228.7	248.0	269.5	305.6
22	333.6	10.3	31.9	51.3	70.6	93.0			187.1	209.3	228.9	248.1	269.7	306.2
23	332.8	10.1	31.7	51.1	70.4	92.8			187.3	209.5	229.0	248.3	269.9	307.0
24	331.8	9.9	31.5	51.0	70.3	92.5			187.5	209.7	229.2	248.5	270.1	308.2
25	330.8	9.7	31.4	50.8	70.2	92.3			187.7	209.9	229.4	248.6	270.3	309.2
26	329.3	9.5	31.2	50.6	70.0	92.1			187.9	210.0	229.5	248.8	270.5	310.7
27	327.8	9.3	31.0	50.5	69.8	91.9			188.1	210.2	229.7	249.0	270.7	312.2
28	325.8	9.1	30.9	50.3	69.7	91.7			188.3	210.4	229.8	249.1	270.9	314.1
29	323.8	8.9	30.7	50.2	69.5	91.5			188.5	210.5	229.9	249.3	271.1	316.2
30	320.0	8.7	30.6	50.0	69.4	91.3	140.0	140.0	188.7	210.6	230.0	249.4	271.3	320.0
31		8.5	30.4	49.8	69.3	91.1	136.2	143.8	188.9	210.7	230.1	249.6	271.5	
32		8.3	30.2	49.7	69.1	90.9	132.7	147.2	189.1	210.9	230.3	249.8	271.7	
33		8.1	30.0	49.5	69.0	90.7	131.2	148.7	189.3	211.0	230.5	250.0	272.0	
34		7.9	29.9	49.4	68.8	90.5	129.7	150.2	189.5	211.2	230.6	250.1	272.2	
35		7.7	29.7	49.2	68.6	90.3	128.7	151.2	189.7	211.4	230.8	250.3	272.4	
36		7.5	29.5	49.0	68.5	90.1	127.7	152.2	189.9	211.5	231.0	250.5	272.6	
37		7.3	29.3	48.9	68.3	89.9	126.9	153.0	190.1	211.7	231.1	250.7	272.8	
38		7.0	29.2	48.7	68.1	89.7	126.1	153.8	190.3	211.9	231.3	250.8	273.1	
39		6.8	29.0	48.6	68.0	89.5	125.4	154.5	190.5	212.0	231.5	251.0	273.3	
40		6.6	28.8	48.4	67.8	89.3	124.7	155.2	190.7	212.2	231.6	251.2	273.5	
41		6.4	28.7	48.2	67.6	89.1	124.1	155.8	190.9	212.4	231.8	251.3	273.7	
42		6.1	28.5	48.1	67.5	88.9	123.5	156.4	191.1	212.5	231.9	251.5	273.9	
43		5.9	28.3	47.9	67.3	88.7	122.9	157.0	191.3	212.7	232.1	251.7	274.2	
44		5.7	28.1	47.8	67.1	88.5	122.3	157.6	191.5	212.9	232.2	251.9	274.4	
45		5.5	28.0	47.6	66.9	88.3	121.7	158.2	191.7	213.1	232.4	252.0	274.6	
46		5.2	27.8	47.4	66.8	88.1	121.1	153.8	191.9	213.2	232.6	252.2	274.8	
47		5.0	27.6	47.3	66.6	87.9	120.6	159.3	192.1	213.4	232.7	252.4	275.0	
48		4.8	27.5	47.1	66.5	87 7	120.1	159.8	192.3	213.6	232.9	252.5	275.3	
49		4.6	27.3	47.0	66.3	87.5	119.6	160.3	192.5	213.8	233.1	252.7	275.5	
50		4.3	27.1	46.8	66.1	87.3	119.1	160.8	192.7	214.0	233.2	252.9	275.7	
51		4.1	26.9	46.7	65.9	87.1	118.7	161.2	192.9	214.1	233.3	253.1	276.0	
52		3.9	26.8	46.5	65.7	86.9	118.3	161.6	193.1	214.2	233.5	253.2	276.2	
53		3.7	26.6	46.3	65.5	86.7	117.9	162.0	193.3	214.4	233.7	253.4	276.3	
54		3.4	26.4	46.2	65.3	86.5	117.5	162.4	193.5	214.5	233.8	253.6	276.5	
55		3.2	26.3	46.0	65.2	86.3	117.1	162.8	193.7	214.7	234.0	253.7	276.7	
56		3.0	26.1	45.9	65.0	86.1	116.7	163.2	193.9	214.8	234.1	253.9	277.0	
57		2.8	25.9	45.7	64.9	85.9	116.3	163.6	194.1	215.0	234.3	254.1	277.2	
58		2.5	25.8	45.5	64.7	85.7	115.9	164.0	194.3	215.2	234.5	254.2	277.4	
59		2.3	25.7	45.4	64.6	85.5	115.5	164.4	194.5	215.4	234.6	254.3	277.6	
60		2.1	25.6	45.3	64.4	85.3	115.1	164.9	194.7	215.6.	234.7	254.4	277.9	

DECCA

770. GENERAL

The Decca Navigator System is a frequency-stable, continuous-wave phase-comparison system with transmissions in the medium frequency Radio Navigation band, 70–130 kc/s. The transmitting stations consist of a Master station (A) and three Slave stations designated Red (B), Green (C), and Purple (D), each about 60–100 miles from the Master. The continuous wave transmissions from the Slave stations are rigidly phase-locked to those from the Master station, and transmission frequencies are exactly: Master 6f, Red 8f, Green 9f and Purple 5f, where f is a basic frequency of around 14.2 kc/s.

Multiplying circuits in a ship-borne receiver produce Comparison frequencies of 24f for the Master and Red transmissions, 18f for the Master and Green transmissions, and 30f for the Master and Purple transmissions.

Phase meters on the receiver, called Decometers, indicate the Phase-Difference, at these comparison frequencies, of the transmissions received from the Master station and each of the Slave stations. The line of constant phase difference is a hyperbola, and for each Master/Slave pair there is a stable family of hyperbolae.

The hyperbolic lattice lines of zero phase difference are printed in their respective colors, Red, Green or Purple, on the appropriate chart. The interval between successive zero phase hyperbolae is termed a LANE. The position of the ship is at the intersection of the relevant hyperbolae of the Decometer readings and can easily and continuously be plotted on the latticed chart.

The Decometers measure only the decimal fraction of each lane. The correct lane is determined by Lane Identification transmissions utilizing as a comparison frequency the basic frequency (1f). The correct lane number of each color is indicated in succession on one common Lane Identification Meter on the receiver, and is then set on the Decometer. This common 1f comparison frequency determines the lane number within a ZONE whose width on the base-lines between the Master and Slave stations is the same for all colors. Each Zone contains 24 Red lanes, 18 Green lanes, or 30 Purple lanes. The width of each lane on the basic-line is approximately Red: 450 meters, Green: 590 meters and Purple: 350 meters. For unambiguous presentation the Zones are lettered, and the Lanes numbered outwards from the Master station. Each group of ten Zones is lettered from A to J, and the Lanes in each zone are numbered: Red, 0 to 23; Green, 30 to 47; and Purple, 50 to 79.

Readings at the Master station are Red A 0.00, Green A 30.00 and Purple A 50.00.

The correct Zone Letter must be determined from normal navigational methods and by reference to the appropriate Decca latticed chart. As the zones are about 6 miles in width on the base lines, and as this width increases away from the base-lines, the accepted position of the ship is generally not critical for this purpose.

770A. Chain Numbers

There are 11 Groups of basic frequencies, numbered from 0 to 10. In each of these 11 basic groups, 6 Master frequencies, lettered A to F, are derived to provide for existing and future chains. Thus, in Group 0, normal Master frequencies in kc/s are OA 84.100, OB 84.105, OC 84.110, OD 84.190, OE 84.195 and OF 84.200. The frequency interval between each numbered group is 0.180 kc/s, e.g. the English Chain No. 5B has a Master frequeucy of 85.005 kc/s. Group 10 includes only the A, B, and C frequencies.

Mark 12 receivers can be switched to each of these 63 frequencies. Earlier receivers can be switched to the numbers only: cannot discriminate between the A, B, or C frequencies, and cannot receive the D, E or F transmissions.

All existing Navigational Chain transmissions are on A, B or C frequencies, excepting the North Bothnian chain, on frequency 5F.

When once correctly set up, the Decca Navigator system will give a continuous record of position. Lane Slip (or incorrect Lane Identification), giving errors in position, may however result from:—

(i) Interruption or disturbance in transmissions (see Sec. 770F).

(ii) Incorrect referencing of receiver.

(iii) Interference: either excessive Decca skywave signals, external radio interference, or electrical storms.

770B. Accuracy

The accuracy obtained from the Decca Navigator system is dependent upon the distance from the transmitters and the angle of cut of the lattice lines. Used correctly and under favorable conditions, the system is capable of a high degree of accuracy, and positions correct to within $\pm$ 50 yards can be obtained up to 50 miles from the transmitting stations. In limited areas the chains are capable of being used for survey and ships' trials. However, two types of errors, Fixed Errors and Variable Errors are inherent in the system and are explained below.

770C. Fixed Errors

The speed of propagation of the medium frequency Decca transmissions from the Master and Slave stations is affected by the conductivity of the terrain, and is slightly lower over land than over the sea. The advancing wave fronts are thus not exactly circular, as they would be in a uniform medium, but are slightly irregular, and the lines of constant phase difference in these overlapping patterns produce slightly irregular hyperbolic position lines. This system of irregular position lines is, however, stable in position, as the Decca chains are continuously monitored and the phase-locking of the Slave stations held rigid. The hyperbolic lattices shown on the charts are calculated using a mean speed of propagation obtained by averaging the calculated probable velocities at numerous points over the coverage of the chain. The difference between the actual position of a hyperbolic position line and its theoretically calculated position (i.e. the position given on the chart) is known as the Fixed Error.

This Fixed Error, or Pattern Correction, varies with locality. Where the Decca chain coverage is almost wholly over water, as in the Persian Gulf chains, the speed of propagation differs only slightly from that adopted for the calculation of the lattices, and the resultant Fixed Errors are small. Where, however, the chain extends over large mountainous land masses or islands, as in the North Scottish chain, the actual speed of propagation varies markedly in different localities; the resultant Fixed Errors are appreciable, and can exceed ± 0.5 lanes.

The variation in the speeds of propagation can cause simultaneous observations of all 3 Decometers to produce three separate two-color position fixes. In the areas of overlap of adjoining chains, observations of each separate chain can similarly produce different position fixes.

Observations to determine these Fixed Errors of the chains, i.e. the corrections to be applied to observed Decometer readings to make them agree with the theoretical lattice on the charts, have usually been carried out during the acceptance trials. The resultant Fixed Errors at certain positions, generally about 3 miles off-shore, along the coastal coverage of the chains, and including the approaches to all the important ports, are given in detail in the DATA SHEETS No. 2, Fixed-Errors (Pattern Corrections) issued by the Decca Navigator Company.

When NO information regarding Fixed Errors is available, the charted Decca lattices should be used with caution, especially near the coast and in restricted waters.

At one time it was anticipated that adequate observations would be made of the Fixed Errors, and that the corrections would be included in the lattices printed on the charts. Experience has shown this task is not practicable, and it is unlikely that the theoretical lattices shown on Admiralty charts will ever be corrected. However, the Swedish Hydrographer has published Swedish charts with adjusted Decca lattices incorporating the results of extended observations in the Baltic, and these have been copied on the Admiralty latticed charts of the Swedish Chain.

770D. Variable Errors

A small proportion of the transmitted signal is reflected from the ionosphere and interferes with the direct or ground-wave signal. At night, or in daylight at extreme range, this sky-wave signal may become sufficiently strong to cause an inaccurate reading to be shown on the Decometer. This causes a Variable Error which can become considerable at extreme ranges, and is greater at night than by day and generally worse in winter.

These Variable errors, and the resultant diamond of error in position, are explained in detail, and the values given for numerous ports and localities over the coastal coverage of the chains, in DATA SHEETS No. 3 issued by the Decca Navigator Company.

Mariners are strongly cautioned that, at distances of over 150 miles from the transmitting stations, particularly at night or dusk, the signals may be too weak to work the Lane Identification Meter correctly. This can lead to sudden lane slipping and the loss of one or more lanes. Decca should not be relied upon as the sole aid to navigation in these circumstances.

