



# **U.S.C.G. Auxiliary Aids to Navigation/Chart Updating Study Guide**

**Eleventh District Southern Region**

**2011**

**AIDS TO NAVIGATION**

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Auxiliarists who come to training in Aids to Navigation have a wide variety of backgrounds in boating and navigation. This gives the instructor a problem as some of the students have to grasp the basics of navigation knowledge and this takes time and requires other students to sit through the presentation of material with which they are very familiar. Therefore we are asking all who wish to train and qualify as Aids Verifiers to do a little homework before they attend the training workshop.

There are four subjects that are basic to doing the Aid Verifiers job. They are:

- A good understanding of the United States Aids to Navigation System.
- A general knowledge of the Global Positioning System and it's enhancements, DGPS and WAAS.
- A set of basic skills in working with Nautical Charts including plotting Latitude and Longitude, understanding of line of position, fix, bearing, relative bearing, Compass Rose, and true, magnetic, and compass headings.
- Knowledge of Government Publications on Navigation

There are many sources for such knowledge and students are encouraged to do their own investigations. However, at a minimum we would ask you to read and become familiar with the attached brief descriptions of Aids to Navigation, and GPS, which are largely taken from information on U.S. Coast Guard websites.

As for the Chart knowledge we would refer you to the text for the Auxiliary Public Education class Boating Skills and Seamanship (BS&S). You probably shouldn't be taking the AV course if you are not Basically Qualified (BQ) in the Auxiliary. BQ simply means that you have taken and successfully passed the test in a boating safety course such as BS&S. Chapter 9 in BS&S is Navigation and it covers the basics of using a Nautical Chart. And while you are looking into your BS&S text you might also review Chapter 5, "Your Highway Signs". A more complete source is the Auxiliary "Advanced Coastal Navigation" text where Chapter 1, "Introduction to Coastal Navigation" and Chapter 2, "The Nautical Chart" are good sources.

All of this homework will take an about hour to read. The Chart knowledge and a little practice with a chart might take another hour or so. You will get some of this time back as we will not have to cover these subjects in detail in the workshop. There will be a very brief review of this basic material at the workshop and we will answer any questions you may have. The test you will take to qualify will include questions on these topics, so do your homework.

# COURSE OUTLINE

## 1. Basic Training

A. Be familiar with U.S. Aids to Navigation System, authority for the System; types of AtoNs; colors, shapes, numbers, letters, lights, sounds, PatoNs and PatoN classes. This includes bridge aids.

B. Know basic Nautical Chart plotting techniques, including plotting a position by Latitude/Longitude, bearings, relative bearings, line of position, fix, the difference between True, Magnetic and Compass headings.

C. Be familiar and able to access and use Local Notice to Mariners, Coast Pilot, Light List, Navigation Rules and Nautical Charts.

D. Be familiar with and have knowledge of how to read a GPS and know the difference between GPS, DGPS and WAAS

E. Know and be able to determine Latitude/Longitude from GPS and Nautical Charts and to convert decimal readings to Seconds and convert Minutes and Seconds to nautical miles and yards.

## 2. PATON Records

A. Understand the Coast Guard and the Auxiliary's role in verifying AtoNs.

B. Understand system for verifying PatoNs.

C. Preparation and equipment required for PatoN verification.

D. Line by line understanding of PatoN Record form.

E. Understand importance of timeliness and work quality in doing verifications.

D. Detailed knowledge of the difference between Watching Properly and Discrepancy.

E. Checking lights.

F. The task of verifying PatoNs in District 11SR.

### **3. Report of Bridge Survey**

- A. Purpose of Bridge Surveys
- B. Different types of bridges, their lighting and other items to be checked
- C. Bridge Survey Forms and how to fill them out.
- D. Procedures for returning Bridge Survey forms
- E. Bridge Surveys in District 11SR

### **4. Important Forms and Maintaining Qualification**

### **5. Brief Comments on Small Craft Facility and Chart Updating.**

- A. What is updating.
- B. How to get involved.

### **6. Review of the Day**

### **7. Test**

# 1. Basic Training - Aids to Navigation - Road Signs of the Waterway

## U.S. Aids To Navigation System

The waters of the United States and its territories are marked to assist navigation by the U.S. Aids to Navigation System. This system employs a simple arrangement of colors, shapes, numbers, and light characteristics to mark navigable channels, waterways and obstructions adjacent to these.

The U.S. Aids to Navigation System is intended for use with Nautical Charts. Charts are one of the most important tools used by boaters for planning trips and safely navigating waterways. Charts show the nature and shape of the coast, buoys and beacons, depths of water, land features, directional information, marine hazards and other pertinent information. This valuable information cannot be obtained from other sources, such as a road map or atlas.

## Private Aids to Navigation

A Private Aid to Navigation (PatoN) is a buoy, light or daybeacon owned and maintained by any individual or organization other than the U.S. Coast Guard. These aids are designed to allow individuals or organizations to mark privately owned marine obstructions or other similar hazards to navigation.

Private aids (PatoN) are divided into three Classes.

**Class I** aids to navigation are aids on marine structures or other works, which the owners are legally obligated to establish, maintain, and operate as prescribed by the Coast Guard in waters used by general navigation. General navigation refers to commercial traffic.

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

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

Only lighted PatoNs will be found on the Light List (the Light List will be covered later). This includes all of Class I, most of Class II and **none of Class III**. Nautical Charts will carry Class I, some of Class II and **none of Class III**.

## Buoys and Beacons

Aids to navigation (AtoNs) are placed on shore or on marine sites to assist a navigator to determine his position or safe course. They may mark limits of navigable channels, or warn of dangers or obstructions to navigation. The primary components of the U.S. Aids to Navigation System are beacons and buoys.

**Beacons** are aids to navigation that 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. Beacons may 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 does the aid's light or reflector at night. The daymark of towers, however, consists of the structure itself. As a result, these daymarks do not infer lateral significance.

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.

**Buoys** are floating aids to navigation used extensively throughout U.S. waters. They are moored to the seabed by sinkers with chain or other moorings of various lengths. 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 position due to factors limiting buoy reliability. Prudent mariners will use bearings or angles from beacons or other landmarks, soundings, and various methods of electronic navigation.

Buoy positions represented on nautical charts are approximate positions only, due to the practical limitations of positioning and maintaining buoys and their sinkers in precise geographical locations.

Buoy moorings vary in length. The mooring lengths define a "watch circle", and buoys can be expected to move within this circle. Actual watch circles do not coincide with the symbols representing them on charts.

Buoy positions are normally 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. Also buoys may be dragged off station, sunk or capsized by a collision with a vessel.

