U.S. Department of Homeland Security

United States Coast Guard

LIGHT LIST

Volume II

ATLANTIC COAST

Shrewsbury River, New Jersey to Little River, South Carolina

This Light List contains a list of lights, sound signals, buoys, daybeacons, and other aids to navigation.

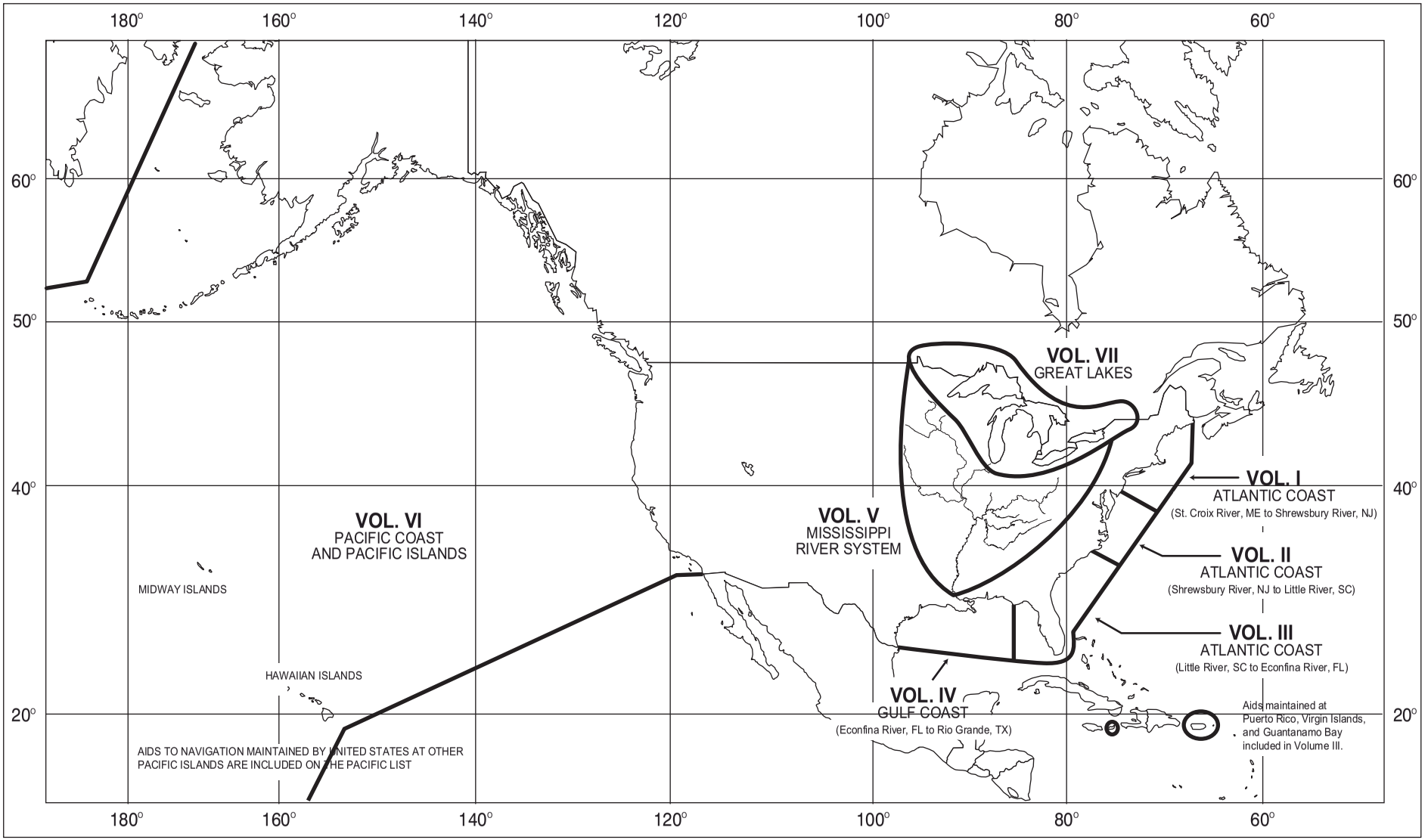
IMPORTANT
THIS LIGHT LIST SHOULD BE CORRECTED EACH WEEK FROM THE LOCAL NOTICES TO MARINERS OR NOTICES TO MARINERS AS APPROPRIATE.

2017

COMDTPUB P16502.2

LIMITS OF LIGHT LISTS PUBLISHED BY

U.S. COAST GUARD



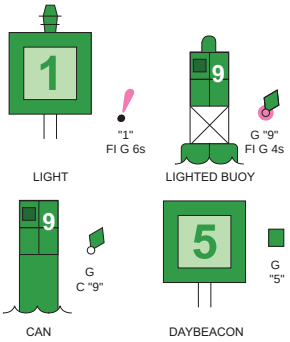
U.S. AIDS TO NAVIGATION SYSTEM
on navigable waters except Western Rivers

LATERAL SYSTEM AS SEEN ENTERING FROM SEAWARD

PORT SIDE
ODD NUMBERED AIDS

GREEN LIGHT ONLY

FLASHING (2)
FLASHING
OCCULTING
QUICK FLASHING
ISO

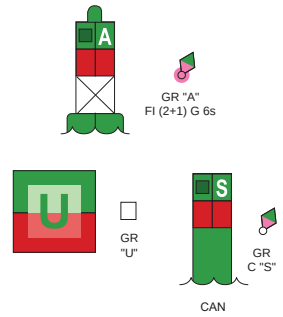


PREFERRED CHANNEL
NO NUMBERS - MAY BE LETTERED

PREFERRED
CHANNEL TO
STARBOARD
TOPMOST BAND
GREEN

GREEN LIGHT ONLY

COMPOSITE GROUP FLASHING (2+1)

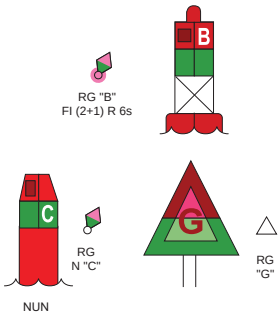


PREFERRED CHANNEL
NO NUMBERS - MAY BE LETTERED

PREFERRED
CHANNEL TO
PORT
TOPMOST BAND
RED

RED LIGHT ONLY

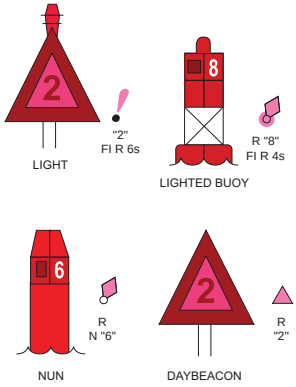
COMPOSITE GROUP FLASHING (2+1)



STARBOARD SIDE
EVEN NUMBERED AIDS

RED LIGHT ONLY

FLASHING (2)
FLASHING
OCCULTING
QUICK FLASHING
ISO

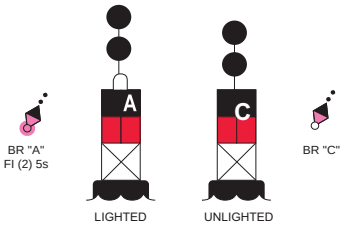


AIDS TO NAVIGATION HAVING NO LATERAL SIGNIFICANCE

ISOLATED DANGER
NO NUMBERS - MAY BE LETTERED

WHITE LIGHT ONLY

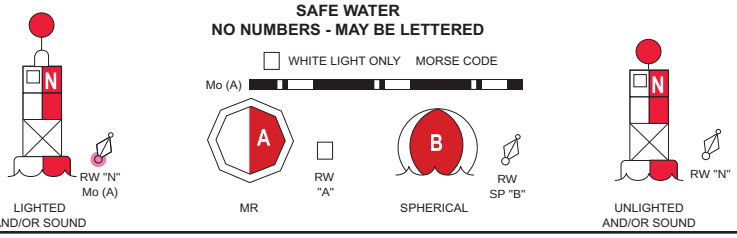
Fl (2) 5s



SAFE WATER
NO NUMBERS - MAY BE LETTERED

WHITE LIGHT ONLY MORSE CODE

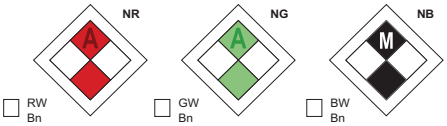
Mo (A)



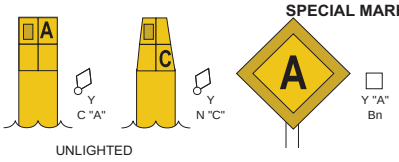
RANGE DAYBOARDS MAY BE LETTERED

DAYBOARDS - MAY BE LETTERED

WHITE LIGHT ONLY

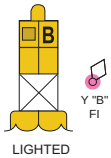


SPECIAL MARKS - MAY BE LETTERED

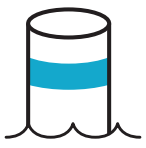


YELLOW LIGHT ONLY
FIXED
FLASHING

SHAPE OPTIONAL--BUT SELECTED TO BE APPROPRIATE FOR THE POSITION OF THE MARK IN RELATION TO THE NAVIGABLE WATERWAY AND THE DIRECTION OF BUOYAGE.



Aids to Navigation marking the Intracoastal Waterway (ICW) display unique yellow symbols to distinguish them from aids marking other waters. Yellow triangles △ indicate aids should be passed by keeping them on the starboard (right) hand of the vessel. Yellow squares ■ indicate aids should be passed by keeping them on the port (left) hand of the vessel. A yellow horizontal band ▬ provides no lateral information, but simply identifies aids as marking the ICW.



MOORING
BUOY

WHITE WITH BLUE BAND

MAY SHOW WHITE
REFLECTOR OR LIGHT

TYPICAL INFORMATION AND REGULATORY MARKS

INFORMATION AND REGULATORY MARKERS

WHEN LIGHTED, INFORMATION AND REGULATORY MARKS MAY DISPLAY ANY WHITE LIGHT RHYTHM EXCEPT QUICK FLASHING, Mo(A), AND FLASHING (2)

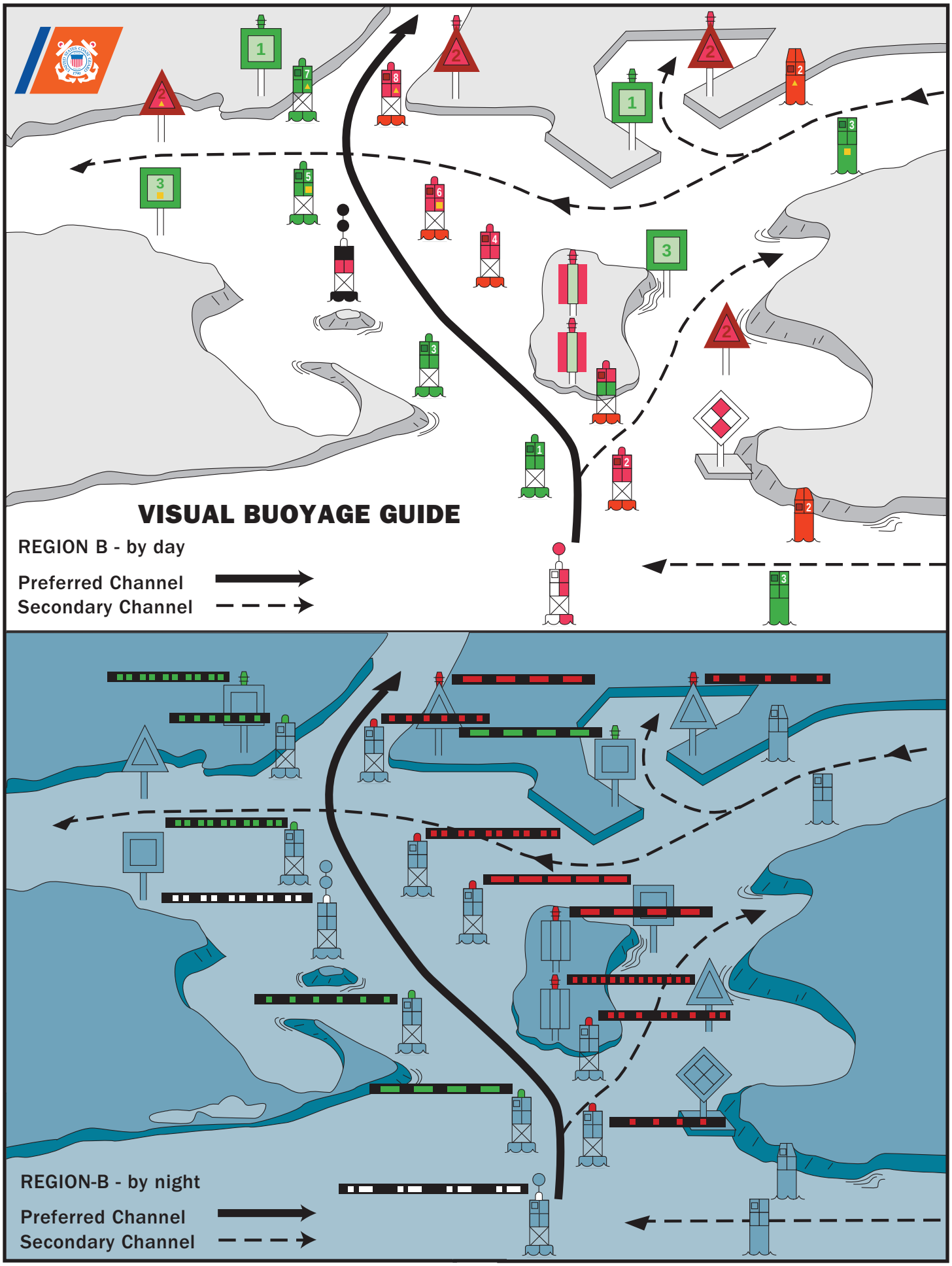
EXPLAINATION MAY BE PLACED OUTSIDE THE CROSSED DIAMOND SHAPE, SUCH AS DAM, RAPIDS, SWIM AREA, ETC.

THE NATURE OF DANGER MAY BE INDICATED INSIDE THE DIAMOND SHAPE, SUCH AS ROCK, WRECK, SHOAL, DAM, ETC.

TYPE OF CONTROL IS INDICATED IN THE CIRCLE, SUCH AS SLOW, NO WAKE, ANCHORING, ETC.

FOR DISPLAYING INFORMATION SUCH AS DIRECTIONS, DISTANCES, LOCATIONS, ETC.