Notes:—

1. Ships fitted with receivers of an earlier type than the Mark V (QM.5 or QM.9) (i.e. those without Lane Identification facilities) must know their position accurately when initially setting up the meters and when re-setting them for any reason (for example after failure of the transmitter or receiver or when the ship enters the approved coverage area). The possibility of lane-slipping must also be borne in mind. Steps should be taken at all times to check that lanes have not slipped, e.g. by checking with the dead-reckoning plot at regular intervals.

2. Ships fitted with Mark V and later receivers will, when in the appropriate areas, be able to make use of the Lane Identification facilities provided. It is emphasized that before using Lane Identification, reference should be made to the following paragraphs and to the Decca Navigator Company's special instructions referred to therein.

Lane Identification

3. The British Ministry of Transport has approved the general use of Lane Identification as a facility additional to the service provided by normal Decca transmissions; approval is conditional on strict compliance with the instructions contained in Data Sheet 5B issued by the Decca Navigator Company with the authority of the Ministry. Failure to follow the procedures laid down may result in misleading information being obtained; adherence to the instructions will permit the use of Lane Identification to the fullest extent.

4. *In night conditions* the high probability of correct Lane Identification may be reduced at ranges of over 150 nautical miles from the transmitting stations. It should be noted that provided the instructions referred to above are followed rigidly, use can be made of Lane Identification facilities in these conditions; the chances of correct Lane Identification readings will be lower but following the instructions should ensure that information from correct readings only is used.

5. Earlier receivers do not incorporate the necessary circuits or meters to display Lane Identification signals, but a slight kick of the decometer pointers will be observed on these receivers, as well as on Mark V (QM.5 or QM.9), at the start of each Lane Identification transmission. This may be neglected, since it in no way affects the performance of the receiver as a navigational aid.

Transmission Failures

6. Any break or disturbance of the normal transmissions of Decca stations are broadcast as Decca Warnings by the coast radio stations in the vicinity. These stations are listed in paragraph 7 below.

These warnings are issued because the transmission failure may result in lane loss on Decca Navigator receivers. Whether a lane is lost or not depends on the position, course and speed of the vessel at the time, and the duration of the failure. In some cases more than one lane may be lost.

Two types of warning are used:—

(i) "DECCA ENGLISH CHAIN RED TRANSMISSION INTERRUPTED 1315 to 1330 GMT TENTH APRIL CHECK LANE NUMBER."

This warning implies that the whole number Red lane reading is liable to be in error and that special care should be taken to check the Decca position indicated.

(ii) "DECCA ENGLISH CHAIN RED PATTERN DISTURBED 1315 GMT CHECK LANE NUMBER."

This message is sent when any pattern has been disturbed by severe interference with the ground station which is likely to have caused the gain or loss of a lane. The same precautions should be taken.

Any faults in Lane Identification transmissions will be apparent if the instructions for their use given in the Decca Navigator Company's Data Sheets are followed, and no procedure for promulgation by broadcast is necessary.

7. STATIONS BROADCASTING DECCA WARNINGS.

Warnings are given on both W/T and R/T, except for stations marked:

* *R/T only.* † *W/T only.*

GREAT BRITAIN AND IRELAND.

English Chain: Wick, Humber, North Foreland*, Niton, Lands End, Portpatrick.
S.W. British Chain: Niton, Lands End, Ilfracombe, Portpatrick, Vulentia.
N. British Chain: Wick, Humber, Lands End, Portpatrick, Malin Head, Anglesey.
N. Scottish Chain: Wick, Stonehaven, Cullercoats, Humber, Seaforth, Portpatrick, Oban*.

GERMANY.

German Chain: Norddeich.

DENMARK.

Danish Chain: Blåvand, Skagen, Lyngby.

SWEDEN.

Swedish Chain: Stockholm (SDH) (SDJ).
N. and S. Bothnian Chains: Luleå, Härnösand, Stockholm.

PERSIAN GULF.

N. and S. Persian Gulf Chains: Bahrein †.

CANADA (Atlantic Coast).

Newfoundland Chain: Belle Isle, St. Johns (VON), St. Lawrence.
Cabot Strait Chain: Sydney, Grindstone, Fox River.
Nova Scotia Chain: Yarmouth, Halifax (VCS), Canso.
Anticosti Chain: Sydney, Grindstone, Fox River, Mont Joli, Quebec, Sept–Iles.

INDIA.

Bombay Chain: Bombay, Naval Radio, repeated by othor coast radio stations.

8. COVERAGE.

(a) British Chains.

The British Ministry of Transport approves the use of transmissions of Decca pattern from the English, North British, South West British and North Scottish chains of transmitting stations as an aid to navigation provided that:

(i) the transmissions are used in accordance with the advice on their correct use and on the limitation of the service they may be expected to provide, to be found herein and in the Data Sheets published by the Decca Navigator Company, and

(ii) appropriate Decca-latticed charts produced by the British Hydrographer of the Navy are available and are used.

The Ministry has arranged that all transmissions from Decca Navigator Stations in the United Kingdom shall be monitored and the results are the subject of close scrutiny by the Ministry; these monitor stations thus provide a check on the accuracy and the reliability of the chains.

(b) Other European chains.

(c) Persian Gulf Chains.

(d) Indian Chain.

(e) Canadian and New York Chains.

CHAIN INTERFERENCE: English Chain

Warning is given that transmissions from the Danish Chain may have an adverse effect on the operation of receivers of an earlier type than Mark V (QM.5 or QM.9) used on the English Chain, particularly by night, within the part of the coverage area to the north and east of a line joining Amsterdam and lat. 55°15'N., long. 1°15'E. The Purple pattern is the one subject to the greatest potential interference; the Green pattern may be affected to a lesser degree; and it is unlikely that the Red pattern will be disturbed at all.

This adverse effect may cause errors in the readings of the decometers of these receivers due to sluggish response, or no response, of the meters to a change in the ship's position; the meters may, however, give inaccurate readings without any such indication that they are not working normally. The effect is expected to occur only when any of the English stations are operating on reduced power (e.g. on a reserve aerial) and the Danish stations are operating on full power. As the mariner will not necessarily know when this condition obtains, this type of receiver should, until further notice, be used with particular discretion at all times in the part of the coverage area specified in the above paragraph.

DECCA CHAINS IN OPERATION

EUROPE

	STATION		POSITION		FREQUENCY (kc/s)
7700.	**English Chain (Chain 5b).**				
	Puckeridge	A Master	51°54'33"N.	0°00'05"E.	85.00
	Norwich	B Red Slave	52°33'08"N.	1°20'00"E.	113.33
	Lewes	C Green Slave	50°54'33"N.	0°08'44"E.	127.50
	Warwich	D Purple Slave	52°11'49"N.	1°21'53"W.	70.83
7705.	**South-West British (Chain 1b).**				
	Bolberry Down	A Master	50°13'56"N.	3°50'13"W.	84.280
	Jersey	B Red Slave	49°14'39"N.	2°05'22"W.	112.373
	St. Mary's	C Green Slave	49°55'50"N.	6°18'15"W.	126.420
	Llancarfen	D Purple Slave	51°25'42"N.	3°22'41"W.	70.233
7710.	**North British Chain (Chain 3b).**				
	Kidsdale	A Master	54°42'03"N.	4°25'02"W.	84.645
	Clanrolla	B Red Slave	54°29'42"N.	6°19'50"W.	112.860
	Neston	C Green Slave	53°16'12"N.	3°03'09"W.	126.968
	Earlshill (Stirling)	D Purple Slave	56°04'18"N.	4°03'33"W.	70.538
7715.	**North Scottish Chain (Chain 6c).**				
	Kirkwall	A Master	59°03'38"N.	3°14'44"W	85.185
	Butt of Lewis	B Red Slave	58°29'49"N.	6°15'18"W.	113.580
	Lerwick	C Green Slave	60°09'51"N.	1°11'01"W.	127.778
	Peterhead	D Purple Slave	57°30'39"N.	1°50'59"W.	70.988
7720.	**Danish Chain (Chain 7b).**				
	Samsø	A Master	55°56'38"N.	10°35'02"E.	85.365
	Møen	B Red Slave	54°57'24"N.	12°28'00"E.	113.820
	Højer	C Green Slave	55°01'16"N.	8°42'10"E.	128.047
	Hjorring	D Purple Slave	57°26'55"N.	10°03'10"E.	71.138
7725.	**German Chain (Chain 9b).**				
	Brilon	A Master	51°26'30"N.	8°42'45"E.	85.720
	Stadtkyll	B Red Slave	50°21'55"N.	6°32'04"E.	114.293
	Zeven	C Green Slave	53°17'08"N.	9°16'10"E.	128.580
	Colburg	D Purple Slave	50°19'25"N.	10°59'21"E.	71.433
7730.	**Swedish Chain (Chain 4b).**				
	Nynashamn	A Master	58°56'44"N.	17°57'32"E.	84.825
	Radmanso	B Red Slave	59°43'21"N.	18°59'48"E.	113.100
	North Gotland	C Green Slave	57°54'53"N.	18°57'31"E.	127.238
	Bjorkvik	D Purple Slave	58°50'47"N.	16°34'22"E.	70.688
7735.	**South Bothnian (Chain 8c).**				
	Njurunda	A Master	62°16'51"N.	17°25'26"E.	85.550
	Skutskar	B Red Slave	60°37'20"N.	17°26'34"E.	114.067
	Jarnas	C Green Slave	63°28'50"N.	19°39'13"E.	128.325
7740.	**North Bothnian (Chain 5f).**				
	Lovanger	A Master	64°21'00"N.	21°20'56"E.	85.095
	Gamla Karleby	B Red Slave	63°51'56"N.	23°11'01"E.	113.460
	Kallax	C Green Slave	65°31'51"N.	22°04'09"E.	127.6425
	Jarnas	D Purple Slave	63°28'50"N.	19°39'13"E.	70.9125
7745.	**French Chain (Chain 8b).**				
	Saint-Angel	A Master	46°21'51"N.	2°43'05"E.	85.545
	Charge	B Red Slave	47°25'15"N.	1°01'51"E.	114.060
	Sanit-Germain-du-Plain	C Green Slave	46°42'20"N.	5°00'16"E.	128.318
	Teissere-du-Cornet	D Purple Slave	44°58'10"N.	2°22'49"E.	71.288

DECCA CHAINS IN OPERATION–Continued

CANADA

	STATION		POSITION		FREQUENCY (kc/s)
7750.	**Newfoundland Chain (Chain 2b).**				
	Port Blandford	A Master	48°21'13"N.	54°10'09"W.	84.465
	Shoe Cove	B Red Slave	47°44'24"N.	52°44'13"W.	112.620
	St. Lawrence	C Green Slave	46°55'06"N.	55°22'46"W.	126.697
	Comfort Cove	D Purple Slave	49°20'37"N.	54°52'12"W.	70.387
7755.	**Cabot Strait Chain (Chain 6b).**				
	Grindstone	A Master	47°21'26"N.	61°55'36"W.	85.180
	Port aux Basques	B Red Slave	47°37'57"N.	59°14'21"W.	113.573
	Antigonish	C Green Slave	45°44'11"N.	61°54'02"W.	127.770
7760.	**Nova Scotia Chain (Chain 7c).**				
	Chester	A Master	44°34'02"N.	64°16'05"W.	85.370
	Alma	B Red Slave	45°39'14"N.	64°55'48"W.	113.827
	Jordan Bay	C Green Slave	43°42'10"N.	65°14'28"W.	128.055
	Ecum Secum	D Purple Slave	44°57'53"N.	62°08'59"W.	71.142
7765.	**Anticosti Chain (Chain 9c).**				
	Port Menier	A Master	49°51'30"N.	64°26'41"W.	85.725
	Shippegan I.	B Red Slave	47°50'55"N.	64°41'24"W.	114.300
	Natashquan	C Green Slave	50°10'47"N.	61°48'47"W.	128.5875
	Sept–Iles	D Purple Slave	50°09'08"N.	66°37'03"W.	71.4375

UNITED STATES

7770.	**New York Chain (Chain 5c).**				
	Yorktown Hts.	A Master	41°16'42"N.	73°46'32"W.	85.005
	Yaphank (L.I.)	B Red Slave	40°48'13"N.	72°55'35"W.	113.340
	Andover (N.J.)	C Green Slave	41°00'31"N.	74°46'47"W.	127.5075
	Red Hook	D Purple Slave	42°03'51"N.	73°52'14"W.	70.8375

INDIA

7775.	**Bombay Chain (Chain 7b).**				
	Sawar Kundla	A Master	21°21'39"N.	71°18'23"E.	85.365
	Bulsar	B Red Slave	20°45'40"N.	73°02'17"E.	113.820
	Veraval	C Green Slave	20°57'07"N.	70°20'13"E.	128.047
	Dhrangdhara	D Purple Slave	23°00'14"N.	71°31'39"E.	71.137

PERSIAN GULF

7780.	**South Persian Gulf Chain (Chain 1c).**				
	Das	A Master	25°09'00"N.	52°52'33"E.	84.285
	Doha	B Red Slave	25°10'02"N.	51°19'34"E.	112.380
	Shaikh Shu'aib	C Green Slave	26°47'39"N.	53°22'25"E.	126.428
	Abu Dhabi	D Purple Slave	24°27'56"N.	54°19'53"E.	70.238
7785.	**North Persian Gulf Chain (Chain 5c).**				
	Bandar Delam	A Master	30°02'37"N.	50°09'20"E.	85.005
	Khosrowabad	B Red Slave	30°09'58"N.	48°25'28"E.	113.340
	Bushire	C Green Slave	28°58'19"N.	50°51'23"E.	127.508

Chapter 8
RADIO REGULATIONS FOR TERRITORIAL WATERS

800. GENERAL

Regulations and restrictions concerning the use of radio in general are given in the general radio regulations annexed to the International Telecommunication Union, Geneva, 1959.