## **Types of Marks**

**Lateral marks** are buoys or beacons indicating the port and starboard sides of a route to be followed, and are used in conjunction with a Conventional Direction of Buoyage. Generally, lateral aids to navigation indicate on which side of a vessel an aid to navigation should be passed when the vessel is proceeding in the Conventional Direction of Buoyage.

Normally, the Conventional Direction of Buoyage is the direction in which a vessel enters navigable channels from seaward and proceeds towards the head of navigation. In the absence of a route leading from seaward, the Conventional Direction of Buoyage

in North America generally follows a clockwise direction around land masses. For example, proceeding southerly along the Atlantic Coast, from Florida to Texas along the Gulf Coast, and northerly along the Pacific Coast are considered as proceeding in the Conventional Direction of Buoyage. Virtually all U.S. lateral marks are located in IALA (International Association of Lighthouse Authorities) Region B and follow the traditional 3R rule of **red, right, returning**.

**Preferred channel marks** are aids to navigation which mark channel junctions or bifurcations and often mark wrecks or obstructions. Preferred channel marks may normally be passed on either side by a vessel, but indicate to the mariner the preferred channel. Preferred channel marks are colored with red and green horizontal bands. At a point where a channel divides, when proceeding in the Conventional Direction of Buoyage, a preferred channel in IALA Region B may be indicated by a modified port or starboard lateral mark as follows:

Preferred channel to starboard

Color: one broad Green band over (on top of) one broad Red band

Shape (buoys): Cylindrical (can) or pillar

Dayboard, square: upper half Green, lower half Red

Light Color: Green

Reflector color: Green

Preferred channel to port

Color: one broad Red band over (on top of) one broad Green band

Shape (buoys): Conical (nun) or pillar

Dayboard: triangle, upper half Red lower half Green

Light color: Red

Reflector color: Red

Light characteristics (whether red or green): group flashing (2+1)

A map showing the Conventional Direction of Buoyage in the United States is on the next page.



# U. S. Marking System - Lateral System

## Conventional Direction of Buoyage







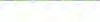


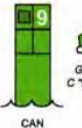


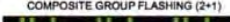

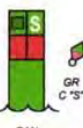















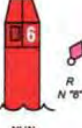



**Non-lateral marks** have no lateral significance, but may be used to supplement the lateral aids to navigation specified above. Occasionally, daybeacons or minor lights outside of the normal channel will not have lateral significance since they do not define limits to navigable waters. These aids to navigation will utilize diamond-shaped dayboards and are divided into four diamond-shaped sectors. The side sectors of these dayboards are colored white, and the top and bottom sectors are colored black, red, yellow or green as the situation (visibility against the background) dictates.

**Safe water marks** are used to mark fairways, mid channels, and offshore approach points, and indicate that there is unobstructed water on all sides. Safe water marks can also be used by the mariner transiting offshore waters to identify the proximity of intended landfall. Safe water marks are red and white vertically striped and have a red spherical topmark to further aid in identification. If lighted, they display a white light with the characteristic Morse code "A" flash (dot - dash).

**Isolated danger marks** are erected on, or moored over, or placed immediately adjacent to an isolated danger that may be passed on all sides. These marks should not be approached closely without special caution. Isolated danger marks are colored with black and red horizontal bands, and if lighted, display a group flashing (2) white light. A topmark consisting of two black spheres, one above the other is fitted for both lighted and unlighted marks.

Examples of lateral and non lateral marks are shown in the following.

 <b>U.S. AIDS TO NAVIGATION SYSTEM</b> on navigable waters except Western Rivers			
LATERAL SYSTEM AS SEEN ENTERING FROM SEAWARD			
<p><b>PORT SIDE</b> <b>ODD NUMBERED AIDS</b></p> <p>  GREEN LIGHT ONLY                      FLASHING (2)                       FLASHING                       OCCULTING                       QUICK FLASHING                       ISO  </p> <p>  LIGHT                      *1* FI G 6s   LIGHTED BUOY                      G 9* FI G 4s                 </p> <p>  CAN                      G C 9*   DAYBEACON                      G 5*                 </p>	<p><b>PREFERRED CHANNEL</b> <b>NO NUMBERS - MAY BE LETTERED</b></p> <p>                     PREFERRED CHANNEL TO STARBOARD                      TOPMOST BAND GREEN                      GREEN LIGHT ONLY   </p> <p>                     COMPOSITE GROUP FLASHING (2+1)   </p> <p>  LIGHT                      GR "A" FI (2+1) G 6s   LIGHTED BUOY                      GR C "S"                 </p> <p>  CAN                      GR "U"                 </p>	<p><b>PREFERRED CHANNEL</b> <b>NO NUMBERS - MAY BE LETTERED</b></p> <p>                     PREFERRED CHANNEL TO PORT                      TOPMOST BAND RED                      RED LIGHT ONLY   </p> <p>                     COMPOSITE GROUP FLASHING (2+1)   </p> <p>  LIGHT                      RG "B" FI (2+1) R 6s   LIGHTED BUOY                      RG N "C"                 </p> <p>  NUN                      RG N "C"   DAYBEACON                      RG "G"                 </p>	<p><b>STARBOARD SIDE</b> <b>EVEN NUMBERED AIDS</b></p> <p>  RED LIGHT ONLY                      FLASHING (2)                       FLASHING                       OCCULTING                       QUICK FLASHING                       ISO  </p> <p>  LIGHT                      **8* FI R 6s   LIGHTED BUOY                      R 8* FI R 4s                 </p> <p>  NUN                      R N "6"   DAYBEACON                      R "8"                 </p>