PLATE 1


VISUAL BUOYAGE GUIDE
REGION B - by day
Preferred Channel
Secondary Channel
REGION-B - by night
Preferred Channel
Secondary Channel

FICTITIOUS NAUTICAL CHART

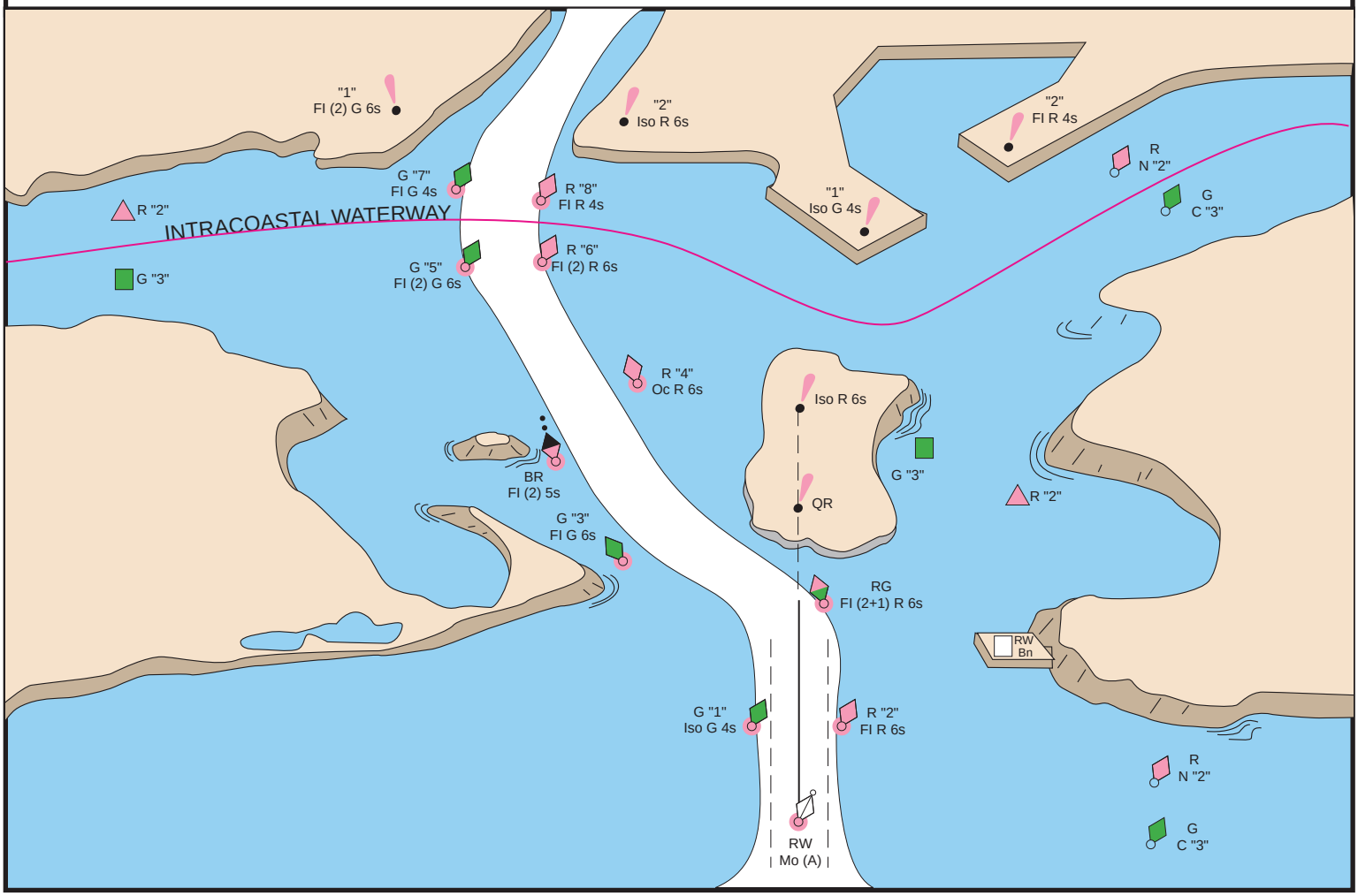


PLATE 3

U.S. AIDS TO NAVIGATION SYSTEM

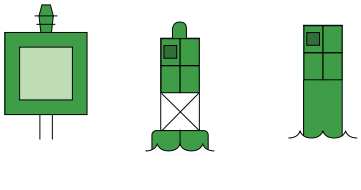
on the Western River System

AS SEEN ENTERING FROM SEAWARD

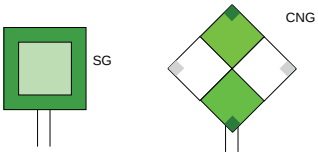
PORT SIDE
OR RIGHT DESCENDING BANK

GREEN OR WHITE LIGHTS

FLASHING
ISO



LIGHT LIGHTED BUOY CAN



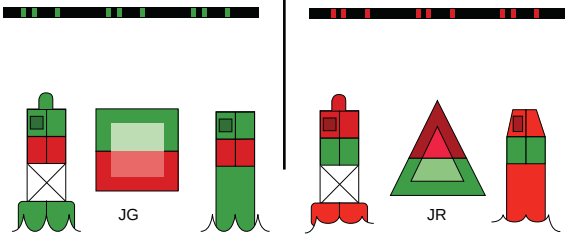
PASSING DAYBEACON CROSSING DAYBEACON

176.9
MILE BOARD

PREFERRED CHANNEL
MARK JUNCTIONS AND OBSTRUCTIONS
COMPOSITE GROUP FLASHING (2+1)

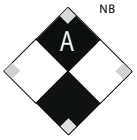
PREFERRED CHANNEL TO STARBOARD
TOPMOST BAND GREEN
FI (2+1) G

PREFERRED CHANNEL TO PORT
TOPMOST BAND RED
FI (2+1) R



DAYBOARDS HAVING NO LATERAL SIsignificance

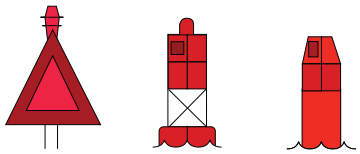
MAY BE LETTERED WHITE LIGHT ONLY



STARBOARD SIDE
OR LEFT DESCENDING BANK

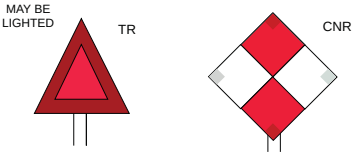
RED OR WHITE LIGHTS

FLASHING (2)
ISO



LIGHT LIGHTED BUOY NUN

MAY BE LIGHTED



PASSING DAYBEACON CROSSING DAYBEACON

123.5
MILE BOARD

SPECIAL MARKS--MAY BE LETTERED

UNLIGHTED LIGHTED

SHAPE: OPTIONAL--BUT SELECTED TO BE APPROPRIATE FOR THE POSITION OF THE MARK IN RELATION TO THE NAVIGABLE WATERWAY AND THE DIRECTION OF BUOYAGE.

YELLOW LIGHT ONLY
FIXED
FLASHING

MOORING BUOY
WHITE WITH BLUE BAND

MAY SHOW WHITE REFLECTOR OR LIGHT

TYPICAL INFORMATION AND REGULATORY MARKS

INFORMATION AND REGULATORY MARKERS

WHEN LIGHTED, INFORMATION AND REGULATORY MARKS MAY DISPLAY ANY LIGHT RHYTHM EXCEPT QUICK FLASHING, Mo(a) AND FLASHING (2)

NW WHITE LIGHT ONLY

BOAT EXCLUSION AREA

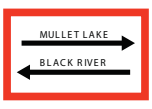
EXPLAINATION MAY BE PLACED OUTSIDE THE CROSSED DIAMOND SHAPE, SUCH AS DAM, RAPIDS, SWIM AREA, ETC.

DANGER

THE NATURE OF DANGER MAY BE INDICATED INSIDE THE DIAMOND SHAPE, SUCH AS ROCK, WRECK, SHOAL, DAM, ETC.

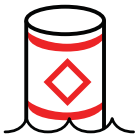
CONTROLLED AREA

TYPE OF CONTROL IS INDICATED IN THE CIRCLE, SUCH AS SLOW, NO WAKE, ANCHORING, ETC.



INFORMATION

FOR DISPLAYING INFORMATION SUCH AS DIRECTIONS, DISTANCES, LOCATIONS, ETC.



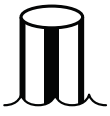
BUOY USED TO DISPLAY REGULATORY MARKERS

MAY SHOW WHITE LIGHT
MAY BE LETTERED

STATE WATERS

INLAND (STATE) WATERS OBSTRUCTION MARK

MAY SHOW WHITE REFLECTOR OR QUICK FLASHING WHITE LIGHT



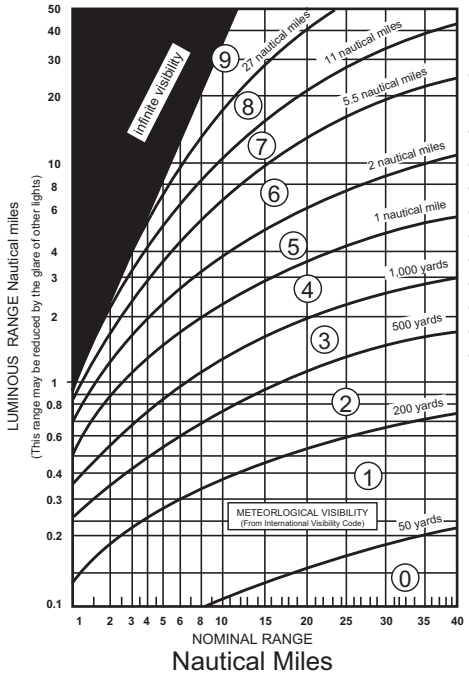
BLACK-STRIPED WHITE BUOY

Used to indicate an obstruction to navigation, extends from the nearest shore to the buoy. This means "do not pass between the buoy and the nearest shore." This aid is replacing the red and white striped buoy within the USWMS, but cannot be used until all red and white striped buoys on a waterway have been replaced.

LUMINOUS RANGE DIAGRAM

The nominal range given in this Light List is the maximum distance a given light can be seen when the meteorological visibility is 10 nautical miles. If the existing visibility is less than 10 NM, the range at which the light can be seen will be reduced below its nominal range. And, if the visibility is greater than 10 NM, the light can be seen at greater distances. The distance at which a light may be expected to be seen in the prevailing visibility is called its luminous range.

This diagram enables the mariner to determine the approximate luminous range of a light when the nominal range and the prevailing meteorological visibility are known. The diagram is entered from the bottom border using the nominal range listed in column 6 of this book. The intersection of the nominal range with the appropriate visibility curve (or, more often, a point between two curves) yields, by moving horizontally to the left border, the luminous range.



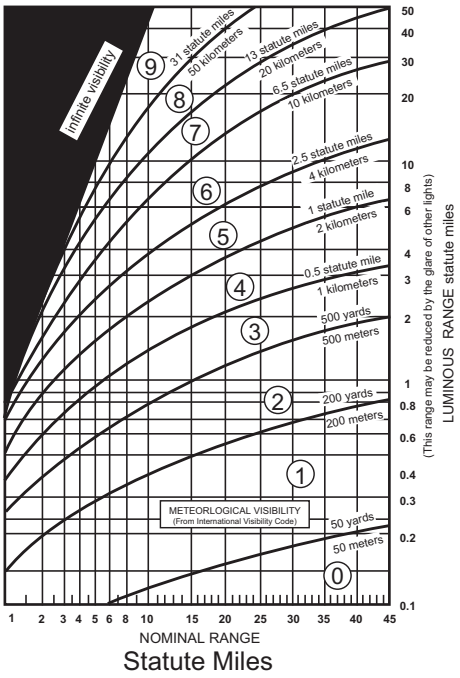
METEOROLOGICAL VISIBILITY
(From International Visibility Code)

Code	Metric	Nautical (approximate)
0	less than 50 meters	less than 50 yards
1	50-200 meters	50-200 yards
2	200-500 meters	200-500 yards
3	500-1,000 meters	500-1,000 yards
4	1-2 kilometers	1,000-2,000 yards
5	2-4 kilometers	1-2 nautical miles
6	4-10 kilometers	2-5.5 nautical miles
7	10-20 kilometers	5.5-11 nautical miles
8	20-50 kilometers	11-27 nautical miles
9	greater than 50 km	greater than 27 nm

CAUTION

When using this diagram it must be remembered that:

1. The ranges obtained are approximate.
2. The transparency of the atmosphere may vary between observer and light.
3. Glare from background lighting will reduce the range that lights are sighted.
4. The rolling motion of a vessel and/or of a lighted aid may reduce the distance that lights can be detected or identified.



GEOGRAPHIC RANGE TABLE

The following table gives the approximate geographic range of visibility for an object which may be seen by an observer at sea level. It is necessary to add to the distance for the height of any object the distance corresponding to the height of the observer's eye above sea level.

Height Feet / Meters	Distance Nautical Miles (NM)	Height Feet / Meters	Distance Nautical Miles (NM)	Height Feet / Meters	Distance Nautical Miles (NM)
5/1.5	2.6	70/21.3	9.8	250/76.2	18.5
10/3.1	3.7	75/22.9	10.1	300/91.4	20.3
15/4.6	4.5	80/24.4	10.5	350/106.7	21.9
20/6.1	5.2	85/25.9	10.8	400/121.9	23.4
25/7.6	5.9	90/27.4	11.1	450/137.2	24.8
30/9.1	6.4	95/29.0	11.4	500/152.4	26.2
35/10.7	6.9	100/30.5	11.7	550/167.6	27.4
40/12.2	7.4	110/33.5	12.3	600/182.9	28.7
45/13.7	7.8	120/36.6	12.8	650/198.1	29.8
50/15.2	8.3	130/39.6	13.3	700/213.4	31.0
55/16.8	8.7	140/42.7	13.8	800/243.8	33.1
60/18.3	9.1	150/45.7	14.3	900/274.3	35.1
65/19.8	9.4	200/61.0	16.5	1000/304.8	37.0

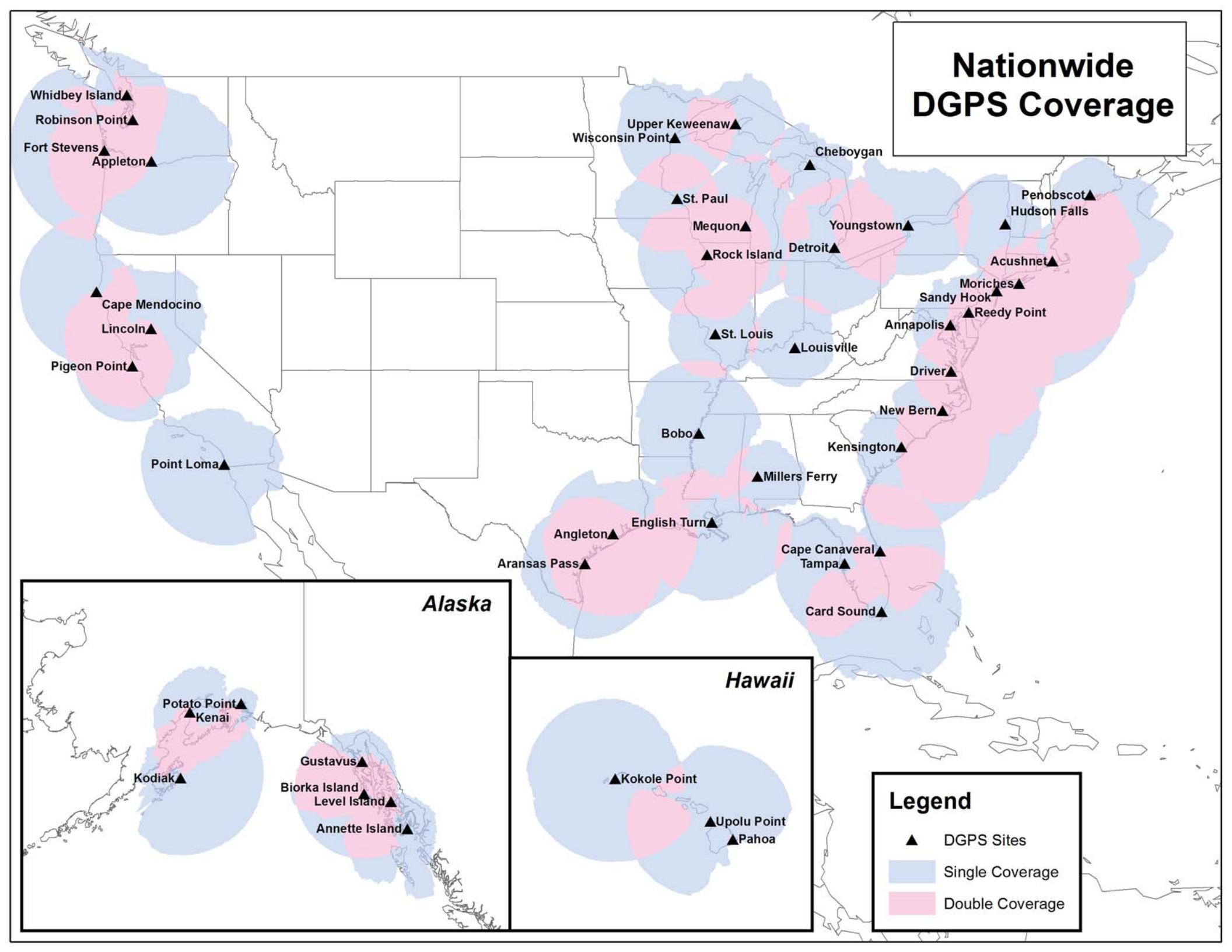
Example: Determine the geographic visibility of an object, with a height above water of 65 feet, for an observer with a height of eyeof 35 feet.