All ships which are compulsorily equipped with radio and which are registered with countries which have ratified this Convention are required to have on board copies of the Convention and the regulations annexed thereto.

The following section of this book (800 to 896) contain special regulations issued by various countries regarding the use of radio within their harbors and terrirtorial waters.

PERU

810. It being necessary to adopt appropriate regulations for the purpose of preventing interference in wireless communications produced by ships anchored in ports on the coast:

It is hereby resolved: That the following rules of procedure be established:

1. Wireless communication is absolutely prohibited between stations on land and stations on ships anchored in Callao Bay.

2. When ships are anchored in other ports they may oommunicate with land stations but only through the nearest station and with the minimum power necessary.

3. While ships are anchored in Peruvian ports they are prohibited from entering into wireless communication with stations on board other ships except to give the international distress signals, S.O.S., *and*

4. If transmission by any anchored ship causes interference with other communications, the transmission must always cease immediately when the station which suffers interruption so requests.

Use of Radio by Foreign Warships

A decree dated 25th June, 1946, issued by the Peruvian Government makes the following regulations concerning the use of radio by foreign warships in Peruvian ports and territorial waters:

As a general rule there will be no limitation on the use of wireless communications by foreign warship during their stay in Peruvian ports or waters, but the Government reserves the right to restrict and/or suspend the use if considered desirable for security or other reasons.

(a) Transmissions are prohibited in the band 485–515 kc. (619–583 metres) except to send or reply to S.O.S. signals.

(b) Transmissions should not be employed which obstruct radiobeacon or D.F. stations, in accordance with the Washington International Convention of 1927.

(c) In accordance with the Washington International Convention of 1927, the band 550–1500 kc. (545–200 metres) should not be interfered with.

(d) The military and civil radio stations using bands 6675–7000 kc. (4494–4286 metres) and 7300–8550 kc. (41.10–35.09 metres) should not he interfered with.

(e) The following frequencies used by the Peruvian Naval School for the time signals should not be interfered with:

1100 hours, frequency 8,205; 500; 12,305.
1400 hours, frequency 8,205; 500; 12,305.
2000 hours, frequency 8,205; 12,305.

When the Commanding Officer of a foreign warship desires to consult the authorities on the question of transmissions he should address his communications to the Port Authorities or the Senior Naval Officer of the Port. In the absence of these persons his communication should be addressed to the Military Authority in residence, or local Civil Authority.

CANAL ZONE

812. The following paragraphs are taken from Title 35, Code of Federal Regulations, PanamaCanal–Part 123–Radio Communications; published in the Federal Register September 16, 1966. The provisions of this Part 123 issued under authority vested in President by 2 C.Z.C. 1331, 76A Stat. 46, and delegated to Secretary of Army, and effective December 15, 1966.

SECTION 123.1 *Radio communication defined.* For the purposes of this part, unless the context otherwise required, "radio communication" means the transmission by radio of writing, signs, signals, pictures, and sounds of all kinds, including all instrumentalities, facilities, apparatus, and services (among other things the receipt, forwarding, and delivery of communications) incidental to such transmission.

SEC. 123.2 *Control by Governor; excerise through Naval Shore Stations.* The Governor of the Canal Zone shall, subject to the provisions of this part, have entire control of radio communication in the Canal Zone so far as concerns or affects vessels in the harbors and other waters of the Canal Zone or the navigation of such waters, except vessels owned or operated by the United States Army, Navy or Air Force. In the exercise of such control the Governor may in his discretion utilize the shore radio stations owned by the United States and operated by the Navy Department, which stations are referred to as the shore stations.

SEC. 123.3 *Advance information required by radio from vessels approaching Canal.* Vessels approaching the Panama Canal shall communicate by radio to the Port Captain, through the Balboa Radio Station, call letters NBA, at least 48 hours in advance of arrival in the Canal Zone, the information required by Sec. 123.4. If radio communication can be established earlier than 48 hours in advance of arrival, the required information should be furnished at the time such commuoication is first practicable. The signal station on Flamenco Island is equipped with voice radio for communication with vessels approaching the Pacific entrance to the Canal on the following frequencies: International Calling and Distress 2182 kc/s and Panama Canal Company 2846 kc/s.

SEC. 123.4 *Same; information required.* (a) All of the items of information listed below, nnless previously commnnicated through agents or otherwise to the Canal Authorities, shall be transmitted to the Port Captain as required by Sec. 123.3, using the phonetic alphabet letters to identify the items, as follows:

ALFA—If Canal transit is desired.

BRAVO—48-hour advance estimate of time of arrival.

CHARLIE—Fore and aft draft of vessel. Warships should include displacement.

DELTA—Last port of call.

ECHO—If there is any communicable disease aboard and, if so, identify such disease or diseases.

FOXTROT—Number, kind and origia of animals aboard, if any.

GOLF—Number of landing passengers, if any.

HOTEL—Number and origin of stowaways aboard, if any.

INDIA—If any structural changes, or changes in use of tanks, have been made since the vessel's last transit.

JULIET—Number of smallpox vaccinations required by crew members and passengers.

In addition to the above, tankers shall report:

KILO—The grades of cargo carried, if any. Give name of cargo if other than petroleum products.

LIMA—The grade of cargo last carried in each empty tank that is not gas free. Give name if other than petroleum products.

Vessels carrying explosives of any nature, whether for transit or docking, shall also report:

MIKE—The grades of such explosives.

NOVEMBER—The quantity in tons of each grade of such explosives.

Vessels docking shall also report:

OSCAR—Whether docking at Balboa or Cristobal and give reason, such as cargo operations, fuel, water, etc. Also give amounts in tons in each case.

(b) The following additional information shall be transmitted via radio to the Port Captain from *all* vessels as applicable:

(1) Vessels approaching from the Pacific shall report actual time of passing Cape Mala, or the latitude of Cape Mala, and the vessel's speed.

(2) Vessels approaching from the Atlantic shall report 12 hours prior to arrival at Cristobal any change of one hour or more in the expected time of arrival.

(3) Any other matters of importance and interest.

(c) Timely receipt of the above information will facilitate the transit or docking of arriving vessels. Failure to comply with these reporting requirements may subject a vessel to delay since vessels which do comply will receive priority of service and handling over those which do not.

SEC. 123.5 *Radio communication between vessels in Canal Zone and other vessels or places.* Except as authorized by authority of the Governor, and except as regards vessels operated by the United States *Army*, *Navy*, or Air Force, all radio communication between vessels in the Canal Zone and other vessels or places whether within or without the Canal Zone shall be carried on by forwarding through the Balboa Radio Station, call letters NVA; and, with such exceptions, no vessel in the Canal Zone, or person on board any such vessels, shall do any radio broadcasting, or shall, otherwise than by forwarding through such shore station, transmit any radio communication.

SEC. 123.6 *Restrictions on vessel radios as to power, testing and tuning.* Except as authorized by authority of the Governor, vessels within 15 miles of the Canal Zone should transmit only with low power, i.e., not more than 100 watts on a tube set, and should not do do any testing or tuning.

SEC. 123.7 *Operator on board during transit.* All vessels equipped with radio shall have a qualified radio operator on board, available to operate the radio installation if necessary, from the time the vessel leaves a terminal port to pass through the Canal until her arrival at the opposite ptrminal port. The provisions of this section do not apply to those vessels whose radio equipment has been sealed in Canal Zone waters in accordance with orders issued by competent authority.

SEC. 123.8 *Precedence of messages relative to vessel's movements and Canal business; use of vessel's radio by pilot.* Messages relating to a vessel's movements and Canal business shall take precedence over all commerical messages. The pilot on a vessel passing through the Canal shall be afforded free use of the vessel's radio for the transaction of Canal business.

SEC. 123.9 *Immediate report of accidents, delays, or casualties.* Under the direction of the pilot, ships shall report by radio to the local Government shore radio station any accident, either to themselves, or anything else that may delay them or require assistance, any sickness or casualties that require medical attendance, or any other matter of importance that may arise.

SEC. 123.10 *Operation of vessel radios in conformity with treaties.* Except as may be otherwise provided by this part, while in Canal Zone waters, vessels equipped with radio shall operate such equipment at all times in conformity with the principles and rules stipulated in the treaties or conventions to which the United States is a party.

SEC. 123.11 *Radio charges.* No receiving or relaying charges, will be imposed against ships on radiograms transmitted by ships on Canal business nor in the cases of dispatches involving medical assistance to ships.

SEC. 123.12 *Penalties for violation.* Whoever violates any of the provisions of Sec. 123.1 to 123.11 is subject to punishment as provided by 2 C.Z.C. 1331, 76A Stat. 46, by a fine of not more than $100, or by imprisonment in jail for not more than 30 days, or by both.

Amend Section 123.7 o read:

SEC. 123.7 *Operator on board during transit.* All vessels equipped with radio shall have a qualified radio operator on board, available to operate the radio installation if necessary, from the time the vessel leaves a terminal port to pass through the Canal until her arrival at the opposite terminal port. Vessels equipped with radio telephones operating on the freqnencies designated by the Panama Canal Company are deemed to meet the requirements of this section provided they have someone aboard capable and qnalified to operate such equipment. The provisions of this section do not apply to those vessels whose radio equipment has been sealed in Canal Zone waters in accordance with orders issued by competent authority.

NAVOCEANO 27 67.

MEXICO

830. The following extracts are taken from The Law of General Lines of Communication, published February 19, 1940:

INSTALLATIONS ABOARD VESSEL

Article 416.—All vessels of more than 500 tons gross tonnage and vessels of any tonnage carrying fifty or more souls, including the crew, provided they are engaged in foreign or coastal traffic, must carry wireless receiving and transmitting apparatus. Boats of over 20 but less than 500 tons gross tonnage engaged in such traffic shall carry a wireless receiving apparatus.

Article 417.—No vessels or aircraft which, in conformity with this Law, should be equipped with wireless installations, shall be allowed to leave or take off if they are not so equipped, or if, in the opinion of the inspectors of the Secretariat of Communications, such installations are not in good operating condition, or if they are not carrying the necessary radio operators.

Article 418.—The sending or receiving of paid messages by stations aboard vessels or aircraft shall be governed by the provisions of the respective International Conventions to which the Mexican Government has subscribed.

The owners of vessels and aircraft shall deposit the sum specified by the Secretariat of Communications to guarantee payment for the service of paid messages.

Article 419.—National and foreign vessels are prohibited from using their radio transmitting apparatus while anchored in Mexican ports where radio stations belonging to the National System are in operation, except in the following cases:

(i) When it is necessary to send or receive distress signals.

(ii) When, for any reason, the passengers or crew are unable to disembark.

Article 420.—Stations aboard national or foreign vessels anchored in Mexican ports where no installations of the National System are in operation, may furnish service by communicating with said System or with other vessels which are navigating or anchored off Mexican shores; all international service must, however, invariably be transmitted through national stations.

UNITED STATES

840. While United States regulations are in general conformity with the provisions of international conventions, the following extracts from the Communications Act of 1934, as amended, are quoted for the convenience of the mariner.