## AIDS TO NAVIGATION HAVING NO LATERAL SIGNIFICANCE

<p style="text-align: center;"><b>ISOLATED DANGER</b> NO NUMBERS - MAY BE LETTERED</p> <p style="text-align: center;">☐ WHITE LIGHT ONLY</p> <p style="text-align: center;">FR (2) 5m</p> <p style="text-align: center;">BR 7'6" FR (2) 5m</p> <p style="text-align: center;">LIGHTED      UNLIGHTED</p>	<p style="text-align: center;"><b>SAFE WATER</b> NO NUMBERS - MAY BE LETTERED</p> <p style="text-align: center;">☐ WHITE LIGHT ONLY    MORSE CODE</p> <p style="text-align: center;">Mo (A)    Mo (B)</p> <p style="text-align: center;">LIGHTED AND/OR SOUND      UNLIGHTED AND/OR SOUND</p>
<p style="text-align: center;"><b>DAYBOARDS - MAY BE LETTERED</b></p> <p style="text-align: center;">☐ WHITE LIGHT ONLY</p> <p style="text-align: center;">BR 7'6" FR (2) 5m</p>	<p style="text-align: center;"><b>RANGE DAYBOARDS - MAY BE LETTERED</b></p>
<p style="text-align: center;"><b>Aids to Navigation marking the Intracoastal Waterway (ICW) display unique yellow symbols to distinguish them from aids marking other waters.</b></p> <p style="text-align: center;"><b>Yellow triangles <math>\Delta</math> indicate aids should be passed by keeping them on the starboard (right) hand of the vessel.</b></p> <p style="text-align: center;"><b>Yellow squares <math>\square</math> indicate aids should be passed by keeping them on the port (left) hand of the vessel.</b></p> <p style="text-align: center;"><b>A yellow horizontal band <math>\text{—}</math> provides no lateral information, but simply identifies aids as marking the ICW.</b></p>	<p style="text-align: center;"><b>SPECIAL MARKS - MAY BE LETTERED</b></p> <p style="text-align: center;">☐ YELLOW LIGHT ONLY</p> <p style="text-align: center;">FIXED    FLASHING</p> <p style="text-align: center;">UNLIGHTED      LIGHTED</p> <p style="text-align: center;">SHAPE OPTIONAL - BUT SELECTED TO BE APPROPRIATE FOR THE POSITION OF THE MARK IN RELATION TO THE NAVIGABLE WATERWAY AND THE DIRECTION OF BUOYAGE.</p>
<p style="text-align: center;"><b>MOORING BUOY</b></p> <p style="text-align: center;">WHITE WITH BLUE BAND MAY SHOW WHITE REFLECTOR OR LIGHT</p>	<p style="text-align: center;"><b>TYPICAL INFORMATION AND REGULATORY MARKS</b></p> <p style="text-align: center;"><u>INFORMATION AND REGULATORY MARKERS</u></p> <p style="text-align: center;">WHEN LIGHTED, INFORMATION AND REGULATORY MARKERS MAY DISPLAY ANY WHITE LIGHT RHYTHM EXCEPT QUICK FLASHING, Mo(A), AND FLASHING (2)</p> <p style="text-align: center;">EXPLANATIONS MAY BE PLACED OUTSIDE THE CIRCLED SHAPING SHAPE, SUCH AS GALE, FOGGY, SHIP, HEAT, ETC.</p> <p style="text-align: center;">THE NATURE OF DANGER MAY BE INDICATED INSIDE THE SHAPING SHAPE, SUCH AS ROCK, HAZARD, SHOULDER, ETC.</p> <p style="text-align: center;">THE TYPE OF CONTROL IS INDICATED IN THE CIRCLE, SUCH AS SLOW, STOP, STOP AND GO, ETC.</p> <p style="text-align: center;">MAY SHOW WHITE LIGHT    MAY SHOW WHITE LIGHT    MAY BE LETTERED</p> <p style="text-align: right;">PLATE 1</p>

## Lighted aids to Navigation

Most lighted aids to navigation are equipped with 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.

Lighted aids to navigation should be visible from a distance of one nautical mile. 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 thick weather. 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 unattended 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 so powerful lights, visible in the distance, are not mistaken 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 apparently be 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 alternately appear and disappear. This may lead the unwary to assign a false characteristic and hence, to err 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 effects 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 are 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, but solely to indicate, in the case of lights, which do not show equally in all directions, the bearings between which the variation of visibility or obstruction of the light occurs.

### ***Oil Well Structures***

There are oil well structures in some areas in District 11(SR). Oil well structures in navigable waters are not listed in the Light List. 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 fixed or quick flashing white or red 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, anchor and mooring buoys, etc., normally are not lighted. In addition, some of the structures are equipped with sound signals (bell, siren, whistle, or horn). When operating, bells sound one stroke every 15 seconds, while sirens, whistles, or horns sound a single two-second blast every 20 seconds.

## Characteristics of Aids to Navigation

### Light Colors

Only aids to navigation with green or red lights have lateral significance. When proceeding in the conventional direction of buoyage, the mariner in IALA Region B, (returning from sea or south to north on the West Coast) 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 passed 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 passed 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. Red or green retro reflective material is used on lateral aids to navigation that, if lighted, will display lights of the same color.

### Light Rhythms

Light rhythms have no lateral significance. Aids to navigation with lateral significance exhibit flashing, quick, occulting or isophase light rhythms. Ordinarily, flashing lights (frequency not exceeding 30 flashes per minute) will be used.


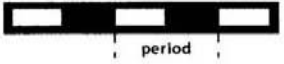


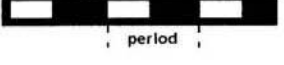

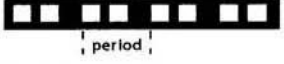




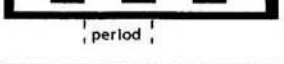
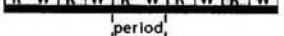
**Preferred channel** marks exhibit a composite group flashing light rhythm of two flashes followed by a single flash.

**Safe water** marks show a white Morse code "A" rhythm (a short flash followed by a long flash).

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

**Special marks** show yellow lights and exhibit a flashing or fixed rhythm; however, a flashing rhythm is preferred. Information and regulatory marks, when lighted, display 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.

A list of light rhythms appears below.

CHARACTERISTICS OF LIGHTS		
Illustration	Type Description	Abbreviation
	1. Fixed. A light showing continuously and steadily.	F
	2. Occluding. 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-occluding. An occluding light in which an eclipse is regularly repeated.	Oc
	2.2 Group-occluding. An occluding light in which a group of eclipses, specified in numbers, is regularly repeated.	Oc (2)
	2.3 Composite group-occluding. A light, similar to a group-occluding 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).	FI
	4.2 Group-flashing. A flashing light in which a group of flashes, specified in number, is regularly repeated.	FI (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 flashes.	FI (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.	IQ
	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.	FFI
	8. ALTERNATING. A light showing different colors alternately	AI RW

## Shapes

In order to provide easy identification, certain unlighted buoys and dayboards on beacons are differentiated by shape. These shapes are laterally significant only when associated with laterally significant colors.

Cylindrical buoys (referred to as "**can buoys**") and square dayboards mark the left 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 right 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.

## Numbers

All solid red and solid green aids to navigation are numbered, with **red aids to navigation bearing even numbers and green aids to navigation bearing odd numbers**. The numbers for each increase from seaward, 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.

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.

## Dayboards

In order to describe the appearance and purpose of each dayboard used in the U.S. System, standard designations have been formulated. 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

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

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

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.

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

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

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.