Enter above table;

Height of object 65 feet= 9.4 NM
Height of observer 35 feet= 6.9 NM
Computed geographic visibility= 16.3 NM

This Page Intentionally Left Blank

TABLE OF CONTENTS


Nationwide
DGPS Coverage
Whidbey Island
Robinson Point
Fort Stevens
Appleton
Cape Mendocino
Lincoln
Pigeon Point
Point Loma
Upper Keweenaw
Wisconsin Point
Cheboygan
St. Paul
Mequon
Rock Island
Detroit
Youngstown
Penobscot
Hudson Falls
Acushnet
Moriches
Sandy Hook
Reedy Point
Annapolis
St. Louis
Louisville
Driver
New Bern
Bobo
Kensington
Millers Ferry
English Turn
Angleton
Aransas Pass
Cape Canaveral
Tampa
Card Sound
Alaska
Potato Point
Kenai
Kodiak
Gustavus
Biorka Island
Level Island
Annette Island
Hawaii
Kokole Point
Upolu Point
Pahoa
Legend
DGPS Sites
Single Coverage
Double Coverage

COAST GUARD DISTRICT COMMANDERS

DISTRICT	ADDRESS	WATERS OF JURISDICTION
FIRST	408 Atlantic Avenue Boston, MA 02110-3350 Tel: (617) 223-8351 http://www.uscg.mil/d1	Maine, New Hampshire, Massachusetts, Vermont (Lake Champlain), Rhode Island, Connecticut, New York, to Shrewsbury River, New Jersey.
FIFTH	Federal Building 431 Crawford Street Portsmouth, VA 23704-5004 Tel: (757) 398-6486 (757) 398-6552 http://www.uscg.mil/d5	Shrewsbury River, New Jersey to Delaware, Maryland, Virginia, District of Columbia, and North Carolina.
SEVENTH	Brickell Plaza Federal Building 909 SE 1st Avenue; Rm:406 Miami, FL 33131-3050 Tel: (305) 415-6752 (305) 415-6800 http://www.uscg.mil/d7	South Carolina, Georgia, Florida to 83°50'W, and Puerto Rico and adjacent islands of the United States.
EIGHTH	Hale Boggs Federal Building 500 Poydras Street New Orleans, LA 70130-3310 Tel: (504) 671-2327 (504) 671-2137 http://www.uscg.mil/d8	Florida westward from 83°50'W, Alabama, Mississippi, Louisiana, Texas, the Mississippi River System except that portion of the Illinois River north of Joliet, Illinois.
NINTH	1240 East 9th Street Cleveland, OH 44199-2060 Tel: (216) 902-6060 (216) 902-6117 http://www.uscg.mil/d9	Great Lakes and St. Lawrence River above St. Regis River.
ELEVENTH	Coast Guard Island Building 50-2 Alameda, CA 94501-5100 Tel: (510) 437-2975 http://www.uscg.mil/d11	California, Nevada, Utah, Arizona.
THIRTEENTH	Federal Building 915 Second Avenue 35th Floor, Rm 3510 Seattle, WA 98174-1067 Tel: (206) 220-7270 (206) 220-7004 http://www.uscg.mil/d13	Oregon, Washington, Idaho, and Montana.
FOURTEENTH	Prince Kalanianaole Federal Bldg. 300 Ala Moana Blvd 9th Floor, Room 9-220 Honolulu, HI 96850-4982 Tel: (808) 535-3409 (808) 535-3414 http://www.uscg.mil/d14	Hawaiian, American Samoa, Marshall, Marianas, and Caroline Islands.
SEVENTEENTH	PO Box 25517 Juneau, AK 99802-5517 Tel: (907) 463-2029 (907) 463-2269 http://www.uscg.mil/d17	Alaska.

U. S. COAST GUARD
FIFTH DISTRICT ATON UNIT LISTING

AIDS TO NAVIGATION TEAMS

ANT Baltimore
2401 Hawkins Point Rd.
Baltimore, MD 21226
Tel: (410) 576-2646

ANT Cape May
C/O Training Center
1 Munro Ave.
Cape May, NJ 08204
Tel: (609) 898-6987

ANT Chincoteague
3823 Main Street
Chincoteague, VA 23333
Tel: (757) 336-2872

ANT Crisfield
810 Norris Harbor Drive
Crisfield, MD 21817
Tel: (410) 968-0971

ANT Fort Macon
2301 E. Fort Macon Rd.
Atlantic Beach, NC 28512
Tel: (252) 240-8440

ANT Hampton Roads
4000 Coast Guard Blvd.
Portsmouth, VA 23703
Tel: (757) 483-8520

ANT Milford Haven
59 Mill Point Rd.
Hudgins, VA 23076
Tel: (804) 725-5932

ANT Oak Island
300-B Caswell Beach Road
Oak Island, NC 28465-8443
Tel: (910) 278-6247

ANT Philadelphia
1 Washington Ave.
Philadelphia, PA 19147
Tel: (215) 271-4847/4913

ANT Potomac
PO Box 8
St Inigoes, MD 20684
Tel: (301) 872-4036

ANT Wanchese
PO Box 908 Harbor Rd.
Wanchese, NC 27959
Tel: (252) 473-1531

BUOY TENDERS

USCGC BAYBERRY (WLI 65400)
300-B Caswell Beach Road
Oak Island, NC 28465-8443
Tel: (910) 278-6933

USCGC ELM (WLB 204)
2301 E. Fort Macon Rd.
Atlantic Beach, NC 28512
Tel: (252) 240-8360

USCGC FRANK DREW (WLM 557)
4000 Coast Guard Blvd.
Portsmouth, VA 23703
Tel: (757) 483-8760/8761/8762

USCGC JAMES RANKIN (WLM 555)
2401 Hawkins Point Rd.
Baltimore, MD 21226
Tel: (410) 576-2640

USCGC KENNEBEC (WLIC 802)
4000 Coast Guard Blvd.
Portsmouth, VA 23703
Tel: (757) 483-8775

USCGC SLEDGE (WLIC 75303)
2401 Hawkins Point Rd.
Baltimore, MD 21226
Tel: (410) 576-2635

USCGC SMILAX (WLIC 315)
2301 E. Fort Macon Rd.
Atlantic Beach, NC 28512
Tel: (252) 247-4596

USCGC WILLIAM TATE (WLM 560)
1 Washington Ave.
Philadelphia, PA 19147
Tel: (215) 271-4954/4955/4956

USCG NAVIGATION CENTER
Navigation Information Service (NIS)

The U.S. Coast Guard Navigation Center (NAVCEN) is the official government source of information for civil users of the Global Positioning System (GPS). The Navigation Information Service (NIS) is available 24 hours a day, seven days a week, for all Radio Navigation and maritime related needs via phone, fax or e-mail. The NIS provides users the ability to access real time or archived GPS, NDGPS, DGPS, and LNM information at http://www.navcen.uscg.gov, as well as subscribe to an automated list service which enables users to receive GPS status messages and Notice to NAVSTAR User (NANU) messages via direct Internet e-mail.

The NAVCEN also disseminates GPS and DGPS safety advisory broadcast messages through USCG broadcast stations utilizing VHF-FM voice, HF-SSB voice, and NAVTEX broadcasts. The broadcasts provide the GPS and DGPS user in the marine environment with the current status of the navigation systems, as well as any planned/unplanned system outages that could affect GPS and DGPS navigational accuracy.

To comment on any of these services or ask questions about the service offered, contact the NAVCEN at:

Commanding Officer
U.S. Coast Guard NAVCEN (NIS)
MS 7310
7323 Telegraph Road
Alexandria, VA 20598-7310
Phone: (703) 313-5900
FAX: (703) 313-5920
Internet: http://www.navcen.uscg.gov

This Light List is corrected through Fifth Coast Guard District Local Notice to Mariners No. 01/17

and through National Geospatial-Intelligence Agency (NGA) Notice to Mariners No. 01/17

The 2017 edition supersedes the 2016 print edition.

RECORD OF CORRECTIONS

YEAR 2017

1.....	2.....	3.....	4.....	5.....
6.....	7.....	8.....	9.....	10.....
11.....	12.....	13.....	14.....	15.....
16.....	17.....	18.....	19.....	20.....
21.....	22.....	23.....	24.....	25.....
26.....	27.....	28.....	29.....	30.....
31.....	32.....	33.....	34.....	35.....
36.....	37.....	38.....	39.....	40.....
41.....	42.....	43.....	44.....	45.....
46.....	47.....	48.....	49.....	50.....
51.....	52.....			

YEAR 2018

1.....	2.....	3.....	4.....	5.....
6.....	7.....	8.....	9.....	10.....
11.....	12.....	13.....	14.....	15.....
16.....	17.....	18.....	19.....	20.....
21.....	22.....	23.....	24.....	25.....
26.....	27.....	28.....	29.....	30.....
31.....	32.....	33.....	34.....	35.....
36.....	37.....	38.....	39.....	40.....
41.....	42.....	43.....	44.....	45.....
46.....	47.....	48.....	49.....	50.....
51.....	52.....			

PREFACE

Lights and other marine aids to navigation, maintained by or under authority of the U.S. Coast Guard and located on waters used by general navigation, are described in the Light List. This volume includes aids located between Shrewsbury River, New Jersey and Little River South Carolina.

Included are all Coast Guard aids to navigation used for general navigation such as lights, sound signals, buoys, daybeacons, and other aids to navigation. Not included are some buoys having no lateral significance, such as special purpose, anchorage, fish net, and dredging.

Aids to Navigation Link: http://www.uscgboating.org

CAUTION: Mariners attempting to pass a buoy close aboard risk collision with a yawing buoy or with the obstruction, which the buoy marks. Mariners must not rely on buoys alone for determining their positions due to factors limiting buoy reliability.

PRIVATE AIDS TO NAVIGATION

Included: Class I aids to navigation on marine structures or other works which the owners are legally obligated to establish, maintain, and operate as prescribed by the Coast Guard.

Included: Class II aids to navigation exclusive of Class I, located in waters used by general navigation.

Not included: Class III aids to navigation exclusive of Class I and Class II, located in waters not ordinarily used by general navigation.

This Light List is published electroniclly annually and is intended to furnish more complete information concerning aids to navigation than can be conveniently shown on charts. This Light List is not intended to be used in place of charts or Coast Pilots. Charts should be consulted for the location of all aids to navigation. It may be dangerous to use aids to navigation without reference to charts.

This list is corrected to the date of the notices to mariners shown on the title page. Changes to aids to navigation during the year are advertised in U.S. Coast Guard Local Notices to Mariners and National Geospatial-Intelligence Agency (NGA) Notices to Mariners. Important changes to aids to navigation are also broadcast through Coast Guard or Naval radio stations and NAVTEX. Mariners should keep their Light Lists, charts and other nautical publications corrected from these notices and should consult all notices issued after the date of publication of this Light List.

The electronic version of this publication is available at: http://www.navcen.uscg.gov/index.php?pageName=lightLists

A weekly-updated electronic copy of this publication is also available at:
http://www.navcen.uscg.gov/index.php?pageName=lightListWeeklyUpdates

IMPORTANT*:* A summary of corrections for this publication, which includes corrections from the dates shown on the title page to the date of availability, is advertised in the Local Notice to Mariners and the Notice to Mariners. These corrections must be applied in order to bring the Light List up-to-date. Additionally, this publication should be corrected weekly from the Local Notices to Mariners or the Notices to Mariners, as appropriate.

Mariners and others are requested to bring any apparent errors or omissions in these lists to the attention of:

COMMANDER
FIFTH COAST GUARD DISTRICT (dpw)
431 Crawford Street
Portsmouth, Virginia 23704
or for correspondence and article requests:
CGD5Waterways@uscg.mil

or

USCG Navigation Center
Charting Branch
MS 7310
7323 Telegraph Road
Alexandria, VA 20598-7310
Email: TIS-PF-NISWS@USCG.MIL

INTRODUCTION

Light List Arrangement

In the context of the Light List, aids to navigation on the coasts are arranged in geographic order clockwise from north to south along to Atlantic coast, east to west along the Gulf of Mexico, and south to north along the Pacific coast. On the Great Lakes, aids to navigation are arranged from east to west and from south to north, except on Lake Michigan, which is arranged from north to south. Seacoast aids to navigation are listed first, followed by entrance and harbor aids to navigation, arranged from seaward to the head of navigation.

Names of aids to navigation are printed as follows to help distinguish at a glance the type of aid to navigation.

Seacoast/Lake coast Lights and Secondary Lights
RACONS
Sound Signals
RIVER, HARBOR, OTHER LIGHTS, AND VIRTUAL AIS
Lighted Buoys
Daybeacons, Unlighted Buoys, and Virtual Automatic Identification System (V-AIS) ATON

Light List numbers are assigned to all Federal aids to navigation and many private aids to navigation for reference in the Light List. Aids to navigation are numbered by fives in accordance with their order of appearance in each volume of the Light List. Other numbers and decimal fractions are assigned where newly established aids to navigation are listed between previously numbered aids to navigation. The Light Lists are renumbered periodically to assign whole numbers to all aids to navigation.

International numbers are assigned to certain aids to navigation in cooperation with the International Hydrographic Organization. They consist of an alphabetic character followed by three or four numeric characters. A cross reference listing appears after the index.

Description of Columns

Column (1): Light List Number.

Column (2): Name and location of the aid to navigation.
Note: A dash (-) is used to indicate the bold heading is part of the name of the aid to navigation. When reporting discrepancies or making references to such an aid to navigation in correspondence, the full name of the aid including the geographic heading, should be given.

Bearings are in degrees true, read clockwise from 000° through 359°.

Bearings on range lines are given in degrees and tenths or hundredths where applicable.

(C) indicates Canadian aid to navigation.

Column (3): Geographic position of the aid to navigation in latitude and longitude.

Column (4): Light characteristic for lighted aids to navigation.

Column (5): Height above water from the focal plane of the fixed light to mean high water, listed in feet.

For Volume 7 (Great Lakes), height above water from the focal plane of the fixed light to low water datum, listed in feet and meters.

Column (6): Nominal range of lighted aids to navigation, in nautical miles, listed by color for sector and passing lights. Not listed for ranges, directional lights, or private aids to navigation.

Column (7): The structural characteristic of the aid to navigation, including: dayboard (if any), description of fixed structure, color and type of buoy, height of structure above ground for major lights.

Column (8): Aid remarks, sound signal characteristics, including: VHF-FM channel if remotely activated, RACON characteristic, light sector arc of visibility, radar reflector, emergency lights, seasonal remarks, and private aid to navigation identification. AIS specific information may include its unique Maritime Mobile Service Identity (MMSI), the MMSI(s) of its source AIS transmission, and the application identifier of any Application Specific Messages (ASM) it may also be transmitting.