TITLE III, PART I

SEC. 301. *License for radio communication or transmission of energy.*—* * * No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio * * * upon any vessel or aircraft of the United States; or *(f)* upon any other mobile stations within the jurisdiction of the United States, except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act.

SEC. 321. (b) All radio stations, including Government stations and stations on board foreign vessels when within the territorial waters of the United States, shall give absolute priority to radio communications or signals relating to ships in distress; shall cease all sending on frequencies which will interfere with hearing a radio communication or signal of distress, and, except when engaged in answering or aiding the ship in distress, shall refrain from sending any radio communications or signals until there is assurance that no interference will be caused with the radio communications or signals relating thereto, and shall assist the vessel in distress, so far as possible, by complying with its instructions.

SEC. 323. *Interference between government and commercial stations.—(a)* At all places where Government and private or commercial radio stations on land operate in such close proximity that interference with the work of Government stations cannot be avoided when they are operating simultaneously, such private or commercial stations as do interfere with the transmission or reception of radio communications or signals by the Government stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time.

SEC. 324. *Use of minimum power.*—In all circumstances, except in case of radio communications or signals relating to vessels in distress, all radio stations, including those owned and operated by the United States, shall use the minimum amount of power necessary to carry out the communication desired.

TITLE III, PART II
TRANSMISSION OF INFORMATION

SEC. 359 *(d)* No charge shall be made by any ships or station in the mobile service of the United States for the transmission of distress messages and replies thereto in connection with situations involving the safety of life and property at sea.

(e) Notwithstanding any other provision of law, any station or carrier may render free service in connection with situations involving the safety of life and property, including hydrographic reports, weather reports, reports regarding aids to navigation and medical assistance to injured or sick persons on ships and aircraft at sea. All free service permitted by this subsection shall be subject to such rules and regulations as the Commission may prescribe, which rules may limit such free service to the extent which the Commission finds desirable in the public interest.

AUTHORITY OF MASTER

SEC. 360. The radio installation, the operators, the regulation of their watches, the transmission and receipt of messages, and the radio service of the ship except as they may be regulated by law or international agreement, or by rules and regulations made in pursuance thereof, shall in the case of a ship of the United States be under the supreme control of the master.

REPUBLIC OF SOUTH AFRICA

850. Wireless apparatus in ships (other than ships of war) shall not be worked or used while the ships are moored to any wharf or pier within a harbor or bay of the Republic of South Africa. Such ships within a harbor or bay of the Republic of South Africa but not moored alongside a wharf or pier may, however, use wireless apparatus only for the purpose of communication with land stations situated in the Republic of South Africa.

SAUDI ARABIA

860. The following regulation has been issued by the government of Saudi Arabia:

It is prohibited for owners and agents of shipping companies to use wireless apparatus in their ships either for broadcasting or receiving messages and signals so long as their ships remain in the harbors or in territorial waters of the said kingdom except in cases of serious danger such as fire, collision, or other similar emergencies. Any infringements of these instructions will be punishable in accordance with regulations in force.

UNION OF SOVIET SOCIALIST REPUBLICS

870. The following wireless regulations have been issued:

Regulations for the Use of Radio Telegraphy in Soviet Inland or Territorial Waters

1. Foreign war and merchant (nonwar) vessels, in the maritime frontier zone of the Union of Soviet Socialist Republics and in inland waters of the Union of Soviet Socialist Republics, within a distance of ten miles from the shore are allowed to use their radio installations only on the basis set forth in this decree.

2. Foreign merchant vessels, within the regions where coastal radio installations are established, are forbidden to exchange radio telegrams, except in the cases mentioned in article 7 of the present decree.

3. Foreign merchant vessels in ports where the nearest coastal radio installation is outside a radius of ten miles and also within the Sea of Azov, may be allowed to use their radio installations only under special written permits from the chief of the corresponding commercial port, to be issued for a period or for each separate occasion that the vessel visits the ports of inland waters of the Union of Soviet Socialist Republics.

In case the nearest coastal radio station belonging to the People's Commissariat for Military and Naval Affairs or other departments is situated at a distance of not more than ten miles in radius from the corresponding commercial port, the aforesaid foreign vessels receive permission for radio communication from the chief of the commercial port only in agreement with the local representatives of the respective departments.

4. The local command of naval forces has the right to restrict radio communication between foreign war vessels within the 10-mile zone, both as regards time and place of conducting conversations, and also as regards wavelength.

5. The chief of the nearest commercial port will supervise the execution of the regulations in article 2 of the present decree.

He closes and seals radio installations of foreign merchant vessels throughout their stay in port or within the 10-mile zone mentioned in article I of the present decree.

6. Foreign vessels standing at anchor in quarantine and requiring to communicate by radio with the local coastal radio station may, in exceptional cases, use the minimum power of the main radio transmitter or a low-powered radio set during days and hours to be communicated by the said station.

7. The restrictions on the rights to use vessels' radio installations foreseen in articles 2 and 6 of this decree do not affect: *(a)* Vessels in danger, or transmitting communications to prevent an accident; *(b)* vessels rendering help to other vessels in distress; and *(c)* while conducting vessels through ice.

When entering ports where coastal radio stations exist, foreign vessels in specially important cases are allowed to finish a radio communication started with the corresponding port, but not otherwise than on the condition that they switch over to the minimum power or to low-powered sets.

8. In all cases where vessels' radio installations are used in accordance with the present decree, foreign war and merchant vessels are guided by the appropriate regulations for international radio communications accepted by the Union of Soviet Socialist Republics, and also by the regulations controlling inland radio communication of the Union of Soviet Socialist Republics.

The unpublished regulations for inland radio communication are communicated to foreign vessels by the corresponding local military, naval, or port authorities upon the arrival of the vessels in ports of the Union of Soviet Socialist Republics.

9. Radio communications by foreign war and merchant vessels may be in plain language only, without the use of any kind of ciphers or codes, except the established signals under the international service regulations for radio communication, and also under the International Code of Signals.

10. The person empowered to communicate with the authorities on all questions arising out of the present decree is the commander or captain of the foreign vessel in question.

11. The regulations promulgated in the present decree remain in force only when the Union of Soviet Socialist Republics is not in a state of war, and only as regards vessels flying the flag of nonwarring States.

12. Persons infringing the regulations promulgated in the present decree are liable under the criminal legislation of the respective federal republics.

JAPAN

880. The following is extracted from Radio Transmission Law (Denpa Ho) No. 131 of May 1950:

In general, the law states that transmitters cannot be used in the territorial waters of Japan except to transmit distress messages, urgent messages, emergency messages and such other messages as the Japanese Postal Ministry may prescribe. Ships are permitted to use radio receivers in port.

Prior to securing transmitters, ships should clear traffic with the nearest Japanese coastal station and announce that they are securing the transmitters. The shore station should also be informed when the transmitter is again manned upon departing Japanese Territorial waters.

Transmitters may also be used in Japanese harbors with the permission of the local port authorities under the following conditions:

1. When there is no other means of communications with shore activities and urgent messages must be sent. In this situation the transmitter can only be used to transmit to the Japanese Coastal Radio Station.

2. When it is necessary to transmit in order to affect repairs by a Japanese Postal Ministry repairman.

AUSTRALIA

LIMITED USE OF RADIO IN CERTAIN CIRCUMSTANCES

Ships anchored or moored in ports or harbours of the Commonwealth of Australia and its territories where access to public land telecommunication facilities is not possible, may, subject to the following conditions, transmit radiotelegrams to the nearest coast station open for service:

(a) W/T and R/T transmissions must be confined to medium frequencies.

(b) The minimum power must be used and interference to other traffic avoided.

EGYPT (Suez Canal)

Art. 16—Captains of vessels shall place the radio apparatus at the disposal of the Canal Company during transit through the canal. Pilots shall be allowed to receive and send, free of charge to the company, all service messages which may be deemed necessary. The radio watch will be kept in accordance with the instructions of the pilot, and it may even be required that a continual watch shall be kept during the whole transit through the canal.

IRAQ

All foreign ships entering territoral waters of the Republic of Iraq and destined to Iraqi ports are hereby notified that the use of wireless installation aboard ships is strictly prohibited for the establishment of contact with any wireless station except Iraqi.

Chapter 9
MISCELLANEOUS INFORMATION

900. INTERNATIONAL MORSE CODE AND CONVENTIONAL SIGNALS[1]

A	ALFA	Period and decimal Point (AAA)	
B	BRAVO	Comma	
C	CHARLIE	Colon	
D	DELTA	Interrogation (IMI)	
E	ECHO	Apostrophe	
F	FOXTROT	Hyphen	
G	GOLF	Bar indicating fraction (1) (XE)	
H	HOTEL	Parenthesis	
I	INDIA	Inverted commas	
J	JULIETT	Underline	
K	KILO	Distress call (SOS)	
L	LIMA	Attention call to precede every transmission (CT)	
M	MIKE	General inquiry call (CQ)	
N	NOVEMBER	From (de)	
O	OSCAR	Invitation to transmit (go ahead) (K)	
P	PAPA	Question (please repeat after) when interrupting long messages (IMI)	
Q	QUEBEC	Wait (AS)	
R	ROMEO	Break (or =) (BT)	
S	SIERRA	Understand (VE)	
T	TANGO	Error (EEEE)	
U	UNIFORM	Received (O.K.) (R)	
V	VICTOR	Position report (to precede all position messages) (C)	
W	WHISKEY	End of each message (cross) (AR)	
X	XRAY	Transmission finished (end of work) (conclusion of correspondence) (VA)	
Y	YANKEE		
Z	ZULU		
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[1] To be used for all general public service radio communication. (1) A dash is equal to three dots; (2) the space between parts of the same letter is equal to one dot; (3) the space between two letters is equal to three dots; (4) the space between two words is equal to five dots.

MISCELLANEOUS ABBREVIATIONS

Abbreviation or signal	Definition
AA	All after - - - *(used after a question mark to request a repetition).*
AB	All before - - - *(used after a question mark to request a repetition).*
ADS	Address *(used after a question mark to request a repetition).*
AR	End of transmission (•▬•▬• *to be sent as one signal)* .
AS	Waiting period (•▬••• *to be sent as one signal).*
BK	Signal used to interrupt a transmission in progress.
BN	All between - - - and - - - *(used after a question mark to request a repetition.*
BQ	A reply to an RQ.
CFM	Confirm (*or* I confirm).
CL	I am closing my station.
COL	Collate (*or* I collate).
CP	General call to two or more specified stations.
CQ	General call to all stations.
CS	Call sign *(used to request a call sign).*
DDD	Used to identify the transmission of the distress message by a station not itself in distress.
DE	From *(used to precede the call sign of the calling station).*
DF	Your bearing at - - - hours was - - - degrees, in the doubtful sector of this station, with a possible error of - - - degrees.
DO	Bearing doubtful. Ask for another bearing later (*or* at - - - hours).
E	East (Cardinal).
ER	Here - - -
ETA	Estimated time of arrival.
ITP	The punctuation counts.
K	Invitation to transmit.
KMH	Kilometers per hour.
KTS	Nautical miles per hour *(Knots).*
MIN	Minute (*or* Minutes).
MPH	Statute miles per hour.
MSG	Prefix indicating a message to or from the master of a ship concerning its operation or navigation.
N	North (Cardinal) .
NIL	I have nothing to send to you.
NO	No *(Negative).*
NW	Now.
OK	We agree (*or* It is correct).
OL	Ocean Letter.
P	Prefix indicating a private radiotelegram.
PBL	Preamble *used after a question mark to request a repetition).*
R	Received.
REF	Reference to - - - (*or* Refer to - - -).
RPT	Repeat (*or* I repeat) (*or* Repeat - - -).
RQ	Indication of a request.
S	South (Cardinal) .
SIG	Signature *used after a question mark to request a repetition).*
SLT	Radiomaritime Letter.
SOS	Distress Signal (••• ▬▬▬ ••• *to be sent as one signal).*
SS	Indicator preceeding the name of a ship station.
SVC	Prefix indicating a service telegram.
SYS	Refer to your service telegram.
TFC	Traffic.
TR	Used by a land station to request the position and next port of call of a mobile station station; used also as a prefix to the reply.
TTT	This group when sent three times constitutes the safety signal.
TU	Thank you.
TXT	Text *(used after a question mark to request a repetition).*
VA	End of work (•••▬•▬ *to be sent as one signal).*
W	W (Cardinal) .