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

### 2. Second letter - Key color

G – Green

B – Black

R - Red

W - White

Y - Yellow

### 3. Third letter (color of center stripe; range boards only)

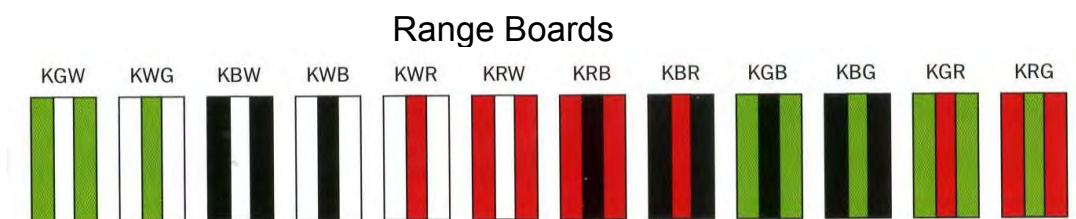
G – Green

B – Black

R - Red

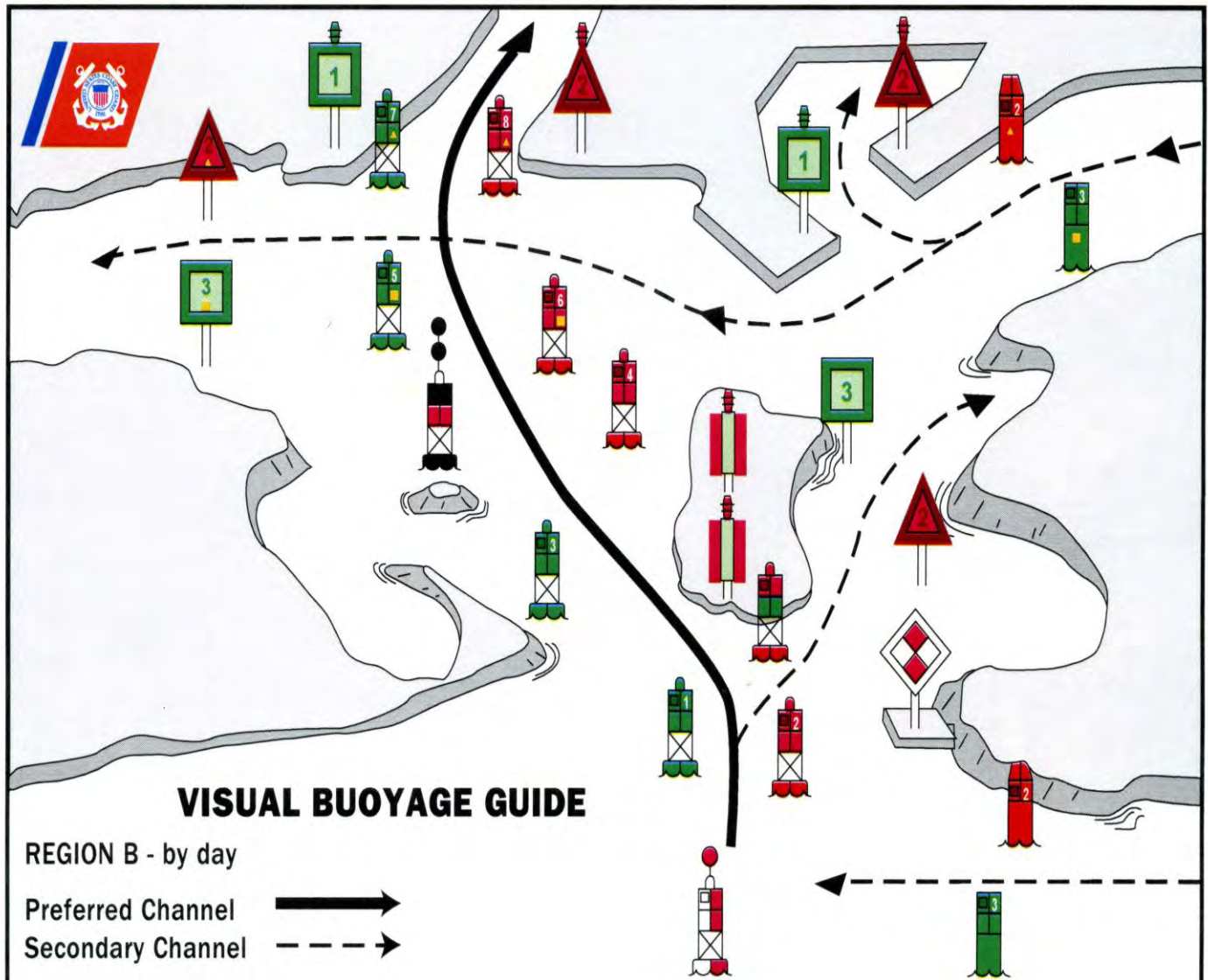
W - White

Y - Yellow



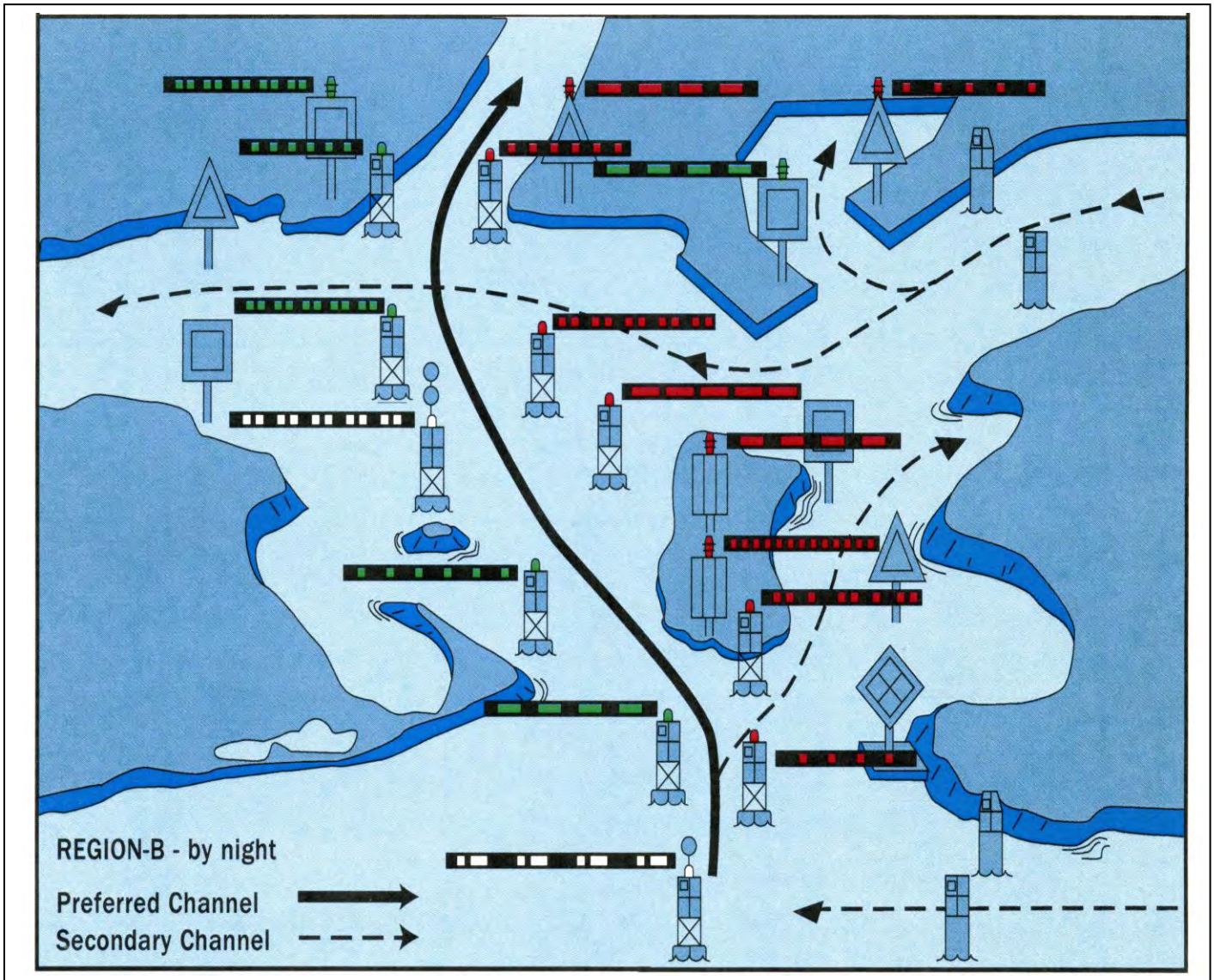
The next illustrations show Aids to Navigation in daylight, at night and how they would appear on a Nautical Chart.

### Daytime View



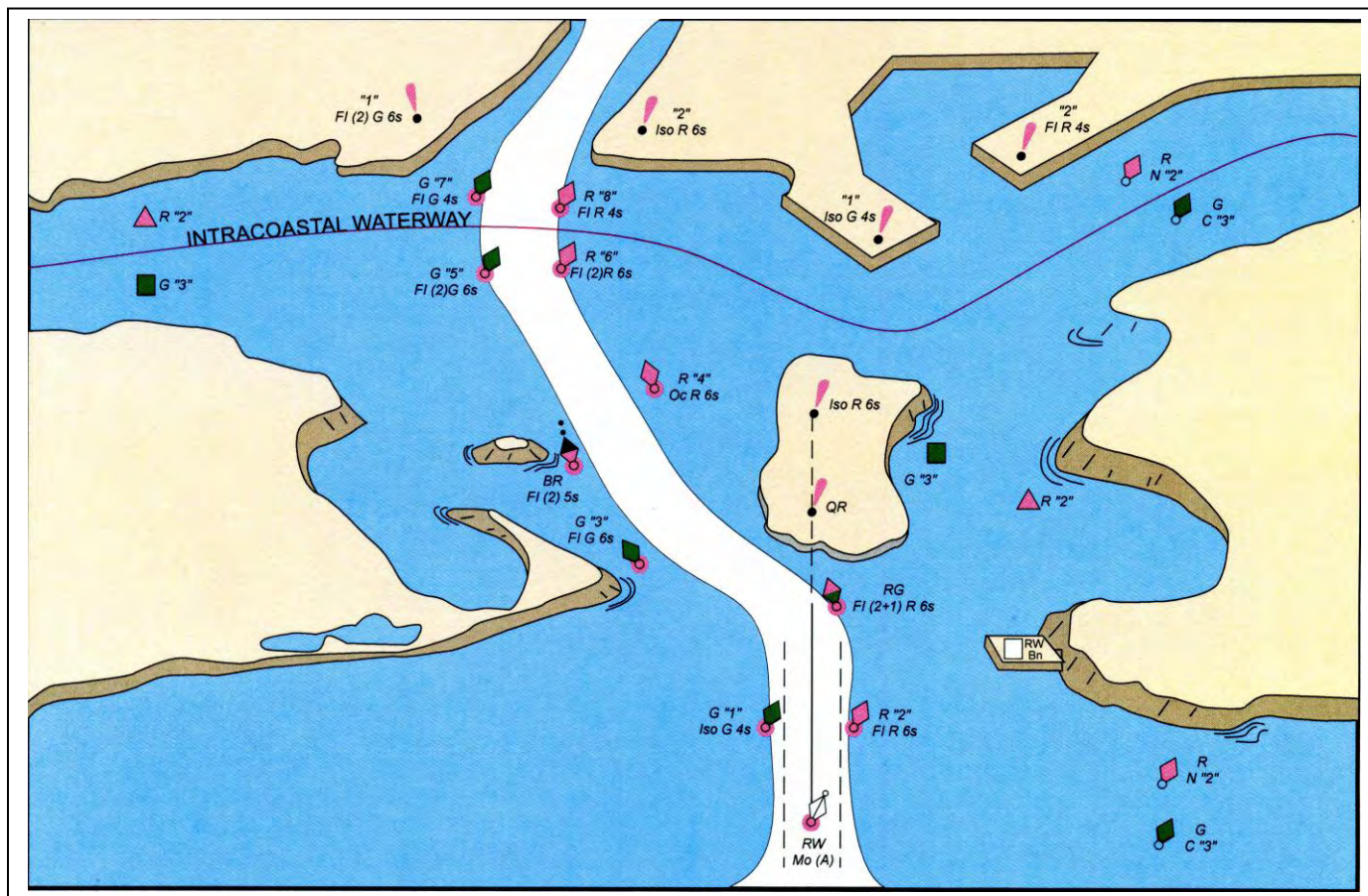


# Night-time View





## Chart View



### Other Short Range Aids to Navigation

Lighthouses are placed on shore or on marine sites and most often do not show lateral markings. They assist the mariner in determining his position or safe course, or warn of obstructions or dangers to navigation. Lighthouses with no lateral significance usually exhibit a white light. Occasionally, lighthouses use sectored lights to mark shoals or warn mariners of other dangers. Lights so equipped show one color from most directions and a different color or colors over definite arcs of the horizon as indicated on the appropriate nautical chart.