U.S. Coast Guard Light List Distribution

U.S. regulations require that most commercial vessels maintain on board a currently corrected, copy or pertinent extract, of the U.S. Coast Guard Light Lists which are available for free and are updated weekly on the Coast Guard Navigation Center's website at http://www.navcen.uscg.gov/?pageName=lightLists. Commercially printed versions are also available, but the Coast Guard does not attest to their veracity or sanction such publications.

CHARTS & PUBLICATIONS

Nautical Charts & Publications

Nautical charts covering the coastal waters of the United States and its territories are published by the National Ocean Service (NOS). Up-to-date paper copies of NOS charts are available from NOS Certified Agents. A list of agents can be found at: http://www.nauticalcharts.noaa.gov/staff/print_agents.html. NOS also produces Raster Navigational Charts (RNC) and Electronic Navigational Charts (ENC). RNCs can be found at http://www.nauticalcharts.noaa.gov/mcd/Raster/index.htm. ENCs can be found at http://www.nauticalcharts.noaa.gov/mcd/enc/index.htm.

Inland Electronic Navigational Charts (IENC) and chart books are published by the U.S. Army Corps of Engineers and are available online at http://www.agc.army.mil/Missions/Echarts.aspx. Tide Tables and Tidal Current Tables are no longer printed or distributed by NOS. NOS Tide and Tidal Current predictions are available online at http://tidesandcurrents.noaa.gov/tide_predictions.html. Commercially printed versions, using data provided by NOS, are also available. These products may be obtained from local stores that carry marine publications.

Notices to Mariners

Broadcast Notices to Mariners are made by the Coast Guard through Coast Guard radio stations. These notices, which are broadcast on VHF-FM, NAVTEX, and other maritime frequencies, are warnings that contain important navigational safety information. Included are reports of discrepancies and changes to aids to navigation, the positions of ice and derelicts, and other important hydrographic information.

Radio stations broadcasting Notices to Mariners are listed in the National Ocean Service United States Coast Pilot and in the National Geospatial-Intelligence Agency publication Radio Navigational Aids (Publication No. 117). VHF-FM voice broadcast times can be found online at http://www.nws.noaa.gov/om/marine/vhfvoice.htm.

Local Notices to Mariners (U.S. regional coverage) are another means which the Coast Guard disseminates navigational information for the United States, its territories, and possessions. A Local Notice to Mariners is issued by each Coast Guard district and is used to report changes and discrepancies to aids to navigation maintained by and under the authority of the Coast Guard. The Local Notice to Mariners also contain chart and Light List corrections, proposed aids to navigation projects open for public comment, ongoing waterway projects, bridge regulation changes, marine event information, and other concerns pertinent to the mariner.

Local Notices to Mariners are essential to all navigators for the purposes of keeping charts, Light Lists, Coast Pilots, and other nautical publications up-to-date. These notices are published weekly and can be found online at http://www.navcen.uscg.gov/index.php?pageName=lnmMain. Mariners may register with the Coast Guard Navigation Center to receive automatic notifications via email when new editions of the Local Notice to Mariners are available. Register at http://www.navcen.uscg.gov/?pageName=listServerForm. Vessels operating in ports and waterways in several districts will have to obtain the Local Notice to Mariners for each district.

Notice to Mariners are prepared jointly by the National Geospatial-Intelligence Agency (NGA), the U.S. Coast Guard, and the National Ocean Service, and are published weekly by the NGA. The weekly Notice to Mariners advises mariners of important matters affecting navigational safety including new hydrographic discoveries, changes to aids to navigation, and foreign marine information. Also included are corrections to Light Lists, Coast Pilots, and Sailing Directions. This notice is intended for mariners and others who have a need for information related to oceangoing operations. Because it is intended for use by oceangoing vessels, many corrections that affect small craft navigation and associated waters are not included. Information concerning small craft is contained in the Coast Guard Local Notice to Mariners only. The weekly Notices to Marines may be found online at http://msi.nga.mil/NGAPortal/MSI.portal.

ATON DISCREPANCIES

The Coast Guard does not keep the tens of thousands of aids to navigation comprising the U.S. Aids to Navigation System under simultaneous and continuous observation. Mariners should realize that it is impossible to maintain every aid to navigation operating properly and on its assigned position at all times. Therefore, for the safety of all mariners, any who discovers an aid to navigation that is either off station or exhibiting characteristics other than those listed in

the Light Lists should promptly notify the nearest Coast Guard unit. Radio messages should be prefixed “COAST GUARD” and transmitted on VHF-FM channel 16 or directly to one of the U.S. Government radio stations listed in Chapter 3, Section 300L, Radio Navigation Aids (Publication No. 117). In addition to notifying the nearest Coast Guard unit by radio, a discrepant aid to navigation can be reported online at http://www.navcen.uscg.gov/?pageName=atonOutageReport.

U.S. AIDS TO NAVIGATION SYSTEM

GENERAL

The navigable waters of the United States are marked to assist navigation using the U.S. Aids to Navigation System, a system consistent with the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Maritime Buoyage System. The IALA Maritime Buoyage System is followed by most of the world’s maritime nations and improves maritime safety by encouraging conformity in buoyage systems worldwide. IALA buoyage is divided into two regions made up of Region A and Region B. All navigable waters of the United States follow IALA Region B, except U.S. possessions west of the International Date Line and south of 10° north latitude, which follow Region A. Lateral aids to navigation in Region A vary from those located within Region B. Non-lateral aids to navigation in Region A are the same as those used in Region B. Appropriate nautical charts and publications should be consulted to determine whether the Region A or Region B marking schemes are in effect for a given area.

Aids to navigation are developed, established, operated, and maintained by the U.S. Coast Guard to accomplish the following:

1. Assist navigators in determining their position,
2. Assist the navigator in determining a safe course,
3. Warn the navigator of dangers and obstructions,
4. Promote the safe and economic movement of commercial vessel traffic, and
5. Promote the safe and efficient movement of military vessel traffic, and cargo of strategic military importance.

The U.S. Aids to Navigation System is designed for use with nautical charts. Nautical charts portray the physical features of the marine environment, which include: soundings, landmarks, hazards to navigation, and aids to navigation. To best understand the purpose of a specific aid to navigation, mariners should consult the associated nautical chart, which illustrates the relationship of the aid to navigation to channel limits, obstructions, hazards to navigation, and to the aids to navigation system as a whole. Seasonal aids to navigation are placed into service, withdrawn, or changed at specified times of the year. The dates shown in the Light Lists are approximate and may vary due to adverse weather or other conditions. These aids will be changed on Electronic Navigational Charts (ENC) based on Light List dates and electronic navigation system settings.

Mariners should maintain and consult suitable publications and navigation equipment depending on the vessel’s requirements. This shipboard navigation equipment is separate from the aids to navigation system, but is often essential to its use.

The U.S. Aids to Navigation System is primarily a lateral system, which employs a simple arrangement of colors, shapes, numbers, and light characteristics to mark the limits of navigable

routes. This lateral system is supplemented with non-lateral aids to navigation where appropriate.

Federal aids to navigation consist of Coast Guard operated aids to navigation. The Coast Guard establishes, maintains, and operates a system of aids to navigation consisting of visual, audible, and electronic signals designed to assist the prudent mariner in the process of navigation.

The U.S. Aids to Navigation System contains the following subsystems:

1. **Intracoastal Waterway**: The aids to navigation marking the Intracoastal Waterway are arranged geographically from north to south on the Atlantic Coast and generally east to west on the coast of the Gulf of Mexico. Red lights (if so equipped), even numbers, and red buoys or triangle shaped daymarks are located on the southbound/westbound starboard waterway boundary. Green lights (if so equipped), odd numbers, and green buoys or square shaped daymarks are on the southbound/westbound port waterway boundary.

2. **Western Rivers**: The Western Rivers System is employed on the Mississippi River System, in addition to the Tennessee-Tombigbee Waterway and the Alabama, Atchafalaya, and Apalachicola-Chattahoochee-Flint River Systems. The Western Rivers System consists of the following characteristics:

    a. Buoys are not numbered.
    b. Numbers on beacons do not have lateral significance, but rather indicate mileage from a fixed point (normally the river mouth).
    c. Diamond shaped non-lateral dayboards, red and white or green and white as appropriate, are used to indicate where the river channel crosses from one bank to the other.
    d. Lights on green aids to navigation show a single-flash characteristic, which may be green or white.
    e. Lights on red aids to navigation show a group-flash characteristic, which may be red or white.
    f. Isolated danger marks are not used.

3. **Bridge Markings:** Bridges across navigable waters are marked with red, green and/or white lights for nighttime navigation. Red lights mark piers and other parts of the bridge. Red lights are also placed on drawbridges to show when they are in the closed position. Green lights are placed on drawbridges to show when they are in the open position. The location of these lights will vary according to the bridge structure. Green lights are also used to mark the centerline of navigable channels through fixed bridges. If there are two or more channels through the bridge, the preferred channel is also marked by three white lights in a vertical line above the green light.

    Red and green retro-reflective panels may be used to mark bridge piers and may also be used on bridges not required to display lights. Lateral red and green lights and dayboards may mark main channels through bridges. Adjacent piers are marked with fixed yellow lights when the main channel is marked with lateral aids to navigation.

Centerlines of channels through fixed bridges may be marked with a safe water mark and an occulting white light when lateral marks are used to mark main channels. The centerline of the navigable channel through the draw span of floating bridges may be marked with a special mark. The mark will be a yellow diamond with yellow retro-reflective panels and may exhibit a yellow light that displays a Morse code "B" (a long flash followed by three short flashes). AIS-ATON and RACONs may be placed on the bridge structure to mark the centerline of the navigable channel through the bridge.

Vertical clearance gauges may be installed to enhance navigation safety. The gauges are located on the right channel pier or pier protective structure facing approaching vessels. Clearance gauges indicate the vertical distance between "low steel" of the bridge channel span (in the closed to navigation position for drawbridges) and the level of the water, measured to the bottom of the foot marks, read from top to bottom.

Drawbridges equipped with radiotelephones display a blue and white sign which indicates what VHF radiotelephone channels should be used to request bridge openings.

Private aids to navigation include aids to navigation that are either operated by private persons and organizations, or that are operated by states. Private aids to navigation are classified into three categories:

1. **Class I**: Aids to navigation on marine structures or other works which the owners are legally obligated to establish, maintain, and operate as prescribed by the U.S. Coast Guard.
2. **Class II:** Aids to navigation that, exclusive of Class I aids, are located in waters used by general navigation.
3. **Class III:** Aids to navigation that, exclusive of Class I and Class II aids, are located in waters not ordinarily used by general navigation.

Authorization for the establishment of a Class II or Class III private aid to navigation by the U.S. Coast Guard imposes no legal obligation that the aid actually be established and operated. It only specifies the location and operational characteristics of the aid for which the authorization was requested. Once the aid is established, however, the owner is legally obligated to maintain it in good working order and properly painted.

Lights and sound signals on oil wells or other offshore structures in navigable waters are private aids to navigation and are generally not listed in the Light List unless they are equipped with a RACON. Where space allows, the structures are shown on the appropriate nautical charts. Information concerning the location and characteristics of those structures which display lights and sound signals not located in obstruction areas are published in Local and/or weekly Notices to Mariners.

In general, during the nighttime, a series of white lights are displayed extending from the platform to the top of the derrick when drilling operations are in progress. At other times, structures are usually marked with one or more quick flashing white, red, or yellow lights, visible for at least one nautical mile during clear weather. Obstructions, which are a part of the appurtenances to the main structure, such as mooring piles, anchors, and mooring buoys, etc.,

are not normally lighted. In addition, some structures are equipped with a sound signal that produces a single two-second blast every 20 seconds.

BUOYS, BEACONS, AND AIS-ATON

The primary components of the U.S. Aids to Navigation System are buoys, beacons, and AIS-ATON.

Buoys are floating aids to navigation used extensively throughout U.S. waters. They are moored to sinkers by varying lengths of chain and may shift due to sea conditions and other causes. Buoys may also be carried away, capsized, or sunk. Prudent mariners will not rely solely on any single aid to navigation, particularly floating aids.

Buoy positions represented on nautical charts are approximate position only, due to the practical limitations of positioning and maintaining buoys and their sinkers in precise geographical locations. The position of buoys and beacons are indicated with a circle on the chart. The center of the symbol corresponds with the position of the aid.

Positions of Federal aids to navigation are verified during periodic maintenance visits. Between visits, environmental conditions, including atmospheric and sea conditions, seabed slope and composition, may shift buoys off their charted positions. Buoys may also be dragged off station, sunk, or capsized by a collision with a vessel.

Beacons are aids to navigation which are permanently fixed to the earth's surface. They range from large lighthouses to small single-pile structures and may be located on land or in the water. Lighted beacons are called lights; unlighted beacons are called daybeacons. Lighthouses are placed on shore or on marine sites and most often do not indicate lateral significance. Lighthouses with no lateral significance exhibit a white light.

Beacons exhibit a daymark. For small structures, these are colored geometric shapes that make an aid to navigation readily visible and easily identifiable against background conditions. Generally, the daymark conveys to the mariner, during daylight hours, the same significance as the aid's light or reflector does at night. The daymark of towers, however, consists of the structure itself. As a result, these daymarks do not infer lateral significance.

Ranges are non-lateral aids to navigation composed of two beacons, which when the structures appear to be in line, assist the mariner in maintaining a safe course. The appropriate nautical chart must be consulted when using ranges to determine whether the range marks the centerline of the navigable channel and also what section of the range may be safely traversed. Ranges typically display rectangular dayboards of various colors and are generally, but not always lighted. Ranges may display lights during daylight and at night. When lighted, ranges may display lights of any color.

Vessels should not pass fixed aids to navigation close aboard due to the danger of collision with rip-rap or structure foundations, or with the obstruction or danger being marked.

Aids to Navigation (ATON) may be enhanced by the use of an automatic identification system (AIS). AIS is a maritime navigation safety communications protocol standardized by the International Telecommunication Union and adopted by the International Maritime Organization for the broadcast or exchange of navigation information between vessels, aircraft, and shore

stations. AIS ATON can autonomously and at fixed intervals broadcast the name, position, dimensions, type, characteristics, and status from or concerning an aid to navigation.
AIS ATON can be either real (physically fitted to an aid to navigation), synthetic (physically fitted somewhere other than to an aid to navigation) or virtual (physically nonexistent, but capable of being portrayed on AIS-capable displays).

Note: A Real or Physical AIS ATON can actively monitor and report the health and position status of its host; while Synthetic AIS ATON broadcasted from ashore (i.e. NAIS) can be used to electronically augment the range or portrayal (i.e., on radar and ECDIS) of an existing aid to navigation.

Although all existing AIS mobile devices can receive AIS ATON Reports and ASM messages, they may not readily appear on an AIS Minimal Keyboard Display or other shipboard navigational display systems (i.e., radar, ECDIS, ECS), which would require software updates to make these systems compliant with international navigation presentation standards (i.e., IEC 62288 (Ed. 2), IHO S-52 (Ed. 4.4.0)).

AIS ATON can also be used to broadcast both laterally (*e.g.,* Port Hand Mark) and non-laterally significant marine safety information (*e.g.,* environmental data, tidal information, and navigation warnings).

Note: AIS ATON stations broadcast their presence, identity (9-digit Marine Mobile Service Identity (MMSI) number), position, type, and status at least every three minutes or less via an AIS (ITU-R M.1371) message 21–AIS ATON Report. In addition to its AIS ATON Report, AIS ATON can broadcast significant marine safety information via Application Specific Messages (ASM), which are customized messages that can be used to broadcast additional aid information or other marine safety information (i.e., environmental conditions, wind speed and direction, tidal/current data, bridge air clearances, area notices, etc. They are identified by their: AIS message number (i.e. 6, 8, 25 or 26), Designated Area Code (DAC), Function Identifier (FI), and Version Number, e.g. U.S. Geographic Notice message: Msg# = 8, DAC = 367, FI = 22, Version = 2, and, denoted as 8/367.22.2.