920. LIST OF ABBREVIATIONS TO BE USED IN RADIOTELEGRAPHY COMMUNICATIONS
Q CODE

Abbreviation	Question	Answer or advice
QRA	What is the name of your station?	The name of my station is - - - -.
QRB	How far approximately are you from my station?	The approximate distance between our stations is - - - nautical miles (*or* kilometres).
QRC	By what private enterprise (*or* State Administration) are the accounts for charges for your station settled?	The accounts for charges or my station are settled by the private enterprise - - - - (*or* State Administration).
QRD	Where are you bound for and where are you from?	I am bound for - - - - from - - - -.
QRE	What is your estimated time of arrival at - - - - (*or* over - - - -) *(place)*?	My estimated time of arrival at - - - - (*or* over - - - -) *(place)* is is - - - - hours.
QRF	Are you returning to - - - - *(place)*?	I am returning to - - - - *(place)*. *or* Return to - - - - *(place)*.
QRG	Will you tell me my exact frequency (*or* that of - - -)?	Your exact frequency (*or* that of - - -) is - - - kc/s (*or* Mc/s).
QRH	Does my frequency vary?	Your frequencies varies.
QRI	How is the tone of my transmission?	The tone of your transmission is - - - 1. good 2. variable 3. bad.
QRJ	How many radiotelephone calls have you to book?	I have - - - radiotelephone calls to book.
QRK	What is the intelligibility of my signals (*or* those of - - -)?	The intelligibility of your signals (*or* those of - - -) is - - - 1. bad 2. poor 3. fair 4. good 5. excellent.
QRL	Are you busy?	I am busy (*or* I am busy with - - -). Please do not interfere.
QRM	Are you being interfered with?	I am being interfered with (1. nil 2. slightly 3. moderately 4. severely 5. extremely).
QRN	Are you troubled by static?	I am troubled by static (1. nil 2. slightly 3. moderately 4. severely 5. extremely).
QRO	Shall I increase transmitter power?	Increase transmitter power.
QRP	Shall I decrease transmitter power?	Decrease transmitter power.
QRQ	Shall I send faster?	Send faster (- - - words per minute).
QRR	Are you ready for automatic operation?	I am ready for automatic operation. Send at - - - words per minute.
QRS	Shall I send more slowly?	Send more slowly (- - - words per minute).
QRT	Shall I stop sending?	Stop sending.
QRU	Have you anything for me?	I have nothing for you.
QRV	Are you ready?	I am ready.
QRW	Shall I inform - - - that you are calling him on - - - kc/s (*or* Mc/s).	Please inform - - - that I am calling him on - - - kc/s (*or* Mc/s).
QRX	When will you call me again?	I will call you again at - - - hours (on - - - kc/s (*or* Mc/s)).
QRY	What is my turn? *(Relates to communication)*	Your turn is Number - - - *(or according to any other indication)*. *(Relates to communication)*.
QRZ	Who is calling me?	You are being called by - - - (on - - - kc/s (*or* Mc/s)).
QSA	What is the strength of my signals (*or* those of - - -)?	The strength of your signals (*or* those of - - -) is - - - 1. scarcely perceptible 2. weak 3. fairly good 4. good 5. very good
QSB	Are my signals fading?	Your signals are fading.
QSC	Are you a cargo vessel? *(see Article 32, Section V)*	I am a cargo vessel.
QSD	Is my keying defective?	Your keying is defective.
QSE	What is the estimated drift of the survival craft?	The estimated drift of the survival craft is - - - *(figures and units)*

920. LIST OF ABBREVIATIONS TO BE USED IN RADIO COMMUNICATIONS—Continued

Q CODE

Abbreviation	Question	Answer or advice
QSF	Have you effected rescue?	I have effected rescue and am proceeding to - - - base (with - - - persons injured requiring ambulance).
QSG	Shall I send - - - telegrams at a time?	Send - - - telegrams at a time.
QSH	Are you able to home on your D/F equipment?	I am able to home on my D/F equipment (on station - - -).
QSI		I have been unable to break in on your transmission. *or* Will you inform - - - *(call sign)* that I have been unable to break in on his transmission (on - - - kc/s (*or* Mc/s)).
QSJ	What is the charge to be collected to - - - including your internal charge?	The charge to be collected to - - - including my internal charge is - - - francs.
QSK	Can you hear me between your signals and if so can I break in on your transmission?	I can hear you between my signals; break in on my transmission.
QSL	Can you acknowledge receipt?	I am acknowledging receipt.
QSM	Shall I repeat the last telegram which I sent you (*or* some previous telegram)?	Repeat the last telegram which you sent me (*or* telegram(s) number(s) - - -).
QSN	Did you hear me (*or* - - - *(call sign)*) on - - - kc/s (*or* Mc/s)?	I did hear you (*or* - - - *(call sign)*) on - - - kc/s (*or* Mc/s).
QSO	Can you communicate with - - - direct (*or* by relay)?	I can communicate with - - - direct (*or* by relay through - - -).
QSP	Will you relay to - - - free of charge?	I will relay to - - - free of charge.
QSQ	Have you a doctor on board (*or* is - - - *(name of person)* on board)?	I have a doctor on board (*or* - - - *(name of person)* is on board.
QSR	Shall I repeat the call on the calling frequency?	Repeat your call on the calling frequency; did not hear you (*or* have interference).
QSS	What working frequency will you use?	I will use the working frequency - - - kc/s *(normally only the last three figures of the frequency need be given).*
QSU	Shall I send or reply on this frequency (*or* on - - - kc/s (*or* Mc/s)) (with emissions of class - - -)?	Send or reply on this frequency (*or* on - - - kc/s (*or* Mc/s)) (with emissions of class - - -).
QSV	Shall I send a series of V's on this frequency (*or* - - - kc/s (*or* Mc/s))?	Send a series of V's on this frequency (*or* - - - kc/s (*or* Mc/s)).
QSW	Will you send on this frequency (*or* on - - - kc/s (*or* Mc/s)) (with emissions of class - - -)?	I am going to send on this frequency (*or* on - - - kc/s (*or* Mc/s)) (with emissions of class - - -).
QSX	Will you listen to - - - *(call sign(s))* on - - - kc/s (*or* Mc/s)?	I am listening to - - - *(call sign(s))* on - - - kc/s (*or* Mc/s).
QSY	Shall I change to transmission on another frequency?	Change to transmission on another frequency (*or* on - - - kc/s (*or* Mc/s)).
QSZ	Shall I send each word or group more than once?	Send each word or group twice (*or* - - - times).
QTA	Shall I cancel telegram number - - -?	Cancel telegram number - - -
QTB	Do you agree with my counting of words?	I do not agree with your counting of words; I will repeat the first letter or digit of each word or group.
QTC	How many telegrams have you to send?	I have - - - telegrams for you (*or* for - - -).
QTD	What has the rescue vessel or rescue aircraft recovered?	- - - *(identification)* has recovered - - - 1. - - - *(number)* survivors 2. wreckage 3. - - - *(number)* bodies.
QTE	What is my TRUE bearing from you? *or* What is my TRUE bearing from - - - *(call sign)*? *or* What is the TRUE bearing of - - - *(call sign)* from - - - *(call sign)*?	Your TRUE bearing from me is - - - degrees at - - - hours. *or* Your TRUE bearing from - - - *(call sign)* was - - - degrees at - - - hours. *or* The TRUE bearing of - - - *(call sign)* from - - - *(call sign)* was - - - degrees at - - - hours.
QTF	Will you give me the position of my station according to the bearings taken by the D/F stations which you control?	The position of your station according to the bearings taken by the D/F stations which I control was - - - latitude - - - longitude *(or other indication of position),* class- - - at - - - hours.
QTG	Will you send two dashes of ten seconds each followed by your call sign (repeated - - - times) (on - - - kc/s (*or* Mc/s))? or Will you request - - - to send two dashes of ten seconds followed by his call sign (repeated - - - times) on - - - kc/s (*or* Mc/s)?	I am going to send two dashes of ten seconds each followed by my call sign (repeated - - - times) (on - - - kc/s (*or* Mc/s)). or I have requested - - - to send two dashes of ten seconds followed by his call sign (repeated - - - times) on - - - kc/s (*or* Mc/s).

920. LIST OF ABBREVIATIONS TO BE USED IN RADIO COMMUNICATIONS—Continued

Q CODE

Abbreviation	Question	Answer or advice
QTH	What is your position in latitude and longitude *(or according to any other indication)*?	My position is - - - latitude - - - longitude *(or according to any other indication).*
QTI	What is your TRUE track?	My TRUE track is - - - degrees.
QTJ	What is your speed?	My speed is - - - knots (*or* - - - kilometres per hour *or* - - - statute miles per hour).
	(Requests the speed of a ship or aircraft through the water or air respectively.)	*(Indicates the speed of a ship or aircraft through the water or air respectively.)*
QTK	What is the speed of your aircraft in relation to the surface of the earth?	The speed of my aircraft in relation to the surface of the earth is - - - knots (*or* - - - kilometres per hour *or* - - - statute miles per hour).
QTL	What is your TRUE heading?	My TRUE heading is - - - degrees.
QTM	What is your MAGNETIC heading?	My MAGNETIC heading is - - - degrees.
QTN	At what time did you depart from - - - *(place)*?	I departed from - - - *(place)* at - - - hours.
QTO	Have you left dock (*or* port)?	I have left dock (*or* port).
	or	*or*
	Are you airborne?	I am airborne.
QTP	Are you going to enter dock (*or* port)?	I am going to entor dock (*or* port).
	or	*or*
	Are you going to alight (*or* land)?	I am going to alight (*or* land).
QTQ	Can you communicate with my station by means of the International Code of Signals?	I am going to communicate with your station by means of the International Code of Signals.
QTR	What is the correct time?	The correct time is - - - hours.
QTS	Will you send your call sign for tuning purposes or so that your frequency can be measured now (*or* at - - - hours) on - - - kc/s (*or* Mc/s)?	I will send my call sign for tuning purposes or so that my frequency may be measured now (*or* at - - - hours) on - - - kc/s (*or* Mc/s).
QTT		The identification signal which follows is superimposed on another transmission.
QTU	What are the hours during which your station is open?	My station is open from - - - to - - - hours.
QTV	Shall I stand guard for you on the frequency of - - - kc/s (*or* Mc/s) (from - - - to - - - hours)?	Stand guard for me on the frequency of - - - kc/s (*or* Mc/s) (from - - - to - - - hours).
QTW	What is the condition of survivors?	Survivors are in - - - condition and urgently need - - -.
QTX	Will you keep your station open for further communication with me until further notice (*or* until - - - hours)?	I will keep my station open for further communication with you until further notice (*or* until - - - hours).
QTY	Are you proceeding to the position of incident and if so when do you expect to arrive?	I am proceeding to the position of incident and expect to arrive at - - - hours (on - - - *date*).
QTZ	Are you continuing the search?	I am continuing the search for - - - (aircraft, ship, survival craft, survivors or wreckage).
QUA	Have you news of - - - *(call sign)*?	Here is news of - - - *(call sign).*
QUB	Can you give me in the following order information concerning: the direction in degrees TRUE and speed of the surface wind; visibility; present weather; and amount, type and height of base of cloud above surface elevation at - - - *(place of observation)* ?	Here is the information requested: - - - *The units used for speed and distances should be indicated.)*
QUC	What is the number *(or other indication)* of the last message you received from me (*or* from - - - *(call sign)*)?	The number *(or other indication)* of the last message I received from you (*or* from - - - *(call sign)*) is - - -
QUD	Have you received the urgency signal sent by - - - *(call sign of mobile station)*?	I have received the urgency signal sent by - - - *(call sign of mobile station)* at - - - hours.
QUE	Can you use telephony in - - - *(language)*, with interpreter if necessary; if so, on what frequencies?	I can use telephony in - - - *(language)* on - - - kc/s (*or* Mc/s).
QUF	Have you received the distress signal sent by - - - *(call sign of mobile station)*?	I have received the distress signal sent by - - - *(call sign of mobile station)* at - - - hours.
QUG	Will you be forced to alight (*or* land)?	I am forced to alight (*or* land) immediately. *or* I shall be forced to alight (*or* land) at - - - *(position or place)* at - - - hours.
QUH	Will you give me the present barometric pressure at sea level?	The present barometric pressure at sea level - - - *(units).*
QUI	Are your navigation lights working?	My navigation lights are working.