Seasonal aids to navigation are placed into service, withdrawn, or changed at specified times of the year. The dates shown in the Light List (Col. 8) are approximate and may vary due to adverse weather or other conditions.

Ranges are non-lateral aids to navigation employing dual 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 display rectangular dayboards of various colors and are generally, but not always lighted. When lighted, ranges may display lights of any color.

## **Bridge Markings**

Bridges across navigable waters are generally 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 used on drawbridges to show when they are in the closed position.**

**Green lights are used 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 retroreflective 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 should be 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 retroreflective panels and may exhibit a yellow light that displays a Morse code "B"(-...).

**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. They **indicate the vertical clearance available under the span**.

Drawbridges equipped with radiotelephones display a blue and white sign which indicates what VHF radiotelephone channels should be used to request bridge openings. Bridge lights are displayed later in the Study Guide.

## **1. Basic Training - Global Positioning Systems - Electronic Navigation**

**GPS** The Global Positioning System (GPS) was designed as a dual-use system with the primary purpose of enhancing the effectiveness of U.S. and allied military forces. GPS is rapidly becoming an integral component of the emerging Global Information Infrastructure, with applications ranging from mapping and surveying to international air traffic management and global change research. The growing demand from military,

civil, commercial, and scientific users has generated a U.S. commercial GPS equipment and service industry that leads the world. Augmentations to enhance basic GPS services could further expand these civil and commercial markets.

GPS is managed by the National Space-Based Positioning, Navigation, and Timing (PNT) Executive Committee. The PNT manages GPS and U.S. Government augmentations to GPS, consistent with national policy, to support and enhance U.S. economic competitiveness and productivity while protecting national security and foreign policy interests.

The basic GPS is defined as the constellation of satellites, the navigation payloads which produce the GPS signals, ground stations, data links, and associated command and control facilities which are operated and maintained by the Department of Defense; the Standard Positioning Service (SPS) as the civil and commercial service provided by the basic GPS; and augmentations as those systems based on the GPS that provide real-time accuracy greater than the SPS. GPS permits land, sea, and airborne users to determine their three dimensional position, velocity, and time, 24 hours a day in all weather, anywhere in the world.

## **DGPS**

Differential GPS (DGPS) is the regular Global Positioning System (GPS) with an additional correction (differential) signal added. This correction signal improves the accuracy of the GPS and can be broadcast over any authorized communication channel. NAVCEN operates the Coast Guard Maritime Differential GPS (DGPS) Service and the developing Nationwide DGPS Service, consisting of two control centers and over 60 remote broadcast sites. The Service broadcasts correction signals on marine radiobeacon frequencies to improve the accuracy of and integrity to GPS-derived positions. The Coast Guard DGPS Service provides 10-meter accuracy in all established coverage areas. Typically, the positional error of a DGPS position is 1 to 3 meters (3 to 10 feet), greatly enhancing harbor entrance and approach navigation. The System provides service for coastal coverage of the continental U.S., the Great Lakes, Puerto Rico, portions of Alaska and Hawaii, and a greater part of the Mississippi River Basin. Many foreign nations are implementing standard DGPS services modeled after the U.S. Coast Guard's system to significantly enhance maritime safety in their critical waterways.

**Wide Area Augmentation System (WAAS)** WAAS was originally developed by the Federal Aviation Agency for the aviation community. It has been incorporated into maritime GPS. On the average, WAAS and DGPS accuracy are virtually the same, although DGPS accuracy is better when the user is near a DGPS transmitting site. The WAAS architecture is designed to provide uniform 7m accuracy (95%), regardless of the location of the receiver. Within the WAAS service area, DGPS is designed to provide better than 10m navigation service (95%), but typically provides better than 1 meter horizontal positioning accuracy (95%) when the user is less than 100 nautical

miles from the DGPS transmitting site. Accuracy then degrades at a rate of approximately 1 meter per hundred nautical miles as the user moves away from the transmitting site. In D11SR sites are located at Pt. Loma, Lompoc, Bakersfield, CA and Flagstaff AZ.

**Using a GPS** you need to be receiving from three satellites to get a two dimensional position (lat. and long.). With reception from four satellites you can receive three dimensions including elevation. Your GPS receiver will tell you how many satellites you are receiving and you should do your work based on four satellites if at all possible. There will be some wobble in what you receive so you should take a few readings over a couple of minutes and average them. Most GPS provide the option of receiving output displays as degrees, minutes and seconds or as degrees, minutes and tenth of minutes. All Verifiers must use the former degrees, minutes and seconds, in recording position, so pre set the GPS to get the desired output.

A degree (°) is 60 nautical miles or 69 *statue* miles

A minute (') is one nautical mile or 2,025 yards (6076ft)

There are 60 seconds (") in a nautical mile, one second being about 34 yards (101ft)

A reading of 117° 34.6' should be on your work 117° 34 ' 36". 6/10 of a minute would be converted to 36 seconds ( .6 x 60 seconds)

## **1. Basic Training - Government Publications on Navigation**

**Nautical Charts** Charts are fundamental in navigation and the use of charts is necessary in aid verification. They provide very comprehensive information, a list of which is too long for this document. You are encouraged to go the web page of the Office of Coast Survey. The web address is listed below.

(<http://www.nauticalcharts.noaa.gov/mcd/OnLineViewer.html>)

Office of Coast Survey is a component of the National Ocean Service (NOS) that, in turn, is part of the National Oceanic and Atmospheric Agency (NOAA). On the Coast Survey page click on Nautical Charts on the left margin to gain access to more information about charts and where to obtain them. Take a look at the electronic charts page where you can print out current charts, at least to the capacity of your printer. You should have a large scale Nautical Chart of the area in which you plan to work. Lake Mead is chart number 18687 and San Diego is 18773 and most the large scale charts of interest in D11SR fall between these two numbers. For verifying you want the largest scale chart (large scale means a smaller area covered in more detail). A list of nautical charts follows.