TYPES OF SIGNALS

Lighted aids to navigation are, for the most part, equipped with daylight controls which automatically cause the light to operate during darkness and to be extinguished during daylight. These devices are not of equal sensitivity; therefore, all lights do not come on or go off at the same time. Mariners should ensure correct identification of aids to navigation during twilight periods when some lighted aids to navigation are lit while others are not.

The lighting apparatus is serviced at periodic intervals to assure reliable operation, but there is always the possibility of a light being extinguished or operating improperly.
The condition of the atmosphere has a considerable effect upon the distance at which lights can be seen. Sometimes lights are obscured by fog, haze, dust, smoke, or precipitation which may be present at the light, or between the light and the observer, and which is possibly unknown by the observer. Atmospheric refraction may cause a light to be seen farther than under ordinary circumstances.

A light of low intensity will be easily obscured by unfavorable conditions of the atmosphere and little dependence can be placed on it being seen. For this reason, the intensity of a light should always be considered when expecting to sight it in reduced visibility. Haze and distance may

reduce the apparent duration of the flash of a light. In some atmospheric conditions, white lights may have a reddish hue. Lights placed at high elevations are more frequently obscured by clouds, mist, and fog than those lights located at or near sea level.

In regions where ice conditions prevail in the winter, the lantern panes of lights may become covered with ice or snow, which will greatly reduce the visibility of the lights and may also cause colored lights to appear white.

The increasing use of brilliant shore lights for advertising, illuminating bridges, and other purposes, may cause marine navigational lights, particularly those in densely inhabited areas, to be outshone and difficult to distinguish from the background lighting. Mariners are requested to report such cases in order that steps may be taken to improve the conditions.

The “loom” (glow) of a powerful light is often seen beyond the limit of visibility of the actual rays of the light. The loom may sometimes appear sufficiently sharp enough to obtain a bearing. At short distances, some flashing lights may show a faint continuous light between flashes.

The distance of an observer from a light cannot be estimated by its apparent intensity. Always check the characteristics of lights in order to avoid mistaking powerful lights, visible in the distance, for nearby lights (such as those on lighted buoys) showing similar characteristics of low intensity. If lights are not sighted within a reasonable time after prediction, a dangerous situation may exist, requiring prompt resolution or action in order to ensure the safety of the vessel.

The apparent characteristic of a complex light may change with the distance of the observer. For example, a light which actually displays a characteristic of fixed white varied by flashes of alternating white and red (the rhythms having a decreasing range of visibility in the order: flashing white, flashing red, fixed white) may, when first sighted in clear weather, show as a simple flashing white light. As the vessel draws nearer, the red flash will become visible and the characteristics will appear as alternating flashing white and red. Later, the fixed white light will be seen between the flashes and the true characteristic of the light will finally be recognized as fixed white, alternating flashing white and red (F W Al WR).

If a vessel has considerable vertical motion due to pitching in heavy seas, a light sighted on the horizon may alternatively appear and disappear. This may lead the unwary to assign a false characteristic and hence, to error in its identification. The true characteristic will be evident after the distance has been sufficiently decreased or by increasing the height of eye of the observer.

Similarly, the effect of wave motion on lighted buoys may produce the appearance of incorrect light phase characteristics when certain flashes occur, but are not viewed by the mariner. In addition, buoy motion can reduce the distance at which buoy lights are detected.

Sectors of colored glass are placed in the lanterns of some lights in order to produce a system of light sectors of different colors. In general, red sectors are used to mark shoals or to warn the mariner of other obstructions to navigation or of nearby land. Such lights provide approximate bearing information, since observers may note the change of color as they cross the boundary between sectors. These boundaries are indicated in the Light List (Col. 8) and by dotted lines on charts. These bearings, as all bearings referring to lights, are given in true degrees from 000° to 359°, as observed from a vessel toward the light.

Altering course on the changing sectors of a light or using the boundaries between light sectors to determine the bearing for any purpose is not recommended. Be guided instead by the correct compass bearing to the light and do not rely on being able to accurately observe the point at which the color changes. This is difficult to determine because the edges of a colored sector cannot be cut off sharply. On either side of the line of demarcation between white, red, or green sectors, there is always a small arc of uncertain color. Moreover, when haze or smoke is present in the intervening atmosphere, a white sector might have a reddish hue.

The area in which a light can be observed is normally an arc with the light as the center and the range of visibility as the radius. However, on some bearings, the range may be reduced by obstructions. In such cases, the obstructed arc might differ with height of eye and distance. When adjoining land cuts off a light and the arc of visibility is given, the bearing on which the light disappears may vary with the distance of the vessel from which observed and with the height of eye. When the light is cut off by a sloping hill or point of land, the light may be seen over a wider arc by a vessel farther away than by one closer to the light.

The arc drawn on charts around a light is not intended to give information as to the distance at which it can be seen. The arc indicates the bearings between which the variation of visibility or obstruction of the light occurs.

Only aids to navigation with green or red lights have lateral significance and exhibit either flashing, quick flashing, group flashing, occulting, or isophase light rhythms. When proceeding in the conventional direction of buoyage, the mariner in IALA Region B, may see the following lighted aids to navigation:

Green lights on aids to navigation mark port sides of channels and locations of wrecks or obstructions that must be passed by keeping these lighted aids to navigation on the port hand of a vessel. Green lights are also used on preferred channel marks where the preferred channel is to starboard (i.e., aid to navigation left to port when proceeding in the conventional direction of buoyage). Red lights on aids to navigation mark starboard sides of channels and locations of wrecks or obstructions that must be passed by keeping these lighted aids to navigation on the starboard hand of a vessel. Red lights are also used on preferred channel marks where the preferred channel is to port (i.e., aid to navigation left to starboard when proceeding in the conventional direction of buoyage).

White and yellow lights have no lateral significance. The shapes, colors, letters, and light rhythms may determine the purpose of aids to navigation exhibiting white or yellow lights.

Most aids to navigation are fitted with retro reflective material to increase their visibility in darkness. Colored reflective material is used on aids to navigation that, if lighted, will display lights of the same color.

Preferred channel marks exhibit a composite group-flashing light rhythm of two flashes followed by a single flash.

Safe water marks exhibit a white Morse code “A” rhythm (a short flash followed by a long flash).

Isolated danger marks exhibit a white flashing (2) rhythm (two flashes repeated regularly).

Special marks exhibit yellow lights and exhibit a flashing or fixed rhythm.

Information and regulatory marks exhibit a white light with any light rhythm except quick flashing, flashing (2) and Morse code “A.”

For situations where lights require a distinct cautionary significance, as at sharp turns, sudden channel constrictions, wrecks, or obstructions, a quick flashing light rhythm will be used.

Shapes are used to provide easy identification on certain unlighted buoys and dayboards on beacons. These shapes are laterally significant only when associated with laterally significant colors.

In IALA Region B, cylindrical buoys (referred to as “can buoys”) and square dayboards mark the port side of a channel when proceeding from seaward. These aids to navigation are associated with solid green or green and red-banded marks where the topmost band is green.
Conical buoys (referred to as “nun buoys”) and triangular dayboards mark the starboard side of the channel when proceeding from seaward. These aids to navigation are associated with solid red or red and green-banded marks where the topmost band is red.

Unless fitted with topmarks; lighted, sound, pillar, and spar buoys have no shape significance. Their numbers, colors, and light characteristics convey their meanings.

Dayboards throughout the U.S. Aids to Navigation System are described using standard designations that describe the appearance of each dayboard. A brief explanation of the designations and of the purpose of each type of dayboard in the system is given below, followed by a verbal description of the appearance of each dayboard type.

Designations:

1. First Letter – Shape or Purpose

   C: Crossing (Western Rivers only) diamond-shaped, used to indicate the points at which the channel crosses the river.

   J: Junction (square or triangle) used to mark (preferred channel) junctions or bifurcations in the channel, or wrecks or obstructions which may be passed on either side; color of top band has lateral significance for the preferred channel.

   K: Range (rectangular) when both the front and rear range dayboards are aligned on the same bearing, the observer is on the azimuth of the range, usually used to mark the center of the channel.

   M: Safe Water (octagonal) used to mark the fairway or middle of the channel.

   N: No lateral significance (diamond or rectangular) used for special purpose, warning, distance, or location markers.

   S: Square used to mark the port side of channels when proceeding from seaward.

   T: Triangle used to mark the starboard side of channels when proceeding from seaward.

2. Second Letter – Key Color

B – Black G – Green R – Red W – White Y – Yellow

3. Third Letter – Color of Center Stripe (Range Dayboards Only)

4. Additional Information after a (-)

   -I: Intracoastal Waterway; a yellow reflective horizontal band on a dayboard; indicates the aid to navigation marks the Intracoastal Waterway.

   -SY: Intracoastal Waterway; a yellow reflective square on a dayboard; indicates the aid to navigation is a port hand mark for vessels traversing the Intracoastal Waterway. May appear on a triangular daymark where the Intracoastal Waterway coincides with a waterway having opposite conventional direction of buoyage.

   -TY: Intracoastal Waterway; a yellow reflective triangle on a dayboard; indicates the aid to navigation is a starboard hand mark for vessels traversing the Intracoastal Waterway. May appear on a square daymark where the Intracoastal Waterway coincides with a waterway having opposite conventional direction of buoyage.

Descriptions:

CNG: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners green, with green reflective diamonds at the top and bottom corners and white reflective diamonds in the side corners (Western Rivers only).

CNR: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners red, with red reflective diamonds at the top and bottom corners and white reflective diamonds in the side corners (Western Rivers only).

JG: Dayboard bearing horizontal bands of green and red, green band topmost, with corresponding reflective borders.

JG-I: Square dayboard bearing horizontal bands of green and red, green band topmost, with corresponding reflective borders and a yellow reflective horizontal band.

JG-SY: Square dayboard bearing horizontal bands of green and red, green band topmost, with corresponding reflective borders and a yellow reflective square.

JG-TY: Square dayboard bearing horizontal bands of green and red, green band topmost, with corresponding reflective borders and a yellow reflective triangle.

JR: Dayboard bearing horizontal bands of red and green, red band topmost, with corresponding reflective borders.

JR-I: Triangular dayboard bearing horizontal bands of red and green, red band topmost, with corresponding reflective borders and a yellow reflective horizontal band.

JR-SY: Triangular dayboard bearing horizontal bands of red and green, red band topmost, with corresponding reflective borders and a yellow reflective square.

JR-TY: Triangular dayboard bearing horizontal bands of red and green, red band topmost, with corresponding reflective borders and a yellow reflective triangle.

KBG: Rectangular black dayboard bearing a central green stripe.

KBG-I: Rectangular black dayboard bearing a central green stripe and a yellow reflective horizontal band.

KBR: Rectangular black dayboard bearing a central red stripe.

KBR-I: Rectangular black dayboard bearing a central red stripe and a yellow reflective horizontal band.

KBW: Rectangular black dayboard bearing a central white stripe.

KBW-I: Rectangular black dayboard bearing a central white stripe and a yellow reflective horizontal band.

KGB: Rectangular green dayboard bearing a central black stripe.

KGB-I: Rectangular green dayboard bearing a central black stripe and a yellow reflective horizontal band.

KGR: Rectangular green dayboard bearing a central red stripe.

KGR-I: Rectangular green dayboard bearing a central red stripe and a yellow reflective horizontal band.

KGW: Rectangular green dayboard bearing a central white stripe.

KGW-I: Rectangular green dayboard bearing a central white stripe and a yellow reflective horizontal band.

KRB: Rectangular red dayboard bearing a central black stripe.

KRB-I: Rectangular red dayboard bearing a central black stripe and a yellow reflective horizontal band.

KRG: Rectangular red dayboard bearing a central green stripe.

KRG-I: Rectangular red dayboard bearing a central green stripe and a yellow reflective horizontal band.

KRW: Rectangular red dayboard bearing a central white stripe.

KRW-I: Rectangular red dayboard bearing a central white stripe and a yellow reflective horizontal band.

KWB: Rectangular white dayboard bearing a central black stripe.

KWB-I: Rectangular white dayboard bearing a central black stripe and a yellow reflective horizontal band.

KWG: Rectangular white dayboard bearing a central green stripe.

KWG-I: Rectangular white dayboard bearing a central green stripe and a yellow reflective horizontal band.

KWR: Rectangular white dayboard bearing a central red stripe.

KWR-I: Rectangular white dayboard bearing a central red stripe and a yellow reflective horizontal band.

MR: Octagonal dayboard bearing stripes of white and red, with a white reflective border.

MR-I: Octagonal dayboard bearing stripes of white and red, with a white reflective border and a yellow reflective horizontal band.

NB: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners black, with a white reflective border.

ND: Rectangular white mileage marker with black numerals indicating the mile number (Western Rivers only).

NG: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners green, with a white reflective border.

NL: Rectangular white location marker with an orange reflective border and black letters indicating the location.

NR: Diamond-shaped dayboard divided into four diamond-shaped colored sectors with the sectors at the side corners white and the sectors at the top and bottom corners red, with a white reflective border.

NW: Diamond-shaped white dayboard with an orange reflective border and black letters describing the information or regulatory nature of the mark.

NY: Diamond-shaped yellow dayboard with yellow reflective border.

SG: Square green dayboard with a green reflective border.

SG-I: Square green dayboard with a green reflective border and a yellow reflective horizontal band.

SG-SY: Square green dayboard with a green reflective border and a yellow reflective square.

SG-TY: Square green dayboard with a green reflective border and a yellow reflective triangle.

SR: Square red dayboard with a red reflective border. (IALA Region “A”)

TG: Triangular green dayboard with a green reflective border. (IALA Region “A”)

TR: Triangular red dayboard with a red reflective border.

TR-I: Triangular red dayboard with a red reflective border and a yellow reflective horizontal band.

TR-SY: Triangular red dayboard with a red reflective border and a yellow reflective square.

TR-TY: Triangular red dayboard with a red reflective border and a yellow reflective triangle. These abbreviated descriptions are used in column (7) and may also be found on the illustrations of the U.S. Aids to Navigation System.

Numbers are used to provide easy identification of aids to navigation. In IALA Region B, all solid red and solid green aids are numbered, with the exception of buoys located on the Western Rivers. Red aids to navigation have even numbers and green aids to navigation have odd numbers. The numbers for each increase from seaward when proceeding in the conventional direction of buoyage. Numbers are kept in approximate sequence on both sides of the channel by omitting numbers where necessary.

Letters may be used to augment numbers when lateral aids to navigation are added to channels with previously completed numerical sequences. Letters will increase in alphabetical order from seaward, proceeding in the conventional direction of buoyage and are added to numbers as suffixes. Letters are not used for buoys on the Western Rivers.
No other aids to navigation are numbered. Preferred channel, safe water, isolated danger, special marks, and information and regulatory aids to navigation may be lettered, but not numbered.

Sound signal is a generic term used to describe aids to navigation that produce an audible signal designed to assist the mariner in periods of reduced visibility. These aids to navigation can be activated by several means (e.g., manually, remotely, or fog detector). The Coast Guard is replacing many fog detectors with mariner radio activated sound signals (MRASS). To activate, mariners key their VHF-FM radio a designated number of times on a designated VHF-FM channel. The sound signal is activated for a period of 15, 30, 45, or 60 minutes after which the activated assistance automatically turns off. In cases where a fog detector is in use, there may be a delay in the automatic activation of the signal. Additionally, fog detectors may not be capable of detecting patchy fog conditions.