920. LIST OF ABBREVIATIONS TO BE USED IN RADIOTELEGRAPHY COMMUNICATIONS—Continued

Q CODE

Abbreviation	Question	Answer or advice
QUJ	Will you indicate the TRUE track to reach you (*or* - - -)?	The TRUE track to reach me (*or* - - -) is - - - degrees at - - - hours.
QUK	Can you tell me the condition of the sea observed at - - - *(place or co-ordinates)*?	The sea at - - - *(place or co-ordinates)* is - - -
QUL	Can you tell me the swell observed at - - - *(place or co-ordinates)*?	The swell at - - - *(place or co-ordinates)* is - - -
QUM	May I resume normal working?	Normal working may be resumed.
QUN	Will vessels in my immediate vicinity - - - *or* (in the vicinity of - - - latitude - - - longitude) *or* (in the vicinity of - - -) please indicate their position, TRUE course and speed?	My position, TRUE course and speed are - - -
QUO	Shall I search for - - - 1. aircraft 2. ship 3. survival craft in the vicinity of - - - latitude - - - longitude (*or according to any other indication*)?	Please search for - - - 1. aircraft 2. ship 3. survival craft in the vicinity of - - - latitude - - - Longitude *(or according to any other indication)*.
QUP	Will you indicate your position by - - - 1. searchlight 2. black smoke trail 3. pyrotechnic lights?	My position is indicated by - - - 1. searchlight 2. black smoke trail 3. pyrotechnic lights.
QUQ	Shall I train my searchlight nearly vertical on a cloud, occulting if possible and, if your aircraft is seen, deflect the beam up wind and on the water (*or* land) to facilitate your landing?	Please train your searchlight on a cloud, occulting if possible and, if my aircraft is seen or heard, deflect the beam up wind and on the water (*or* land) to facilitate my landing.
QUR	Have survivors - - - 1. received survival equipment 2. been picked up by rescue vessel 3. been reached by ground rescue party?	Survivors - - - 1. are in possession of survival equipment dropped by - - - 2. have been picked up by rescue vessel 3. have been reached by ground rescue party.
QUS	Have you sighted survivors or wreckage? If so, in what position?	Have sighted - - - 1. survivors in water 2. survivors on rafts 3. wreckage in position - - - latitude - - - longitude *(or according to any other indication)*.
QUT	Is position of incident marked?	Position of incident is marked by - - - 1. flame or smoke float 2. sea marker 3. sea marker dye 4. - - - *(specify other marking)*.
QUU	Shall I home ship or aircraft to my position?	Home ship or aircraft - - - *(call sign)* - - - 1. to your position by transmitting your call sign and long dashes on - - - kc/s (*or* Mc/s) 2. by transmitting on - - - kc/s (*or* Mc/s) TRUE track to reach you.
QUW	Are you in the search area designated as - - - *(designator or latitude and longitude)*?	I am in the - - - *(designation)* search area.
QUY	Is position of survival craft marked?	Position of survival craft was marked at - - - hours by - - - 1. flame or smoke float 2. sea marker 3. sea marker dye 4. - - - *(specify other marking)*.

930. Frequency and Wave Length Conversion Table

This table is based on the formula:

$$\text{Wave length in meters} = \frac{3 \times 10^5}{\text{Frequency in Kilocycles per second}}$$

Frequency and wave length are reciprocal, i. e., 50 kc. correspond to 6,000 meters and 50 meters to 6,000 kc.

The quantity 3×10^5 is an approximation, based on the assumption that the speed of propagation of radio waves is equal to that of light (299,820 km. per second). It is believed that slight variations in this value occur, depending upon the frequency of the wave.

Frequency (kc.)	Wave length (meters)
1	300, 000
2	150, 000
3	100, 000
4	75, 000
5	60, 000
6	50, 000
7	42, 857
8	37, 500
9	33, 333
10	30, 000
11	27, 273
12	25, 000
13	23, 077
14	21, 428
15	20, 000
16	18, 750
17	17, 647
18	16, 667
19	15, 789
20	15, 000
21	14, 286
22	13, 636
23	13, 043
24	12, 500
25	12, 000
26	11, 538
27	11, 111
28	10, 714
29	10, 344
30	10, 000
31	9, 677
32	9, 375
33	9, 091
34	8, 824
35	8, 571
36	8, 333
37	8, 108
38	7, 895
39	7, 692
40	7, 500
41	7, 317
42	7, 143
43	6, 977
44	6, 818
45	6, 667
46	6, 522
47	6, 383
48	6, 250
49	6, 122

Frequency (kc.)	Wave length (meters)
50	6, 000
51	5, 882
52	5, 769
53	5, 660
54	5, 556
55	5, 455
56	5, 357
57	5, 263
58	5, 172
59	5, 085
60	5, 000
61	4, 918
62	4, 839
63	4, 762
64	4, 687
65	4, 615
66	4, 546
67	4, 478
68	4, 412
69	4, 348
70	4, 286
71	4, 225
72	4, 167
73	4, 110
74	4, 054
75	4, 000
76	3, 947
77	3, 896
78	3, 846
79	3, 798
80	3, 750
81	3, 704
82	3, 659
83	3, 615
84	3, 571
85	3, 529
86	3, 488
87	3, 448
88	3, 409
89	3, 371
90	3, 333
91	3, 297
92	3, 261
93	3, 226
94	3, 192
95	3, 158
96	3, 125
97	3, 109
98	3, 103

Frequency (kc.)	Wave length (meters)
99	3, 030
100	3, 000
105	2, 857
110	2, 727
115	2, 609
120	2, 500
125	2, 400
130	2, 308
135	2, 222
140	2, 143
145	2, 069
150	2, 000
155	1, 936
160	1, 875
165	1, 818
170	1, 765
175	1, 714
180	1, 667
185	1, 622
190	1, 579
195	1, 538
200	1, 500
250	1, 200
300	1, 000
350	857. 1
400	750. 0
450	666. 7
500	600. 0
550	545. 5
600	500. 0
650	461. 5
700	428. 6
750	400. 0
800	375. 0
850	352. 9
900	333. 3
950	315. 8
1, 000	300. 0
1, 050	285. 7
1, 100	272. 7
1, 150	260. 9
1, 200	250. 0
1, 250	240. 0
1, 300	230. 8
1, 350	222. 2
1, 400	214. 3
1, 450	206. 9
1, 500	200. 0
1, 550	193. 6

Frequency (kc.)	Wave length (meters)
1, 600	187. 5
1, 650	181. 8
1, 700	176. 5
1, 750	171. 4
1, 800	166. 7
1, 850	162. 2
1, 900	157. 9
1, 950	153. 8
2, 000	150. 0
2, 050	146. 3
2, 100	142. 9
2, 150	139. 5
2, 200	136. 4
2, 250	133. 3
2, 300	130. 4
2, 350	127. 7
2, 400	125. 0
2, 450	122. 4
2, 500	120. 0
2, 550	117. 6
2, 600	115. 4
2, 650	113. 2
2, 700	111. 1
2, 750	109. 1
2, 800	107. 1
2, 850	105. 3
2, 900	103. 4
2, 950	101. 7
3, 000	100. 0
3, 250	92. 31
3, 500	85. 71
3, 750	80. 00
4, 000	75. 00
4, 250	70. 59
4, 500	66. 67
4, 750	63. 16
5, 000	60. 00
5, 250	57. 14
5, 500	54. 55
5, 750	52. 17
6, 000	50. 00
7, 000	42. 86
8, 000	37. 50
9, 000	33. 33
10, 000	30. 00
15, 000	20. 00
30, 000	10. 00
60, 000	5. 00
100, 000	3. 00

940. TECHNICAL RADIO BROADCAST SERVICES, RADIO STATIONS WWV AND WWVH

A. RADIO STATION WWV

The technical radio services broadcast continuously by the National Bureau of Standards Boulder Laboratory, include a total of six radio frequencies, 2.5, 5, 10, 15, 20, and 25 Mc/s, which are on the air at all times, day and night. This insures reliable coverage of the United States and extensive coverage of other parts of the world.

The services are: 1. Standard radio frequencies; 2. Standard audio frequencies; 3. Standard musical pitch; 4. Standard time intervals; 5. Time signals; 6. UT2 corrections; 7. Radio propagation forecasts; and 8. Geophysical alerts.

The Bureau welcomes reports on reception, methods of use, or special applications of the service. Correspondence should be addressed to National Bureau of Standards, Boulder Laboratories, Boulder, Colo. 80302.

WWV

Fort Collins, Colorado

Lat. 40°40′28″N., Long. 105°02′39″W.

Megacycles	Broadcast	Power (kw.)	Modulation, c/s
2.5	Continuously, night and day	1.0	1, 440, 600.
5	do	8.0	1, 440, 600
10	do	9.0	1, 440, 600.
15	do	9.0	1, 440, 600.
20	do	1.0	1, 440, 600.
25	do	.1	1, 440, 600.

WWVH

Puuneme, Maui, Hawaii

Lat. 20°46′02″N., Long. 156°27′42″W.

5	Continuously, night and day	2.0	1, 440, 600.
10	do	2.0	1, 440, 600.
15	do	2.0	1, 440, 600.

941. Standard Radio Frequency

The national standard of frequency is of value in radio, electronic, acoustic, and other measurements requiring an accurate frequency. Any desired radio frequency, including microwave frequencies, may be accurately measured in terms of the standard frequencies. This may be done precisely by the aid of one or more auxiliary oscillators, harmonic generators, and radio receivers. The accuracy of each of the radio carrier frequencies, as transmitted, is better than a part in 100,000,000. However, if received accuracies of this order are required it is necessary to make measurements over a long interval or apply corrections for errors introduced by transmission effects in the medium (Doppler effect, etc.).

942. Time Announcements

The audio frequencies are interrupted at precisely 2 minutes before each hour. They are resumed precisely on the hour and each 5 minutes thereafter.

The beginnings of the periods, when the audio frequencies are resumed, are in agreement with the basic time service of the United States Naval Observatory so that they mark accurately the hour and the successive 5-minute periods.

Universal time (Greenwich civil time or Greenwich mean time) is announced in telegraphic code each 5 minutes. This provides a quick reference to correct time where a timepiece may be in error by a few minutes. The zero- to 24-hour system is used starting with 0000 at midnight. The first two figures give the hour and the last two figures give the number of minutes past the hour when the tone returns. For example, at 1655 UT, or 11:55 a.m. eastern standard time, four figures (1, 6, 5, and 5) are broadcast in code. The time announcement refers to the end of an announcement interval ie.., when the audio frequencies are resumed.

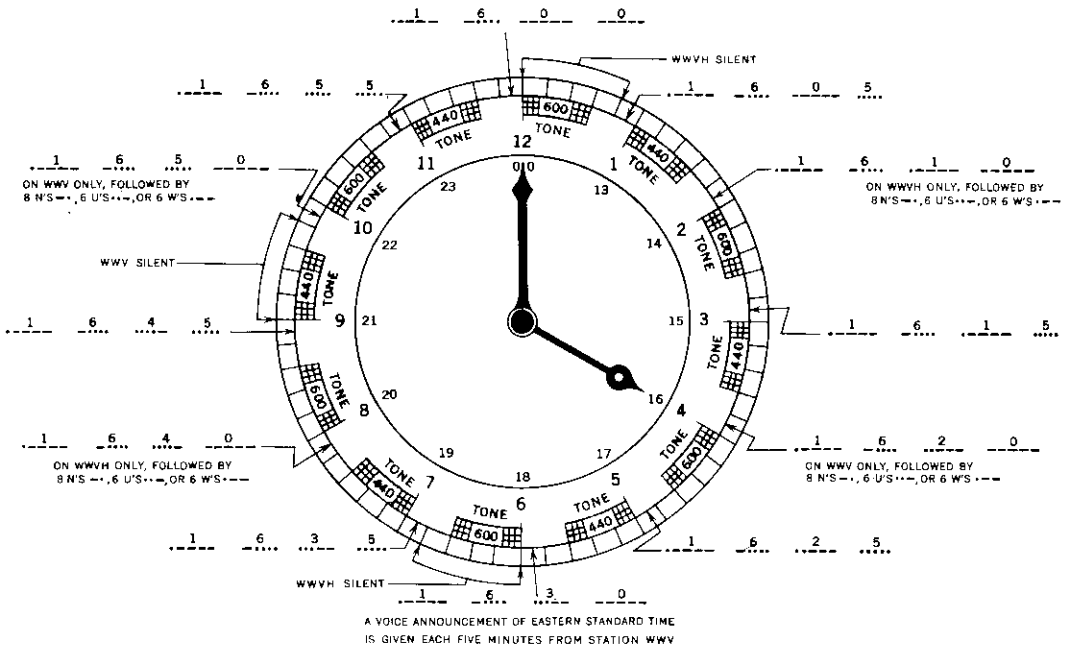
A voice announcement of eastern standard time is given following each telegraphic code announcement. For example, at 9:10 eastern standard time the voice announcement in English is: "This is radio station WWV; when the tone returns it will be 9:10 a.m. eastern standard time; 9:10 a.m."