## NAUTIAL CHARTS IN DIVISION 11SR

Number	Scale	Title
18020	1:1,444,000	San Diego to Cape Mendocino
18022	1:868,003	San Diego to San Francisco Bay
18687	1:48,000	Lake Mead
18700	1:216,116	Point Conception to Point Sur
18703	1:40,000	Estero Bay; Morro Bay
18704	1:20,000	San Luis Obispo Bay, Port San Luis
18720	1:232,188	Point Dume to Purisma Point
18721	1:100,000	Santa Cruz Island to Purisima Point
18724	1:20,000	Port Hueneme and Approaches
18725	1:50,000	Port Hueneme to Santa Barbara; Santa Barbara; Channel Islands Harbor and Port Hueneme; Ventura
18727	1:40,000	San Miguel Passage; Cuyler Harbor
18728	1:40,000	Santa Cruz Channel
18729	1:40,000	Anacapa Passage; Prisoners Harbor
18740	1:234,270	San Diego to Santa Rosa Island
18744	1:40,000	Santa Monica Bay; King Harbor
18746	1:80,000	San Pedro Channel; Dana Point Harbor
18748	1:15,000	El Segundo and Approaches
18749	1:20,000	San Pedro Bay; Anaheim Bay Huntington Harbor
18751	1:12,000	Los Angeles and Long Beach Harbors
18754	1:10,000	Newport Bay
18755	1:40,000	San Nicolas Island
18756	1:20,000	Santa Barbara Island
18757	1:40,000	Santa Catalina Island; Avalon Bay; Catalina Harbor; Isthmus Cove
18758	1:5,000	Del Mar Boat Basin
18762	1:40,000	San Clemente Island
18763	1:20,000	San Clemente Island northern part; Wilson Cove
18764	1:15,000	San Clemente Island Pyramid Cove and approaches
18765	1:100,000	Approaches to San Diego Bay; Mission Bay
18772	1:20,000	Approaches to San Diego Bay
18773	1:12,000	San Diego Bay
18774	1:100,000	Gulf of Santa Catalina; Delmar Boat Basin-Camp Pendleton

**Coast Pilot** The Coast Pilot is a narrative of what a mariner will see as they approach the coast and or a harbor. It lists some aids and gives important information and telephone numbers to arriving boaters. The Coast Pilot is available electronically on the same Office of Coast Survey website. Click on the Nautical Charts and Publications listing on the left margin, and then again on Coast Pilot. The Pacific Coast is covered in Coast Pilot 7.

**<http://www.nauticalcharts.noaa.gov/staff/chartpubs.html>**



**Light List** This is a listing of almost all lighted aids in U.S. waters. It gives characteristics of the lights and where they are found. It is a source you will use in aids verification and you must be familiar with the Light List. It is also available electronically. It can be found on the webpage of the U.S. Coast Guard's Navigation Center (navcen). The web address is below.

(<http://www.navcen.uscg.gov/pdf/lightLists/LightList%20V6.pdf>)

There are a number of good pages in the Light List that graphically display and in some detail describe aids to navigation. Some of this material is used in this commentary. The actual light listings start with seacoast, or aids to those offshore (Section 1), in San Diego and moves north along the Coast. Approach and harbor lights follow in Section 2, again going from south to north. Click on District 11 on the map to get to lists for our area.

**Local Notice to Mariners** The Local Notice to Mariners (LNM) is a weekly publication by the Coast Guard of changes that affect Nautical Charts, the Light List and provides information of activities that effect navigation such as construction projects, military activities or other nautical events. It is also available electronically.

<http://www.navcen.uscg.gov/?pageName=lnmDistrict&region=11>

Again click on District 11 to get the latest changes in our area. You need to check this prior to going out to verify an aid, as some change you might run across may already be noted in LNM.

**Navigation Rules** While you won't need this booklet for verifying you should know about it and possibly refer to it in some situations. It is the law governing marine activities. It is available on the Navigation Center website at:

<http://www.navcen.uscg.gov/?pageName=navRulesMain>

Questions have arisen regarding the lights required in mooring situations when a vessel is moored to a lighted buoy.

Look at all of these websites, become generally familiar with these publications, as they will be referred to in the AVs workshop, where it will be explained how these publications and your work as a verifier are connected. You will need to know what purpose these publications serve.

## **2. PatoN RECORDS**

### **A. The Role of the Coast Guard and the Auxiliary**

The U.S. Coast Guard has the responsibility for the establishment and maintenance of all Aids to Navigation on the Waterways of the U.S. This is an all-inclusive responsibility, and it includes the coastal waters and inland waters of the United States. This responsibility is exercised in conjunction with NOAA National Ocean Service and other Federal Government agencies, State and Local Government elements and private entities.

The U.S. Coast Guard Auxiliary, in its overall supplemental supporting role, provides specifically authorized assistance to the Coast Guard in its Aids to Navigation missions and the National Ocean Service in its Chart Updating missions. The Auxiliary support effort is provided through the Aids to Navigation and Chart Updating (AtoN/CU) Program. In District 11 the Auxiliary's task is to annually check most Private Aids to Navigation (PatoNs) and many of the bridges in the District. This annual effort involves hundreds of trained Auxiliary members and their facilities. Chart Updating, once reserved for Aux AV qualified members is now open to all members. New procedures were adopted in 2007 with a new study guide, worksheets and new requirements. For more information contact the DSO-NS.

### **B. The Process for PatoN Verification**

The Coast Guard form CG-2554 form is used to approve, change or discontinue a PatoN. With approval, the PatoN is entered into a database known as I-ATONIS. AtoN Verifiers (AVs) may see this form as changes are made to PatoNs in an area in which he/she is active. District 11 in late January sends out to both the Northern and Southern Regions worksheets called "Private Aids to Navigation Record - PatoN". Samples of these Records are included in this booklet.

These Records are sent to the District Staff Officer – Navigation Systems (DSO-NS) in each Region. Each Region is broken down into areas, in some instances sub areas, and all PatoNs in each area and sub area are aggregated. The DSO-NS in turn sends all the PatoN Records in each zone to the Division Staff Officers who are responsible for the assignment of the PatoNs to the appropriate Flotillas (FSO-NS). In D11SR the areas (called Zones) are: Inland, San Diego, Los Angeles/Long Beach and Santa Barbara/Ventura.

The SO-NS has an important task as he/she is responsible for getting the PatoN Record in the hands of the members who will do the verifying. This task requires a good deal of coordination with Flotilla Staff Officers - Navigation Systems (FSO-NS), Coxswains, AtoN Verifiers and other SO-NS Officers. The number and location of Verifiers and Operational Facilities in a Division rarely match the work that is assigned, so most SO-NS Officers must work with others to ensure the verifications get done in a timely manner.

Once the PatoN has been checked by the AV the record is returned to the DSO-NS. Each group of completed PatoN Records are covered by a Transmittal Form and returned directly to the DSO-NS. The DSO-NS maintains records of the District's activity, keeps the Transmittal Forms and forwards the completed PatoN Records to District 11 Commander (dpw). DSO-NS advises the SO-NS and FSO-NS of PatoNs received and processed to keep records of their Unit's activity.

Commander (dpw) periodically will send the DSO-NS a printout of all PatoNs in the District including notations of what PatoNs have been checked.