Sound signals are distinguished by their tone and phase characteristics. The devices producing the sound, e.g., diaphones, diaphragm horns, sirens, whistles, bells, or gongs determine tones.

Phase characteristics are defined by the signal's sound pattern, i.e., the number of blasts and silent periods per minute and their durations. Sound signals sounded from fixed structures generally produce a specific number of blasts and silent periods each minute when operating. Sound signals installed on buoys are generally activated by the motion of the sea and therefore do not emit a regular signal characteristic. It is common, in fact, for a buoy to produce no sound signal when seas are calm.

The characteristic of a sound signal is listed in column (8) of the Light List. If the sound signal is remotely activated, column (8) will contain the VHF-FM channel and number of times the VHF-FM radio should be keyed. All waterway users equipped with a VHF-FM radio may activate the sound signal, but they are not required to do so. Unless it is specifically stated that a sound signal "Operates continuously," or the signal is a bell, gong, or whistle on a buoy, it can be assumed that the sound signal only operates during times of fog, reduced visibility, or adverse weather.

Caution: *Mariners should not rely on sound signals to determine their position. Distance cannot be accurately determined by sound intensity. Occasionally, sound signals may not be heard in areas close to their location. Signals may not sound in cases where fog exists close to, but not at, the location of the sound signal.*

Radar Beacons (RACONS) are radar transponders that when triggered by an X-band radar produce a coded response from its location, which is portrayed radially as a series of dots and dashes on the triggering radar. Although RACONS may be used on both laterally significant and non-laterally significant aids to navigation, their signal should just be used for identification purposes only.

RACONS have a typical output of 600 milliwatts and are considered a short range aid to navigation. Reception varies from a nominal range of 6 to 8 nautical miles when mounted on a buoy to as much as 17 nautical miles for a RACON mounted on a fixed structure. It must be understood that these nominal ranges are dependent upon many factors.

The beginning of the RACON presentation occurs about 50 yards beyond the RACON position and will persist for a number of revolutions of the radar antenna (depending on its rotation rate). Distance to the RACON can be measured to the point at which the RACON flash begins, but the figure obtained will be greater than the vessel's distance from the RACON. This is due to the slight response delay in the RACON apparatus.

Radar operators may notice some broadening or spoking of the RACON presentation when their vessel approaches closely to the source of the RACON. This effect can be minimized by adjusting the IF gain or sweep gain control of the radar. If desired, the RACON presentation can be virtually eliminated by operation of the FTC (fast time constant) controls of the radar.

Radar Reflectors are special fixtures, incorporated into both lighted and unlighted aids to navigation, to enhance the reflection of radar energy. These fixtures help radar-equipped vessels to detect buoys and beacons, which are so equipped. However, they do not positively identify a radar target as an aid to navigation.

NAVIGATION SERVICES

GLOBAL POSITIONING SYSTEM (GPS), DIFFERENTIAL GPS (DGPS), AND NATION-WIDE AUTOMATIC IDENTIFICATION SYSTEM (NAIS)

Global Positioning System (GPS) is a satellite based navigation system, operated and controlled by the Department of Defense (DOD) under U.S. Air Force management, which provides precise, worldwide, three-dimensional navigation capabilities. The system was originally designed for military application; however, it is now available to all and used almost ubiquitously. The United States is committed to maintaining the availability of at least 24

operational GPS satellites, is six precise orbital planes, each of which complete a circular 10,900 nautical mile orbit of the earth once every 12 hours. Ideally, a minimum of four satellites will be visible from any position on the earth and will provide positions with a global horizontal accuracy within 3 meters, 95% percent of the time. Whenever possible, advance notice of when GPS satellites should not be used will be provided by the DOD and made available by the US Coast Guard through GPS status messages.

The Navigation Center coordinates and manages the Civil GPS Service Interface Committee (CGSIC), which comprises members from U.S. and international private, government, and industry user groups. The CGSIC is the recognized worldwide forum for effective interaction between all civil GPS users and the U.S. GPS authorities.

At least three satellites are required for a two-dimensional solution, however, GPS does not provide integrity information and mariners should exercise extreme caution when using GPS in restricted waterways.

Differential GPS (DGPS) is an augmentation to the GPS signals. Each site corrects for small variations in the signals from each satellite that is in view at that time. Satellite signals can vary due to small changes in the satellite's circuitry and orbit and from changes caused by local weather conditions. Satellite corrections are transmitted to users via radio signals in the medium frequency band (285-325 kHz) previously used for marine radiobeacons. DGPS corrections and integrity information are transmitted using Minimum Shift Keying (MSK) modulation. The modulation data rate is usually 100 or 200 bits per second (bps), but can also be 50 bps. The range of DGPS transmissions is from 40 to 300 nautical miles.

DGPS was the first Federal radionavigation system capable of providing the 10-meter navigation service required for the Harbor Entrance and Approach phase of maritime navigation. DGPS provides integrity messages for signals from the GPS satellites, as well as DGPS position corrections, and typically provides position accuracy of 1-3 meters.

Each DGPS site has two reference stations (which calculate the differential corrections), two integrity monitors (which ensure the differential corrections are accurate), a transmitter, and equipment to communicate status information to and receive commands from the control station. Each transmitter and reference station has a unique identification number that permits users to determine which site/equipment is providing their differential corrections. As distance from the transmitting site increases, the small error in the differential corrections increases. The best accuracy is achieved when using the DGPS site closest to the user.

Information regarding the location of DGPS transmitters is given on the map labeled U.S. DGPS Sites & Identification Numbers on page i. Users can access additional information and DGPS statuses, submit questions, and provide comments via the Navigation Information Service's website or by calling the Coast Guard Navigation Center DGPS watchstander at (703) 313-5902.

Navigation Information Service (NIS): The Coast Guard is the government interface for civil users of GPS and has established a Navigation Information Service (NIS) to meet the information needs of the civil user. The NIS is a Coast Guard entity that is manned 24 hours a day, 7 days a week, and is located at the Navigation Center (NAVCEN) in Alexandria, VA. It provides data broadcasts and on-line computer-based information services which are available 24 hours a day. The information provided includes present or future satellite outages, constellation changes, user instructions and tutorials, lists of service and receiver provides/users, and other GPS and DGPS related information.

Navigation Center Internet Service (www) website also offers an e-mail subscription service for GPS status messages, Notice Advisory to NAVSTAR Users (NANU) messages, Local Notice to Mariners, and Coast Guard Light List.

The NAVCEN disseminates GPS and DGPS safety advisory broadcast messages through USCG broadcast stations utilizing VHF-FM voice, HF-SSB voice, and NAVTEX broadcasts. The broadcasts provide the GPS and DGPS user in the marine environment with the current status of the navigation systems, as well as any planned/unplanned system outages that could affect GPS and DGPS navigational accuracy.

Nationwide Automatic Identification System (NAIS) consists of approximately 200 VHF receiver sites located throughout the coastal continental United States, inland rivers, Alaska, Hawaii, Puerto Rico, and Guam. NAIS couples AIS technology with a comprehensive network infrastructure to achieve ship-to-shore and shore-to-ship data transmission throughout the navigable waters of the United States. The system enables AIS-equipped vessels to receive important marine information such as safety and security messages, weather alerts, and electronic aids to navigation.

NAIS is designed to collect safety and security data from AIS-equipped vessels in navigable waters of the United States and share that data with Coast Guard operators and other government and port partners. The primary goal of NAIS is to increase situational awareness through data dissemination via a network infrastructure, particularly focusing on improving maritime security, marine and navigational safety, search and rescue, and environmental protection services. Collected AIS data improves the safety of vessels and ports through collision avoidance and the safety of the nation through detection, identification, and classification of vessels. NAIS broadcasts navigation enhancing safety related messages such as Synthetic AIS ATON Reports and Application Specific Messages.

For more information see:

- AIS messages at www.navcen.uscg.gov/?pageName=AISMessages,
- IMO Safety of Navigation Circular 289 and 290 regarding ASM's at www.navcen.uscg.gov/?pageName=AISReferences,
- IALA AIS ASM Catalog at www.e-navigation.nl/asm, and
- USCG Special Notice 14-02 regarding eATON at www.navcen.uscg.gov/?pageName=AISFAQ#21.

To comment on any of these services or ask questions about the service offered, contact the NAVCEN at:

Commanding Officer
U.S. Coast Guard Navigation Center
7323 Telegraph Road STOP 7310
Alexandria, VA 20598-7310
Phone: (703) 313-5900
Internet: http://www.navcen.uscg.gov

ABBREVIATIONS

Various abbreviations are utilized in Broadcast Notices to Mariners, Local Notices to Mariners, on charts, and in the Light Lists. Refer to the following list.

Light Characteristics

Alternating	AL
Characteristic	CHAR
Composite Group-Flashing	FL (2+1)
Composite Group-Occulting	OC (2+1)
Continuous Quick-Flashing	Q
Eclipse	EC
Fixed and Flashing	FFL
Fixed	F
Group-Flashing	FL (3)
Group-Occulting	OC (2)
Interrupted Quick-Flashing	IQ
Isophase	ISO
Morse Code	MO (A)
Occulting	OC
Single-Flashing	FL

Sound Signal Characteristics

Blast	BL
Every	EV
Seconds	S
Silent	SI

Colors*

Black	B
Blue	BU
Green	G
Orange	OR
Red	R
White	W
Yellow	Y

*NOTE: Color refers to characteristics of aids to navigation only.

Aids to Navigation

Aeronautical Radiobeacon	AERO RBN
Automatic Identification System	AIS
Daybeacon	DBN
Destroyed	DESTR
Differential GPS	DGPS
Discontinued	DISCONTD
Established	ESTAB
Exposed Location Buoy	ELB
Extinguished	EXT
Fog Signal Station	FOG SIG
Light List Number	LLNR
Light	LT
Lighted Bell Buoy	LBB
Lighted Buoy	LB
Lighted Gong Buoy	LGB
Lighted Horn Buoy	LHB
Lighted Whistle Buoy	LWB
Mariner Radio Activated Sound Signal	MRASS
Ocean Data Acquisition System	ODAS
Privately Maintained	PRIV MAINTD
Radar Reflector	RA REF
Radar Responder Beacon	RACON
Remote Radio Activated Sound Signal	RRASS
Single Point Mooring Buoy	SPM
Sound Signal	SS
Temporarily Replaced by Lighted Buoy	TRLB
Temporarily Replaced by Unlighted Buoy	TRUB
Topmark	TMK
Virtual AIS Aid to Navigation	V-AIS
Whistle	WHIS

Organizations

Commander, Coast Guard District	CCGD (#)
Coast Guard	CG
Corps of Engineers	USACE
National Geospatial-Intelligence Agency	NGA
National Ocean Service	NOS
National Weather Service	NWS

Vessels

Aircraft	A/C
Fishing Vessel	F/V
Liquefied Natural Gas Carrier	LNG
Motor Vessel (includes Steam Ship, Container Ship, Cargo Vessel, Tanker etc)	M/V
Pleasure Craft	P/C
Research Vessel	R/V
Sailing Vessel	S/V

Compass Directions

North	N

South	S
East	E
West	W
Northeast	NE
Northwest	NW
Southeast	SE
Southwest	SW

Months

January	JAN
February	FEB
March	MAR
April	APR
May	MAY
June	JUN
July	JUL
August	AUG
September	SEP
October	OCT
November	NOV
December	DEC

Days of the Week

Monday	MON
Tuesday	TUE
Wednesday	WED
Thursday	THU
Friday	FRI
Saturday	SAT
Sunday	SUN

Various

Anchorage	ANCH
Anchorage Prohibited	ANCH PROHIB
Approximate	APPROX
Atlantic	ATL
Authorized	AUTH
Average	AVG
Bearing	BRG
Breakwater	BKW
Broadcast Notice to Mariners	BNM
Canadian Aid	(C)
Captain of the Port	COTP
Channel	CHAN
Code of Federal Regulations	CFR
Continue	CONT
Degrees (temp, geo, pos)	DEG
Diameter	DIA
Edition	ED
Effect/Effective	EFF
Entrance	ENTR
Explosive Anchorage	EXPLOS ANCH
Fathom(s)	FM(S)
Foot/Feet	FT
Harbor	HBR
Height	HT
Hertz	HZ
Horizontal Clearance	HOR CL
Hour	HR
International Regulations for Preventing Collisions at Sea	COLREGS
Kilohertz	KHZ
Kilometer	KM
Knot(s)	KT(S)
Minute (time, geo, pos)	MIN
Megahertz	MHZ
Moderate	MOD
Mountain, Mount	MT
Nautical Mile(s)	NM
Notice to Mariners	NTM
Obstruction	OBSTR
Occasion/Occasionally	OCCASION
Operating Area	OPAREA
Pacific	PAC
Point(s)	PT(S)
Position	POS
Position Approximate	PA
Pressure	PRES
Private, Privately	PRIV
Prohibited	PROHIB
Publication	PUB
Range	RGE
Reported	REP
Restricted	RESTR
River	RIV
Rock	RK
Saint	ST
Second (time, geo, pos)	SEC
Signal Station	SIG STA
Station	STA
Statute Mile(s)	SM
Storm Signal Station	S SIG STA
Temporary	TEMP
Thunderstorm	TSTORM
Through	THRU
True	T
Uncovers, Dries	UNCOV
Universal Coordinate Time	UTC
Urgent Marine Information Broadcast	UMIB
Velocity	VEL
Vertical Clearance	VERT CL
Vessel Traffic Service	VTS

Visibility	VIS
Yard(s)	YD
Warning	WARN
Weather	WX
Wreck	WK

Countries and States

Alabama	AL
Alaska	AK
American Samoa	AS
Arizona	AZ
Arkansas	AR
California	CA
Canada	CN
Colorado	CO
Connecticut	CT
Delaware	DE
District of Columbia	DC
Florida	FL
Georgia	GA
Guam	GU
Hawaii	HI
Idaho	ID
Illinois	IL
Indiana	IN
Iowa	IA
Kansas	KS
Kentucky	KY
Louisiana	LA
Maine	ME
Maryland	MD
Marshall Islands	MH
Massachusetts	MA
Missouri	MO
Mississippi	MS
Mexico	MX
Michigan	MI
Minnesota	MN
Montana	MT
Nebraska	NE
Nevada	NV
New Hampshire	NH
New Jersey	NJ
New Mexico	NM
New York	NY
North Carolina	NC
North Dakota	ND
Northern Marianas	MP
Ohio	OH
Oklahoma	OK
Oregon	OR
Pennsylvania	PA
Puerto Rico	PR
Rhode Island	RI
South Carolina	SC
South Dakota	SD
Tennessee	TN
Texas	TX
United States	US
Utah	UT
Vermont	VT
Virgin Islands	VI
Washington	WA
West Virginia	WV
Wisconsin	WI
Wyoming	WY

GLOSSARY OF AIDS TO NAVIGATION TERMS

Adrift: Afloat and unattached in any way to the shore or seabed.

Aid to Navigation: Any device external to a vessel or aircraft specifically intended to assist navigators in determining their position or safe course, or to warn them of dangers or obstructions to navigation.

Alternating Lights: A rhythmic light showing light of alternating colors.

Arc of Visibility: The portion of the horizon over which a lighted aid to navigation is visible from seaward.

Articulated Beacon: A beacon-like buoyant structure, tethered directly to the seabed and having no watch circle. Called articulated light or articulated daybeacon, as appropriate.

Assigned Position: The latitude and longitude position for an aid to navigation.

Beacon: A lighted or unlighted fixed aid to navigation attached directly to the earth's surface. (Lights and daybeacons both constitute beacons.