STRUCTURE OF TIME SIGNALS

STATIONS WWV AND WWVH

THE HOUR ILLUSTRATED IS 1600 TO 1700 IN 24 HOUR TIME.

UNIVERSAL TIME



943. Standard Time Intervals

There is a pulse on each carrier frequency of 0.005-second duration which occurs at intervals of precisely 1 second. The pulse consiste of five cycles, each of 0.001-second duration, and is heard as a faint tick when listening to the broadcast; it provides a useful standard time interval, for purposes of physical measurements, and for quick and accurate measurement or calibration of timing devices or very low frequency oscillators. It may be used as an accurate time signal. The pulse is omitted at the beginning of the last second of every minute. The 1-minute, 4-minute, and 5-minute intervals, sychronized with the second pulses, are marked by the beginning or ending of the periods when the audio frequencies are off.

A time interval of 1 second marked by the pulse is accurate, as transmitted, to one microsecond (0.000001) second). A 1-minute or longer interval is accurate to a part in 50,000,000.

944. Standard Audio Frequencies and Musical Pitch

Two standard audio frequencies, 440 cycles per second and 600 cycles per second, are broadcast on all radio carrier frequencies. The audio frequencies are given alternately, starting with 600 cycles on the hour for 3 minutes, interrupted 2 minutes, followed by 440 cycles for 3 minutes, and interrupted 2 minutes. Each 10-minute period is the same.

The two standard audio frequencies are useful for accurate measurement or calibration of instruments operating in the audio or supersonic regions of the frequency spectrum. They may also be used for accurate measurement of short time intervals. The 440 cycles per second is the standard musical pitch. A above middle C, the standard in the music industry of the United States since 1925.

The accuracy of the audio frequencies, as transmitted is better than a part in 100,000,000. Transmission effects in the medium (Doppler effect, etc.) may result at times in slight fluctuations in the audio frequencies as received; the average frequency received is, however, of the same order of accuracy as that transmitted.

945. Radio Propagation Disturbance Warning Notice

The National Bureau of Standards will broadcast short wave radio disturbance forecasts via the NBS standard frequency broadcasting stations WWV and WWVH. The broadcasts will tell users or radio transmission paths over the North Atlantic the condition of the ionosphere at the time of the announcement and also how good or bad communication conditions are expected to be for the next 12 hours.

The NBS radio disturbance forecasts, prepared four times daily, will be transmitted in Morse code twice each hour-19½ and 49½ minutes past the hour-on WWV standard frequencies of 2.5, 5, 10, 15, 20, and 25 megacycles. Notices include a letter indicating present radio reception conditions and a digit indicating the expected quality of future reception. The letters used will be "N," "U," and "W," signifying that radio propagation conditions are normal, unsettled, or disturbed, respectively. The digit will be the forecast of expected quality of transmitting conditions on the NBS-CRPL scale of 1 (impossible) to 9 (excellent).

If, for example, propagation conditions at the time the forecast is made are normal but are expected to be only "fair to poor" within the next 12 hours, the forecast statement would be broadcast as N4 in Morse code, repeated five times, i.e., "N4, N4, N4, N4, N4."

The NBS forecasts are based on information obtained from a world-wide network of geophysical and solar observatories. Data on the development of sunspots, solar eruptions, and other activities of the sun are funnelled into the NBS Central Radio Propagation Laboratory in Washington, D.C. Radio soundings of the upper atmosphere, short wave reception data, and similar information are also readily available. Trained forecasters digest the information and formulate the predictions. The forecaste are issued by NBS regularly each day at 0500, 1200, 1700

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WWVH

Puuneme, Maui, Hawaii

Lat. 20°46′02″N., Long. 156°27′42″W.

5	Continuously, night and day	2.0	1, 440, 600.
10	----- do	2.0	1, 440, 600.
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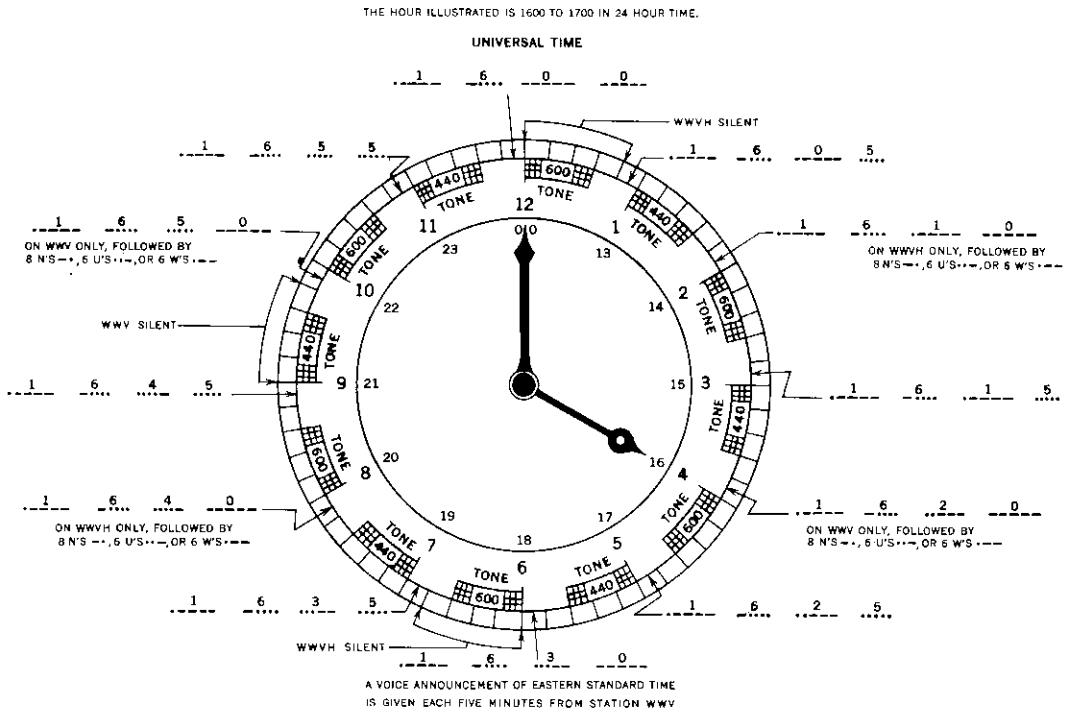
STRUCTURE OF TIME SIGNALS

STATIONS WWV AND WWVH



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The NBS radio disturbance forecasts, prepared four times daily, will be transmitted in Morse code twice each hour-19½ and 49½ minutes past the hour-on WWV standard frequencies of 2.5, 5, 10, 15, 20, and 25 megacycles. Notices include a letter indicating present radio reception conditions and a digit indicating the expected quality of future reception. The letters used will be "N," "U," and "W," signifying that radio propagation conditions are normal, unsettled, or disturbed, respectively. The digit will be the forecast of expected quality of transmitting conditions on the NBS-CRPL scale of 1 (impossible) to 9 (excellent).

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and 2300 G.M.T. Each forecast statement will be broadcast by WWV for a period of about 6 hours—until the next forecast is issued. Thus the forecast prepared at 1700 G.M.T. will be first broadcast at 1719½ and then at half-hourly intervals through 2249½. The broadcast at 2319½ will then carry the next disturbance forecast issued at 2300 G.M.T.

The letter portion of the forecast statement, describing the quality of radio propagation conditions, is valid only for the North Atlantic transmission path at the time the forecast is issued from NBS. The digit portion is a forecast of the average quality of communication conditions along these paths in the 12-hour period beginning at 0000, 0600, 1200, or 1800 G.M.T.-about an hour after the time at which the letter describes the condition. For example, a forecast statement of "W5" issued at 0500 G.M.T. means that at 0500 the conditions across the North Atlantic path were disturbed and that in the period 0600-1800 the average of conditions is expected to improve to quality 5 (fair).

The NBS radio disturbance forecasts refer only to North Atlantic paths, such as Washington to London or New York to Berlin. The forecasters assume that the most suitable radio frequencies for communications are available and in use along these paths. Because of this assumption, their notices must be interpreted on a relative scale in terms of experience on each radio circuit in use. It is impossible to rate conditions on an absolute scale because the varied effects of transmitter power, type of communications traffic and procedure, antennas, and receivers prevent an evaluation that will be valid for all systems and all circuits. One purpose of broadcasting both a description and a forecast is to show more clearly whether propagation conditions are expected to deteriorate or improve in the 12-hour period.

Digit (forecast)	Propagation condition	Letter (current)
1	Impossible	W
2	Very poor	W
3	Poor	W
4	Poor to fair	W
5	Fair	U
6	Fair to good	N
7	Good	N
8	Very good	N
9	Excellent	N

946. Distance Range of Reception

Of the standard radio frequencies (2.5, 5, 10, 15, 20, and 25 mc.), the lowest provide service to short distances, and the highest to great distances. Reliable reception is in general possible at all times throughout the United States and the North Atlantic and Pacific Oceans and reception at times throughout the world. One should select the frequency that gives best reception at any particular place and time. This can be done by two methods:

(a) By tuning to the different frequencies and selecting the one most suitable at that time. For nighttime conditions over the propagation path, lower frequencies than those used during the day are usually necessary because of skip. Received intensities on usable frequencies are much greater for nighttime than for daytime conditions.

(b) By making use of techniques of prediction of usable frequencies. Although there are a great number of variables affecting radio wave propagation and distance range, techniques exist for the prediction of usable frequencies over any specific path during any future month. By means of such techniques and the Central Radio Propagation Laboratory's prediction service, it is possible for a user to prepare a graph or table for his locality showing the best frequency for any period of the day in any month, three months in advance. National Bureau of Standards publications useful for this purpose are the reports of the CRPL-D series, "Basic Radio Propagation Predictions," which are issued monthly 3 months in advance of the month of prediction, and Circular 465 of the National Bureau of Standards, "Instructions for the Use of Basic Radio Propagation Predictions." These two publications may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., price in United States $1 per year (12 issues(and 30 cents per copy, respectively (foreign $1.25 and 40 cents).

For continuous 24-hour reception without a break, the use of more than one receiver and antenna is necessary. With skilled operators to anticipate times for frequency shifting and with schedules prepared as in *(b)* above as a guide, it may in some cases be possible to operate continuously with two receivers. For maximum certainty of reception it is necessary to employ as many receivers as there are satisfactorily receivable WWV frequencies at the location, leaving them all in operation continuously and combining their outputs. A separate and directive antenna for each radio receiver is desirable.

B. RADIO STATION WWVH (HAWAII)

Radio station WWVH, established by the National Bureau of Standards on the island of Maui, Hawaii, broadcasts on 5, 10, and 15 megacycles. Station WWVH extends to the Pacific area the following technical services: standard radio frequencies, time announcements, standard time intervals, standard audio frequencies, and standard musical pitch. Omnidirectional antennas radiate approximately 2,000 watts of power at each carrier frequency.

The program of broadcasts of WWVH, on its three frequencies, 5, 10, and 15 mc., is the same as that of station WWV for standard time intervals, time announcements in code, standard audio frequencies, and accuracy. Reports received indicate that station WWVH may be usefully received at many locations not served by station WWV and that simultaneous reception of WWV and WWVH does not interfere with ordinary use of the standard frequencies and time signals.

The WWVH broadcast is interrupted for 4 minutes following each hour and half hour and for periods of 34 minutes each day beginning at 1900 G.M.T. In using time interval markers for high precision work it is necessary to remember that step adjustment of precisely ± 20 milliseconds may be made at the transmitter on Wednesday at 1900 UT; this is explained under Sec. 942, Time Announcements. The second pulses from WWVH are adjusted if necessary each day during the interval 1900 to 1935 UT so as to commence simultaneously with those from WWV.

950. TECHNICAL RADIO BROADCAST SERVICES, RADIO STATION JJY

Technical radio services from the Standard Frequency Station, Tokyo (JJY) are broadcast continuously, except for the period from 25 to 34 minutes past each hour on 2,500; 5,000; 10,000 and 15,000 kc. 6A9 and include the following:

1. Standard radio frequencies.
2. Time announcements.
3. Radio propagation disturbance warning notices.

951. Standard Radio Frequency

The standard frequency as broadcast has an accuracy of $\pm 5 \times 10^{10}$, and accuracy of the standard time is 0.1 second.

952. Time Announcements—Radio Propagation Forecasts

Second signal (Note 1) is transmitted every second, and the preliminary signal of minute (Note 2) is transmitted beginning at 59.045 second of every minute. Standard carrier frequencies are modulated by 1000 c/s standard audio frequency every hour from 0 to 10 minutes, 20 to 25 minutes and 40 to 50 minutes except the time period of every second signal and every 0.04 seconds before and after these second signals and from 59 to 60 seconds of every minute.

Notes: 1. Second signal is the standard carrier frequency modulated by 1600 c/s standard audio frequency for the period of 0.005 seconds and the starting time of this modulation indicates the exact standard time to the moment.

2. Preliminary signal of minute is the standard carrier frequency modulated by 600 c/s standard audio frequency for 0.655 seconds and it gives previous notice that the second signal *following this signal indicates minute*.

From 34 to 35 minutes and 59 to 60 minutes of every hour, the following are transmitted in order:

(a) By keying of 1000 c/s audio frequency;
1. Call sign (JJY), twice
Time indicated by four figures, once.
2. By voice announcement;
Call sign (JJY) twice.
Time in Japanese, once.
3. By keying of 1000 c/s audio frequency;
Propagation forecast, five times.

Note.—Propagation forecast code
N – normal.
W – warning.
U – Unstable.

Chapter 10
INTERIM EMERGENCY PROCEDURES AND COMMUNICATIONS INSTRUCTIONS FOR U. S. MERCHANT SHIPS

PART I U.S. NAVAL CONTROL OF SHIPPING

PART II EMERGENCY COMMUNICATION INSTRUCTIONS

PART III SHIPPING CONTROL PROCEDURES

PART IV NUCLEAR FALLOUT WARNING SYSTEM FOR MERCHANT SHIPS AT SEA

Chapter 10 sets forth instructions and procedures for compliance by Masters and Radio Officers of U.S. Merchant Vessels which will ensure a rapid and smooth transition from a peacetime status to that of war upon outbreak of hostilities. It is intended that this Chapter serve as interim emergency instructions only; other publications and instructions will be issued upon arrival in port.

Masters and Radio Officers are urged to become familiar with the instructions contained in this Chapter in order to receive maximum protection from U.S. Naval Forces.

INTERIM EMERGENCY PROCEDURES AND COMMUNICATIONS INSTRUCTIONS FOR U.S. MERCHANT SHIPS

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PART I
U.S. NAVAL CONTROL OF SHIPPING IN TIME OF EMERGENCY OR WAR

101. United States Control of Merchant Vessels

In time of war or national emergency, merchant vessels of the United States and those foreign flag vessels, which are considered under effective United States control will be subject to control by agencies of the United States Government. The allocation and employment of such merchant vessels, and the allocation and domestic port facilities, equipment, and services will be performed by appropriate agencies of the War Transport Administration. The movement, routing, and diversion of merchant ships at sea will be controlled by appropriate naval commanders (see paragraph 105). The movement of merchant ships within domestic ports and dispersal anchorages will be coordinated by the United States Coast Guard. The commencement of naval control will be signalled by a general emergency message.

102. General and Suplementary Emergency Messages

a. The existence of a state of war or of the declaration of a national emergency will be announced by the Chief of Naval Operations or a Fleet Commander in Chief to merchant ships in a plain language general emergency message, broadcast through all available commercial and military communication systems. The message, which places merchant vessels of the types indicated above under United States control, will instruct them to comply with this chapter. It will be similar to the following example:

"WGBC (ALL U.S. CONTROLLED MERCHANT VESSELS DE
MMC (YOUR RADIO SERVICE COMPANY, e.g. RMCA, etc.)
XXX XXX XXX (URGENT SIGNAL)
FLASH 091717Z (PRECEDENCE AND DATE-TIME GROUP)
FM: CHIEF OF NAVAL OPERATIONS (ORIGINATOR)
TO: ALL U.S. CONTROLLED MERCHANT VESSELS (ACTION ADDRESSEE)
GR 30 (WORD COUNT BETWEEN BTs) BT (BREAK)
GENERAL EMERGENCY MESSAGE X UNITED STATES IS AT WAR WITH - - - - - - - - - - X MASTERS OF US CONTROLLED VESSELS COMPLY WITH INSTRUCTIONS CONTAINED IN NM OR HO 117A AND B CHAPTER TEN BT
091717Z AR"

b. Supplementary emergency messages (generally addressed) to (all U.S. controlled) ships at sea will be broadcast via the appropriate area merchant ship broadcast (MERCAST) as noted in the MERCAST area chart included in this chapter. Broadcast schedules and frequencies are contained in "Broadcast Schedules of U.S. Naval and Coast Guard Stations."

103. Instructions to U.S. Controlled Merchant Ships at Sea.

(a) Upon receipt of the general emergency message, Masters of U.S. controlled merchant ships at sea will carry out the following measures:

(1) Shift radio guard to the appropriate area MERCAST. During the early period of a national emergency and prior to receipt of detailed communications instructions (including code systems), Masters and Radio Officers should be especially alert for conflicting, false, or deceptive instructions. In this regard, U.S. Naval authorities will endeavor to provide timely warning of such spurious message traffic.

(2) Maintain radio silence except in emergency in order to reduce the disclosure of your position to enemy radio direction finders. Prohibit amateur radio operation. (See Part III, para 309)

(3) Maintain electronic silence when within danger zones, except when use of radar equipment is necessary for safe navigation. (See Part III, para 309)

(4) Darken ship. *Normally,* navigation lights should be used only for avoiding collision, in which case they should be extinguished as soon as the danger of collision has passed. However, in some areas the use of "dimmed" navigation lights for considerable periods may appear necessary, particularly in congested waters where, *in the judgment of the Master,* the danger of collision is greater than the apparent enemy threat (see Art. 308). In this connection, it is emphasized that a good lookout is essential to the ship's safety from enemy attack as well as collision.

(5) Unless sailed under specific orders from competent authority indicating contrary action, or unless in receipt of the document entitled Merchant Ship Movements on the outbreak of war or declared emergency or other reliable information indicating that contrary action would be in the best interest of the safety of the ship, masters of ships will complete their current voyages as follows:

(a) Ships inbound for the United States or on U.S. coastal service continue voyage avoiding major ports whenever practicable.

(b) Ships outbound from the United States for destinations outside known danger areas, continue voyage.

(c) Ships whose destinations are in a danger area, enter the nearest U.S. port or friendly port outside the danger area, perferably a port in which United States or allied naval or consular offices are located. (NOTE: While it is not practicable to list the locations of such ports and authorities in a publication of this kind, Masters should be able to obtain sufficient guidance from supplementary emergency messages and from radio press reports of the existing international situation).

(6) Avoid great circle tracks between principal ports when within danger zones.

(7) Approach and enter ports during daylight hours whenever practicable.

(8) Increase speed and make an occasional large alteration of course (if sea room permits) especially after nautical twilight in order to evade possible interception by enemy submarines. (Zigzagging of token character, or a simple "jury rig" zigzag continued over a long period, has little value. In fact, such procedure may be at variance with prevailing weather conditions and may unnecessarily delay the ship's arrival at a safe haven. Approved zigzagging plans will be issued to merchant ships upon institution of the Naval Control of Shipping.)

104. Instructions to U. S. Controlled Merchant Ships in Port

a. Masters of ships in or arriving in port in accordance with the above instructions, or in the course of their normal schedule, will immediately make an arrival report in person to the nearest of the following authorities:

(1) In U.S. ports—the Naval Control of Shipping Officer (NCSO), or other U.S. naval or Coast Guard authority.

(2) In foreign ports—the U.S. Naval Control of Shipping Officer, Military Sea Transportation Service (MSTS) Officer, Naval Attache, or Consular Officer. In friendly foreign ports where none of the above U.S. officials are stationed, masters will report to the appropriate allied naval authority, or consular officer. Masters, when unable to make reports to one of the above, must exert every effort and utilize the utmost ingenuity (including assistance from U.S. Naval vessels) to ensure the most rapid and secure means of delivery of these reports to the U.S. OCA in whose area his present port lies. (See chart of OCA areas.)

Items to be included are:

(1) Name of Ship, International Call Sign and Flag.
(2) Port or anchorage in which ship is located.
If not in port, indicate by name of geographic location e.g., Bay, inlet, Cape, etc.
(3) Port of original Destination.
When different from present location of ship.
(4) Cargo nature and weight in hundreds of long tons or thousands of barrels.
Description of the cargo should give the main commodity (and if necessary two or more main commodities) in the cargo. Where a cargo, or balance of cargo, contains a number of commodities or items, GEN (General may be used e.g., "BAUXITE 60 GEN 20". Weight should be expressed in hundreds of long tons, to the nearest hundred (5529 is 55). Petroleum products should be listed by type indicating significant split loads, e.g. BLK/100, DIE/75.
(5) Maximum sustained speed available.
(6) Fuel and Provisions Status in Days.
Fuel days to indicate underway steaming capability.
(7) Required Voyage Repairs.
Indicate by type the urgent voyage repairs beyond normal logistics which are necessary prior to immediate employment.

b. Ships under effective U.S. control which are in U.S. or friendly ports shall remain in those ports until otherwise directed by the appropriate authority listed in subparagraph 104a above. However, in the event of a civil defense air raid "alert signal", masters of ships in or approaching U.S. ports shall comply with dispersal orders issued by the U.S. Coast Guard and/or U.S. Navy officials. Similarly, in the absence of specific U.S. instructions, masters of ships in allied ports should comply with the local dispersal instructions of competent authority at the allied port. In the event that a ship is in a port where there are none of the authorities listed in paragraph 104a who can give the masters instructions and if the ship appears in danger of destruction, capture, or internment, the master should proceed to the nearest available friendly port at which one of those authorities is located.

105. Authorities who will issue routing instructions to merchant ships.

a. Instructions for the movement, routing, and diversion of U.S. controlled merchant ships at sea initially will be issued by the Chief of Naval Operations, one of the Fleet Commanders in Chief or by one of the subordinate U.S. naval commanders (Operational Control Authorities) indicated below and on the chart included in this chapter.

b. From the time the master receives the general emergency message his subsequent movements at sea will be subject to naval control. Initially, operational control over U.S. ships will be exercised by the U.S. Navy, and later, an allied naval control of shipping organization may be placed in effect in certain large areas of the world. Such control will be exercised by the U.S. or Allied Operational Control Authorities (OCA) responsible for designated ocean areas. The instructions of the cognizant OCA (time of sailing, routes and to whom to report at the next port) are given to the master by the U.S. or Allied in-port authorities listed in paragraph 104a.

c. Normally operational instructions for the U. S. Naval Control of Shipping will be originated by the principal U. S. naval commanders and subordinate commanders; (Operational Control Authorities) — listed below:

	LONG TITLE	SHORT TITLE
(1)	Commander in Chief, U.S. Atlantic Fleet	CINCLANTFLT
	Commander Anti Submarine Warfare Force, U.S. Atlantic Fleet	COMASWFORLANT
	Commander Ocean Sub Area, U.S. Atlantic Fleet	COMOCEANSUBAREA
	Commander Eastern Sea Frontier	COMEASTSEAFRON
	Commander Caribbean Sea Frontier	COMCARIBSEAFRON
	Commander South Atlantic Force	COMSOLANT
	U.S. Commander Eastern Atlantic	USCOMEASTLANT
(2)	Commander in Chief, U.S. Naval Forces, Europe	CINCUSNAVEUR
	Commander Fleet Air, Mediterranean	COMFAIRMED
	Commander Middle East Force	COMIDEASTFOR
(3)	Commander in Chief, U.S. Pacific Fleet	CINCPACFLT
	Commander Anti Submarine Warfare Force, U.S. Pacific Fleet	COMASWFORPAC
	Commander Western Sea Frontier	COMWESTSEAFRON
	Commander Alaska Sea Frontier	COMALSEAFRON
	Commander Hawaiian Sea Frontier	COMHAWSEAFRON
	Commander U.S. Naval Forces, Marianas	COMNAVMARIANAS
	Commander U.S. Naval Forces, Japan	COMNAVFORJAPAN
	Commander U.S. Naval Forces, Philippines	COMNAVPHIL

U. S. OPERATIONAL CONTROL AUTHORITY (OCA) AREAS