Bearing: The horizontal direction of a line of sight between two objects on the surface of the earth.

Bell: A sound signal producing bell tones by means of a hammer actuated by electricity on fixed aids and by sea motion on buoys.

Bifurcation: The point where a channel divides when proceeding from seaward. The place where two tributaries meet.

Broadcast Notice to Mariners: A radio broadcast designed to provide important marine information.

Buoy: A floating object of defined shape and color, which is anchored at a given position and serves as an aid to navigation.

Characteristic: The audible, visual, or electronic signal displayed by an aid to navigation to assist in the identification of an aid to navigation. Characteristic refers to lights, sound signals, RACONS, and daybeacons.

Commissioned: The action of placing a previously discontinued aid to navigation back in service.

Composite Group Flashing Light: A group flashing light in which the flashes are combined in successive groups of different numbers of flashes.

Composite Group-Occulting Light: A light similar to a group occulting light except that the successive groups in a period have different numbers of eclipses.

Conventional Direction of Buoyage: The general direction taken by the mariner when approaching a harbor, river, estuary, or other waterway from seaward, or proceeding upstream or in a direction of the main stream of flood tide, or in the direction indicated in appropriate nautical documents (normally, following a clockwise direction around land masses).

Daybeacon: An unlighted fixed structure which is equipped with a dayboard for daytime identification.

Dayboard: The daytime identifier of an aid to navigation presenting one of several standard shapes (square, triangle, rectangle) and colors (red, green, white, orange, yellow, or black).

Daymark: The daytime identifier of an aid to navigation. (See column 7 of the Light List)

Diaphone: A sound signal which produces sound by means of a slotted piston moved back and forth by compressed air. A "two-

tone" diaphone produces two sequential tones with a second tone of lower pitch.

Directional Light: A light illuminating a sector or very narrow angle and intended to mark a direction to be followed.

Discontinued: To remove from operation (permanently of temporarily) a previously authorized aid to navigation.

Discrepancy: Failure of an aid to navigation to maintain its position or function as prescribed in the Light List.

Discrepancy Buoy: An easily transportable buoy used to temporarily replace an aid to navigation not watching properly.

Dolphin: A minor aid to navigation structure consisting of a number of piles driven into the seabed or riverbed in a circular pattern and drawn together with rope.

Eclipse: AN interval of darkness between appearances of a light.

Emergency Light: A light of reduced intensity displayed by certain aids to navigation when the main light is extinguished.

Establish: To place an authorized aid to navigation in operation for the first time.

Extinguished: A lighted aid to navigation which fails to show a light characteristic.

Fixed Light: A light showing continuously and steady, as opposed to a rhythmic light. (Do not confuse with "fixed" as used to differentiate from "floating".)

Flash: A relatively brief appearance of a light, in comparison with the longest interval of darkness in the same characteristic.

Flash tube: An electronically controlled high-intensity discharge lamp with a very brief flash duration.

Flashing Light: A light in which the total duration of the light in each period is clearly shorter than the total duration of the darkness and in which the flashed of light are all of equal duration. (Commonly used for a single-flashing light which exhibits only single flashes which are repeated at regular intervals.)

Floating Aid to Navigation: A buoy, secured in its assigned position by a mooring.

Fog Detector: An electronic devise used to automatically determine conditions of visibility which warrant the activation of a sound signal or additional light signals.

Fog Signal: See sound signal.

Geographic Range: The greatest distance the curvature of the earth permits an object of a given height to be seen from a particular height of eye without regard to luminous intensity or visibility conditions.

Global Positioning System (GPS): A satellite based radio-navigation system providing continuous worldwide coverage. It provides navigation, position, and timing information to air, marine, and land users.

Gong: A wave actuated sound signal on buoys which uses a group of saucer-shaped bells to produce different tones.

Group Flashing Light: A flashing light in which a group of flashes, specified in number, is regularly repeated.

Group Occulting Light: An occulting light in which a group of eclipses, specified in number, regularly repeated.

Horn: A sound signal which uses electricity or compressed air to vibrate a disc diaphragm.

Inoperative: Sound signal or electronic aid to navigation out of service due to a malfunction.

Interrupted Quick Flash: A quick flashing light in which the rapid alternations are interrupted at regular intervals by eclipses of long duration.

Isolated Danger Mark: A mark erected on, or moored above or very near, an isolated danger which has navigable water all around it.

Isophase Light: A rhythmic light in which all durations of light and darkness are equal.

Junction: The point where a channel divides when proceeding seaward. The place where a distributary departs from the main stream.

Lateral System: A system of aids to navigation in which characteristics of buoys and beacons indicate the sides of a channel or route relative to a Conventional Direction of Buoyage (usually upstream).

Light: The signal emitted by a lighted aid to navigation. The illuminating apparatus used to emit the light signal. A lighted aid to navigation on a fixed structure.

Light Sector: The arc over which a light is visible, described in degrees true, as observed from seaward towards the light. May be used to define distinctive color difference of two adjoining sectors, or an obscured sector.

Lighted Ice Buoy (LIB): A lighted buoy without a sound signal, and designed to withstand the forces of shifting and flowing ice. Used to replace a conventional buoy when that aid to navigation is endangered by ice.

Lighthouse: A lighted beacon of major importance.

Local Notice to Mariners: A written document issued by each U.S. Coast Guard district to disseminate important information affecting aids to navigation, dredging, marine construction, special marine activities, and bridge construction on waterways within that district.

LORAN: An acronym for Long Range Navigation, is an electronic aid to navigation consisting of shore-based radio transmitters. The LORAN system enables users equipped with a LORAN receiver to determine their position quickly and accurately, day or night, in practically any weather.

Luminous Range: The greatest distance a light can be expected to be seen given its nominal range and the prevailing meteorological visibility.

Mark: A visual aid to navigation. Often called navigational mark, including floating marks (buoys) and fixed marks (beacons).

Meteorological Visibility: The greatest distance at which a black object of suitable dimension could be seen and recognized against the horizon sky by day, or in case of night observations, could be seen and recognized if the general illumination were raised to the daylight level.

Mileage Number: A number assigned to aids to navigation which gives the distance in sailing miles along the river from a reference point to the aid to navigation. The number is used principally in the Mississippi River System.

Nominal Range: The maximum distance a light can be seen in clear weather (meteorological visibility of 10 nautical miles). Listed for all lighted aids to navigation except range lights, directional lights, and private aids to navigation.

Occulting Light: A light in which the total duration of light in each period is clearly longer than the total duration of the darkness and in which the intervals of darkness (occultations) are all of equal duration. Commonly used for single occulting light which exhibits only single occultations which are repeated at regular intervals.

Ocean Data Acquisition System (ODAS): Certain very large buoys in deep water for the collection of oceanographic and meteorological information. All ODAS buoys are yellow in color and display a yellow light.

Off Shore Tower: Monitored light stations built on exposed marine sites to replace lightships.

Off Station: A floating aid to navigation that is not on its assigned position.

Passing Light: A low intensity light which may be mounted on the structure of another light to enable the mariner to keep the latter light in sight when passing out of its beam during transit.

Period: The interval of time between the commencement of two identical successive cycles of the characteristic of the light or sound signal.

Pile: A long, heavy timber driven into the seabed or riverbed to serve as a support for an aid to navigation.

Port Hand Mark: A buoy or beacon which is left to the port hand when proceeding in the "Conventional Direction of Buoyage".

Preferred Channel Mark: A lateral mark indicating a channel junction or bifurcation, or a wreck or other obstruction which after consulting a chart, may be passed on either side.

Primary Aid to Navigation: An aid to navigation established for the purpose of making landfalls and coastwise passages from headland to headland.

Quick Light: A light exhibiting very rapid regular alternations of light and darkness, normally 60 flashes per minute.

RACON: A radar beacon which produces a coded response or radar paint, when triggered by a radar signal.

Radar: An electronic system designed to transmit radio signals and receive reflected images of those signals from a "target" in order to determine the bearing and distance to the "target".

Radar Reflector: A special fixture fitted to or incorporated into the design of certain aids to navigation to enhance their ability to reflect radar energy. In general, these fixtures will materially improve the aid to navigation for use by vessels with radar.

Range: A line formed by the extension of a line connecting two charted points.

Range lights: Two lights associated to form a range which often, but not necessarily, indicates the channel centerline. The front range light is the lower of the two, and nearer to the mariner using the range. The rear light is higher and further from the mariner.

Rebuilt: A fixed aid to navigation, previously destroyed, which has been restored as an aid to navigation.

Regulatory Marks: A white and orange aid to navigation with no lateral significance. Used to indicate a special meaning to the mariner, such as danger, restricted operations, or exclusion area.

Relighted: An extinguished aid to navigation returned to its advertised light characteristics.

Replaced: An aid to navigation previously off station, adrift, or missing, restored by another aid to navigation of the same type and characteristics.

Replaced (temporarily): An aid to navigation previously off station, adrift, or missing restored by another aid to navigation of a different type and/or characteristic.

Reset: A floating aid to navigation previously off station, adrift or missing, returned to its assigned position (station).

Rhythmic Light: A light showing intermittently with a regular periodicity.

Sector: See light sector.

Setting a Buoy: The act of placing a buoy on assigned position in the water.

Siren: A sound signal which uses electricity or compressed air to actuate either a disc or a cup shaped rotor.

Skeleton Tower: A tower, usually of steel, constructed of heavy corner members and various horizontal and diagonal bracing members.

Sound Signal: A device which transmits sound, intended to provide information to mariners during periods of restricted visibility and foul weather.

Starboard Hand Mark: A buoy or beacon which is left to the starboard hand when proceeding in the Conventional Direction of Buoyage.

Topmark: One or more relatively small objects of characteristic shape and color placed on aid to identify its purpose.

Traffic Separation Scheme: Shipping corridors marked by buoys which separate incoming from outgoing vessels. Improperly called SEA LANES.

Watching Properly: An aid to navigation on its assigned position exhibiting the advertised characteristics in all respects.

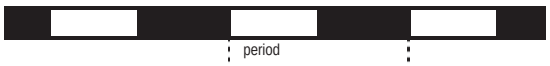
Whistle: A wave actuated sound signal on buoys which produces sound by emitting compressed air through a circumferential slot into a cylindrical bell chamber.

Winter Marker: An unlighted buoy without a sound signal, used to replace a conventional buoy when an aid to navigation is endangered by ice.

Winter Light: A light which is maintained during those winter months when the regular light is extinguished. It is of lower candlepower than the regular light, but usually the same characteristic.

Withdrawn: The discontinuance of an aid to navigation or equipment on an aid to navigation during severe ice conditions or for the winter season.

CHARACTERISTICS OF LIGHTS

Illustration	Type Description	Abbreviation
	1. FIXED. A light showing continuously and steadily.	**F**
	2. OCCULTING. A light in which the total duration of light in a period is longer than the total duration of darkness and the intervals of darkness (eclipses) are usually of equal duration	
	2.1 Single-occulting. An occulting light in which an eclipse is regularly repeated.	**Oc**
	2.2 Group-occulting. An occulting light in which a group of eclipses, specified in numbers, is regularly repeated.	**Oc (2)**
	2.3 Composite group-occulting. A light, similar to a group-occulting light, except that successive groups in a period have different numbers of eclipses.	**Oc (2+1)**
	3. ISOPHASE. A light in which all durations of light and darkness are equal.	**Iso**
	4. FLASHING. A light in which the total duration of light in a period is shorter than the total duration of darkness and the appearances of light (flashes) are usually of equal duration.	
	4.1 Single-flashing. A flashing light in which a flash is regularly repeated (frequency not exceeding 30 flashes per minute).	**Fl**
	4.2 Group-flashing. A flashing light in which a group of flashes, specified in number, is regularly repeated.	**Fl (2)**
	4.3 Composite group-flashing. A light similar to a group flashing light except that successive groups in the period have different numbers of	**Fl (2+1)**
	5. QUICK. A light in which flashes are produced at a rate of 60 flashes per minute.	
	5.1 Continuous quick. A quick light in which a flash is regularly repeated.	**Q**
	5.2 Interrupted quick. A quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration.	**I Q**
	6. MORSE CODE. A light in which appearances of light of two clearly different durations (dots and dashes) are grouped to represent a character or characters in the Morse code.	**Mo (A)**
	7. FIXED AND FLASHING. A light in which a fixed light is combined with a flashing light of higher luminous intensity.	**F Fl**
	8. ALTERNATING. A light showing different colors alternately	**Al RW**

This Page Intentionally Left Blank

(1) No.	(2) Name and Location	(3) Position	(4) Characteristic	(5) Height	(6) Range	(7) Structure	(8) Remarks
	INTRACOASTAL WATERWAY (North Carolina) - Fifth District						
	MYRTLE GROVE SOUND TO LITTLE RIVER (Chart 11534)						
	Cape Fear River - Little River						
40420	- Daybeacon 105 35 feet outside channel limit.	33-53-01.406N 078-30-03.769W				SG-SY on pile.	
40425	- LIGHT 108 35 feet outside channel limit.	33-52-42.246N 078-31-28.786W	Fl R 4s	15	3	TR-TY on pile.	
40430	- Daybeacon 109 35 feet outside channel limit.	33-52-37.302N 078-31-51.559W				SG-SY on pile.	
40435	- LIGHT 111 35 feet outside channel limit.	33-52-32.620N 078-32-25.036W	Fl G 4s	15	4	SG-SY on pile.	
40440	- Daybeacon 113	33-52-22.971N 078-32-45.142W				SG-SY on pile.	
40445	- Daybeacon 115	33-52-13.115N 078-33-04.165W				SG-SY on pile.	
	INTRACOASTAL WATERWAY (South Carolina) - Fifth District						
	MYRTLE GROVE SOUND TO LITTLE RIVER (Chart 11534)						
	Cape Fear River - Little River						
40450	- LIGHT 116	33-51-55.060N 078-33-44.018W	Fl R 4s	18	3	TR-TY on pile.	
40455	- LIGHT 117	33-51-51.730N 078-34-04.074W	Fl G 4s	15	4	SG-SY on pile.	
40460	- LIGHT 119	33-52-04.493N 078-34-16.577W	Fl G 4s	15	4	SG-SY on pile.	

INDEX

INDEX

INDEX

N

O

P

Q

R

S

INDEX

T

U

V

W

Y

CROSS REFERENCE - INTERNATIONAL VS. U.S. LIGHT NUMBER

Inter.	U.S.
J1244.00	90
J1250.00	1440
J1252.00	1445
J1253.00	1455
J1253.10	1460
J1254.00	36780
J1256.00	155
J1258.00	1670
J1260.00	1675
J1261.00	1680
J1262.00	1535
J1264.00	1555
J1266.00	1575
J1268.00	1585
J1270.00	1600
J1272.00	1640
J1273.00	1645
J1273.60	1695
J1274.00	1945
J1280.00	1530
J1280.20	2050
J1281.20	2030
J1281.60	2035
J1281.62	2040
J1281.64	2045
J1282.00	2055
J1282.20	2060
J1283.00	2070
J1283.20	2065
J1284.00	2075
J1284.10	2080
J1285.20	2260
J1285.40	2275
J1285.80	2300
J1286.00	2305
J1286.10	2310
J1288.00	2345
J1290.00	2420
J1292.00	2445
J1292.10	2450
J1293.00	1990
J1294.00	1995
J1296.50	2475
J1296.70	2490
J1297.00	2500
J1297.20	2565
J1297.40	2605
J1298.00	2505
J1298.10	2510
J1299.00	2580
J1299.10	2585
J1299.40	2635
J1300.00	2655
J1301.00	2730
J1301.10	2735
J1303.20	2755
J1303.30	2760
J1304.00	2765
J1304.10	2770
J1305.00	2830
J1305.60	2860
J1305.70	2845
J1306.00	2880
J1306.10	2885
J1307.40	2915
J1308.00	2895
J1308.10	2910
J1308.40	2930
J1308.60	2940
J1309.00	2975
J1309.10	2980
J1311.00	3000
J1312.00	3005
J1312.10	3010
J1313.00	3080
J1313.10	3085
J1313.60	3090
J1314.00	3135
J1314.10	3140
J1314.20	3125
J1314.30	3170
J1314.60	3201
J1314.70	3220
J1314.80	3225
J1315.00	3230
J1315.10	3235
J1315.40	3250
J1315.70	3275
J1315.71	3280
J1316.00	3370
J1316.10	3375
J1317.00	3305
J1319.00	3320
J1319.10	3325
J1320.60	3340
J1322.00	3415
J1322.10	3420
J1322.30	3425
J1323.00	3495
J1323.10	3500
J1323.40	3540
J1323.50	3530
J1323.51	3535
J1324.40	3625
J1324.41	3630
J1325.00	3650
J1325.10	3655
J1325.40	3705
J1325.60	3715
J1326.00	3720
J1326.10	3725
J1327.00	3740
J1327.10	3745
J1328.00	3750
J1328.10	3755
J1328.30	3765
J1328.31	3770
J1328.40	3795
J1328.41	3800
J1328.60	3820
J1328.70	3825
J1329.00	3840
J1329.10	3845
J1329.40	3865
J1329.41	3870
J1329.60	3880
J1329.61	3885
J1329.80	3890
J1329.81	3895
J1330.00	3905
J1330.10	3910
J1330.25	3915
J1330.30	3935
J1330.31	3940
J1330.60	3945
J1330.70	3950
J1331.00	3965
J1331.10	3970
J1331.20	3975
J1331.30	3980
J1331.60	3995
J1331.70	4000
J1332.40	4045
J1332.50	4050
J1333.00	4080
J1333.49	4105
J1333.50	4100
J1333.51	4115
J1335.00	4125
J1335.10	4130
J1336	4145
J1336.10	4150
J1338.00	4185
J1339.00	4205
J1339.10	4210
J1340.00	4255
J1340.10	4260
J1341.00	4280
J1341.10	4285
J1348.00	2085
J1353.20	4375
J1354.00	205
J1364.00	275
J1388.00	6735
J1393.00	6990
J1403.00	360
J1404.00	350
J1408.00	370
J1408.40	9245
J1408.42	9250
J1410.00	10125
J1411.00	10150
J1411.20	10155
J1411.30	10165
J1411.40	10385
J1411.42	10400
J1411.44	10405
J1411.46	10415
J1411.48	10430
J1411.60	10440
J1411.80	10450
J1413.00	10495
J1413.10	10500
J1414.00	10505
J1415.00	10510
J1416.00	9310
J1420.00	9380
J1425.00	10895
J1426.00	10905
J1427.00	10925
J1428.00	10945
J1429.00	10965

Inter.	U.S.	Inter.	U.S.	Inter.	U.S.	Inter.	U.S.
J1430.00	10995	J1468.20	11310	J1477.80	12680	J1954.00	18570
J1430.20	11000	J1469.00	11315	J1477.85	12685	J1956.00	18595
J1431.00	10580	J1469.20	11320	J1477.90	12690	J1960.00	18605
J1433.00	10595	J1470.00	11215	J1477.95	12695	J1970.00	18745
J1433.40	10600	J1472.00	11225	J1478.05	12705	J1974.00	7560
J1433.60	10605	J1474.00	11230	J1478.10	12710	J1974.70	18795
J1434.00	10615	J1475.00	11380	J1478.15	12720	J1975.40	18820
J1434.15	10625	J1475.05	11400	J1478.25	12735	J1978.00	7545
J1434.20	10635	J1475.20	11470	J1478.30	12745	J1979.00	23460
J1434.40	10645	J1475.25	11475	J1478.35	12750	J1980.00	23475
J1434.60	10650	J1475.30	11490	J1478.40	12755	J1982.00	23280
J1434.80	10655	J1475.40	11515	J1478.45	12760	J1984.00	23300
J1435.00	9480	J1475.45	11645	J1478.50	12765	J1986.00	23360
J1436.00	9495	J1475.60	11700	J1478.60	12780	J1986.20	23365
J1439.00	9585	J1475.65	11705	J1478.65	12785	J1986.40	23370
J1439.10	9590	J1475.70	11720	J1478.70	12790	J1987.00	23380
J1440.00	9635	J1475.90	11780	J1478.75	12795	J1987.60	23390
J1440.05	9640	J1476.20	12055	J1478.80	12815	J1987.70	23395
J1440.10	9645	J1476.25	12060	J1489.50	12870	J1988.00	23405
J1440.15	9650	J1476.30	12065	J1490.00	12905	J1988.4	23435
J1440.20	10660	J1476.31	12070	J1500.00	13265	J1988.60	23445
J1440.40	10675	J1476.40	12125	J1500.60	13285	J1992.00	23495
J1440.60	10700	J1476.55	12130	J1501.00	13190	J1992.20	23500
J1440.80	10735	J1476.56	12135	J1502.20	13220	J1992.40	23510
J1440.94	10745	J1476.60	12235	J1502.40	13235	J1994.00	23550
J1441.60	9665	J1476.61	12240	J1504.00	13455	J1995.00	23560
J1441.70	9675	J1476.70	12285	J1506.00	14110	J2000.00	23700
J1441.80	9695	J1476.75	12295	J1508.00	13550	J2000.20	23750
J1442.60	9655	J1476.80	12300	J1508.10	13555	J2000.25	23760
J1443.00	9725	J1476.85	12305	J1509.00	13570	J2000.40	23780
J1443.20	9730	J1476.90	12335	J1509.20	13575	J2000.60	23785
J1443.40	9740	J1476.95	12340	J1916.00	17995	J2000.80	23820
J1446.00	9800	J1477.00	12390	J1916.40	18005	J2002.00	23965
J1446.10	9805	J1477.05	12395	J1917.00	18010	J2003.00	23975
J1448.60	9940	J1477.10	12415	J1918.00	18030	J2004.00	23980
J1449.40	36825	J1477.11	12420	J1930.20	18145	J2007.00	23990
J1449.50	36830	J1477.15	12490	J1930.40	18150	J2007.40	23995
J1450.20	36880	J1477.20	12505	J1931.00	18130	J2008.00	24005
J1450.30	36885	J1477.25	12510	J1931.20	18135	J2008.60	24020
J1454.00	9400	J1477.30	12535	J1932.00	18265	J2009.00	24025
J1456.00	9430	J1477.35	12625	J1934.00	18275	J2010.00	24045
J1458.00	10815	J1477.45	12635	J1934.20	18290	J2012.00	24060
J1461.60	10790	J1477.50	12640	J1934.40	18295	J2014.00	24065
J1467.00	11260	J1477.55	12645	J1934.60	18300	J2015.00	24075
J1467.20	11265	J1477.60	12650	J1938.00	18330	J2016.00	24080
J1467.30	11275	J1477.65	12655	J1944.00	18375	J2017.00	24095
J1467.50	11295	J1477.70	12665	J1950.00	18515	J2018.00	24375
J1468.00	11305	J1477.75	12675	J1952.00	18560	J2020.00	24425

Inter.	U.S.	Inter.	U.S.	Inter.	U.S.	Inter.	U.S.
J2022.00	24400	J2093.80	19115	J2165.00	19285	J2211.00	19880
J2022.40	24410	J2094.00	19135	J2168.00	19300	J2211.10	19890
J2022.60	24415	J2096.00	19160	J2170.00	19305	J2211.20	19895
J2024.00	24380	J2098.00	19165	J2170.60	19320	J2212.20	20030
J2025.00	24385	J2100.00	19210	J2171.00	19345	J2212.40	7815
J2028.00	23590	J2100.50	19235	J2171.10	19350	J2213.00	7890
J2030.00	23615	J2100.60	19240	J2171.40	19335	J2213.20	7975
J2032.00	23605	J2102.00	19260	J2174.00	19325	J2214.00	7990
J2034.00	24450	J2102.20	19265	J2176.00	19395	J2218.00	8340
J2036.00	24455	J2102.40	19270	J2177.00	19400	J2222.00	26590
J2037.00	24465	J2102.60	19275	J2179.00	19415	J2223.00	26595
J2037.20	24470	J2104.00	7630	J2184.40	25995	J2224.00	26600
J2037.40	24475	J2106.00	24630	J2186.00	7750	J2227.00	26750
J2038.00	24495	J2107.00	24635	J2190.00	26015	J2227.20	26765
J2039.00	24480	J2108.00	24640	J2192.00	26055	J2227.40	26790
J2040.00	24505	J2109.00	24645	J2192.50	26120	J2227.60	26810
J2044.00	24515	J2110.00	24660	J2193.00	26165	J2228.80	20095
J2045.00	24520	J2110.40	24730	J2194.00	26185	J2229.00	20100
J2046.00	24525	J2110.60	24735	J2194.20	26200	J2229.20	20115
J2060.00	24580	J2114.00	24840	J2195.00	26265	J2229.40	20120
J2061.00	24585	J2115.00	24915	J2195.40	26270	J2229.60	20125
J2062.00	24590	J2116.00	25320	J2196.00	26345	J2229.70	20130
J2064.00	24595	J2118.00	25375	J2196.80	26460	J2230.00	20160
J2068.00	24600	J2124.00	24920	J2197.00	19450	J2230.10	20185
J2070.00	24605	J2128.00	24935	J2197.40	19470	J2230.80	20250
J2072.00	24610	J2130.00	24955	J2198.00	19475	J2230.90	20270
J2076.00	24615	J2134.00	24975	J2199.00	19480	J2230.94	20275
J2080.00	7590	J2136.00	24995	J2200.00	19500	J2231.00	20300
J2082.00	18860	J2138.00	25010	J2201.00	19510	J2246.00	8040
J2082.20	18865	J2139.00	25015	J2202.00	19515	J2246.10	8050
J2085.00	18880	J2140.00	25020	J2203.00	19545	J2246.50	27000
J2086.00	7605	J2140.10	25025	J2204.00	7760	J2246.60	27020
J2086.20	18890	J2141.00	25055	J2206.30	19670	J2246.70	27035
J2086.40	18895	J2142.00	25125	J2206.40	19675	J2248.00	8120
J2087.00	18900	J2142.20	25130	J2206.80	19570	J2250.00	8390
J2087.20	18910	J2142.60	25170	J2206.90	19580	J2250.10	8395
J2087.40	18920	J2146.00	25980	J2207.00	19585	J2251.00	8150
J2087.60	18945	J2148.00	25540	J2207.10	19595	J2251.10	8155
J2087.70	18950	J2149.00	25670	J2207.30	19590	J2252.00	8090
J2087.80	18960	J2150.00	25830	J2207.40	19605	J2252.10	8095
J2088.00	18990	J2150.40	25835	J2207.80	19625	J2254.00	20315
J2088.40	19010	J2151.00	25840	J2208.00	19630	J2254.60	20330
J2088.50	19020	J2156.00	25870	J2208.40	19645	J2256.00	20370
J2089.00	19030	J2157.00	25880	J2210.00	19780	J2257.00	20385
J2089.20	19035	J2158.00	25915	J2210.40	19785	J2258.00	20410
J2090.00	19055	J2159.00	25815	J2210.50	19745	J2260.00	20430
J2092.00	19065	J2160.00	25820	J2210.60	19815	J2260.80	20495
J2093.00	19090	J2161.00	25825	J2210.80	19835	J2261.00	20510

Inter.	U.S.
J2263.00	20535
J2264.00	20545
J2264.10	20550
J2264.20	20580
J2264.22	20600
J2264.24	20605
J2264.26	20610
J2266.00	20625
J2266.20	20630
J2270.00	8220
J2270.10	8225
J2271.00	20680
J2271.20	20685
J2274.00	20705
J2280.00	20870
J2280.10	20875
J2282.40	20975
J2282.42	20980
J2282.50	20985
J2284.00	20990
J2284.20	20995
J2284.40	21000
J2284.41	21005
J2284.50	21040
J2284.60	21080
J2284.70	21090
J2285.00	21110
J2287.00	21120
J2288.00	21300
J2291.40	21307
J2298.00	8575
J2299.10	8695
J2311.00	27130
J2313.00	27145
J2320.00	27360
J2322.00	8760
J2325.00	8820
J2328.00	8880
J2330.00	27460
J2331.00	27470
J2332.00	27495
J2338.00	8885
J2338.10	8890
J2340.00	8935
J2340.10	8940
J2342.00	8975
J2346.00	9000
J2348.10	8995
J2351.00	9025
J2351.10	9030
J2352.00	9055
J2352.10	9060
J2353.00	9065
J2353.10	9070
J2356.00	9105
J2356.10	9110
J2371.00	27860
J2371.40	27875
J2373.00	27880
J2374.00	27895
J2384.00	555
J2385.00	570
J2385.20	575
J2385.40	580
J2385.60	585
J2386.00	590
J2388.60	28180
J2389.20	28240
J2389.40	28260
J2389.60	28280
J2389.70	28295
J2389.80	28300
J2390.00	31905
J2390.20	31920
J2390.40	31915
J2390.50	31925
J2390.60	31930
J2390.64	31935
J2390.90	31950
J2391.40	31960
J2391.60	31965
J2396.00	625
J2400.00	640
J2401.00	645
J2404	32340
J2408.00	660
J2410.00	28970
J2414.00	28985
J2416.00	29015
J2416.20	29020
J2417.00	29045
J2417.20	29055
J2419.00	29080
J2420.00	29100
J2421.00	29110
J2421.20	29120
J2423.00	32365
J2424	32370
J2425.00	32375
J2426.00	32360
J2430.00	670
J2434.20	29140
J2436.00	29335
J2436.10	29340
J2437.00	29395
J2437.10	29400
J2437.40	29410
J2437.60	29415
J2438.00	29430
J2438.10	29435
J2438.40	29450
J2439.00	34810
J2445.00	29470
J2446.00	38630
J2446.2	38635
J2446.40	38670
J2447.00	38600
J2450.00	38515
J2450.20	38500
J2450.40	38495
J2452.20	34865
J2454.00	29565
J2466.00	835
J2470.00	810
J2472.00	30330
J2472.10	30335
J2473.00	30375
J2473.10	30380
J2474.00	30385
J2474.10	30390
J2476.00	30405
J2476.1	30410
J2477.00	30420
J2478.00	30445
J2480.00	30455
J2484.00	30460
J2484.10	30465
J2488.00	30540
J2494.00	30485
J2494.10	30490
J2494.80	30575
J2495.00	30580
J2496.20	30605
J2496.4	30610
J2496.6	30615
J2500.00	30640
J2500.10	30645
J2501.00	30665
J2501.4	30670
J2502.00	30675
J2502.10	30680
J2506.00	39880
J2514.00	30735
J2514.10	30740
J2516.00	30705
J2518.00	30730
J2524.00	30710
J2524.10	30715
J2526.00	30770
J2531.90	30760
J2532.00	30755
J2532.00	30800
J2532.10	30805
J2538.00	30785
J2540.00	30790
J2541.00	30795
J2542.00	30815
J2542.50	30830
J2542.70	30835
J2544.00	30775
J2544.10	30780
J2550.00	30820
J2550.10	30825
J2552.00	30860
J2554.00	30845
J2554.10	30850
J2556.00	30855
J2560.00	30925
J2560.10	30930
J2564.00	30935
J2565.00	30945
J2566	30940
J2567.00	30950
J2569.00	30955
J2570	30960
J2571.00	30970