### **C. Preparation and Equipment required of AV**

Before undertaking a verification of a PatoN it is important that the AV do some preparation. This includes carefully reading the PatoN Record, checking the current Light List, precisely plotting the PatoN 's position on a nautical chart and checking the most recent Local Notice to Mariners to see if the chart itself needs updating. We will discuss this more fully later in this booklet. The AV will need several tools to do his job. They include:

**GPS** From the reading you were asked to do prior to this class you should be familiar with GPS and realize that the accuracy of GPS has been improved with DGPS and WAAS. Most GPS units sold today will have WAAS capability and the one you use should have this feature. GPS is accurate to about 15 meters (50 feet), DGPS accuracy is at least 5 meters (16 feet) and WAAS accuracy is less than 3 meters (10 feet). Other methods of determining position from the pre electronic days might be used, but the accuracy is far less and for all intents and purposes AVs should be using up to date **WAAS GPS**.

**Binoculars** These are necessary for checking aids to which you cannot get close. 7X50 is the recommended size for you to use.

**Pencil(s) and Pen** Pencils are used to plot position and make notes that can be erased and a pen to fill out the PatoN Record.

**Stopwatch** Needed to time light sequences at night on lighted aids.

**Camera** A digital camera is a great advantage, a photograph will take the place of a long description. This is particularly true of a discrepant PatoN

**Telephone Numbers** In case you need to report an urgent problem, make sure you have the telephone numbers of the controlling Coast Guard Sector or Station. On board a boat the radio or a cell phone can be used, on land a telephone.

**Plotting Instruments** You will need dividers, or compass, and parallel rulers or paraglide, to do your chart plotting

**Calculator** This can keep your math calculation mistakes to a minimum.

If you are doing your work from an Operational Facility, it is required to have Nautical Charts, compass, deviation table, plotting instruments, depth finding equipment, and binoculars on board. The presence of these items and the coxswain's agreement for you to use them may relieve you of the necessity of having some of the items mentioned in the list above. Many boats today will also have a GPS on board.

You should not be underway before your plotting is done, so if you have access to the PatoN Records prior to going aboard using you own chart to plot their location will save everybody some time.

### D. The PatoN Record Form

A sample of the PatoN Record form, broken into its three sections, follows . We will go over this record in detail line by line starting on the next page.

#### THE HEADING

<b>Aid No:</b> 200100796225	PRIVATE AIDS TO NAVIGATION RECORD - PATON	<b>Area:</b> 6.6
<hr/>		
<b>Aid Name:</b> Watchorn Basin Danger Buoy (B)		<b>LLNR:</b>
<b>Latitude:</b> 33-43-09.450N	<b>Longitude:</b> 118-16-37.080W	<b>Class:</b> III
<b>Aid Type:</b> ULB	<b>Color:</b> WO	<b>Lt Char:</b>
<b>Operation:</b> PERMANENT	<b>From:</b>	<b>Chart No:</b> 18751
<b>Remarks:</b>	<b>To:</b>	<b>Depth:</b> 5 FT
WHITE REGULATORY BUOY WITH ORANGE BANDS MARKED "DANGER-HAZARD"		<b>Last Verified:</b> 5/15/2009

**Aid No.:** This is the number for this specific aid in the I-ATONIS database. The Aid number may be as short as four digits or as long as twelve digits such as the example above. The reason for the differing number of digits in the Aid Number is that the database has been built over time and changes in computer operating systems required changes in numbering.

**Title:** All PatoN Records have the same title.

**Area:** PatoN Records are grouped by area when they are mailed to the DSO. In District 11(SR) there are 4 zones. Divisions in each zone are assigned the responsibility for specific areas within the zone. These four are further divided into sub areas.

- Zone – I
  - Area-1 Lake Mead
  - Area-3 Lake Mohave
  - Area-4 Lake Havasu
  - Area-7 Lake Powell
  
- Zone – LA/LB
  - Area-6.1 Dana Point
  - Area-6.2 Newport Harbor
  - Area-6.3 Huntington Beach and Harbor
  - Area-6.4 Alamitos Bay
  - Area-6.5 Long Beach Harbor
  - Area-6.6 Los Angeles Harbor
  - Area-6.7 Catalina Island
  - Area-8.0 Santa Monica Bay
  
- Zone – SB/V
  - Area-2 Point Dume to Point Conception
  
- Zone – SD
  - Area-5.1 San Diego Harbor
  - Area-5.2 Mission Bay to San Clemente

Because of the need to work together PatoNs assigned in one Division may be checked by AVs and/or facilities from another Division.

**Aid Name:** Each name is unique to that PatoN and you must be careful as a group of PatoNs may have the same name and are differentiated by a letter or number. **If the letter or number on the PatoN form is in parenthesis (see above sample) then it appears numbered or lettered only on the form and not on the PatoN.** Remember here that only lateral aids carry numbers, all other PatoNs carry letters if they are marked at all. Exceptions may be mooring buoys that are lettered and may be followed by a number such as A 22. This should not be confused with a lateral aid subsequently placed in position of buoys already numbered in sequence where the buoy could read 22 A. Regulatory buoys indicating a speed limit, 5 MPH, are not considered numbered buoys. If the name of the aid on the PatoN Record has a number or a letter that is not in parenthesis, so must the aid have the same number or letter.

**LLNR:** This refers to the number of the PatoN as it is carried in the Light List. The Light List is published by the Coast Guard, and it provides information on all Class I and many Class II PatoNs that carry lights. It is updated periodically and is available on the web.

(<http://www.navcen.uscg.gov>)

If you have a lighted aid to check make sure you use the Light List in you preparation. If you print this information you need only print the page(s) concerning the PatoN you will be checking. You should also check the most recent Local Notice to Mariners. It is published weekly and tells of all changes to aids and charts that have been reported to the Coast Guard. It is available at the same website as the Light List and if you choose to print out information you again can print out only the pages you need. Our example has no LLNR as it is unlighted and even if it did have a light it is Class three and would not be listed.

**Latitude/Longitude:** This tells you where the PatoN is supposed to be located. One of your jobs as a verifier is to confirm the position, and this is why you plot before you start, so you go to the correct position. Careful plotting is required as there may be a number of aids located near one another.

**Class:** PatoNs may be Class I, II, or III. If lighted, Class I and most Class II will be in the Light List, The same is true for Nautical Charts. Class III, such as the example above, will not be listed or charted.

**Aid Type:** This will be a short letter abbreviation of a description of the aid. The more common of these are:

FR - Front Range	LBB - Lighted Bell Buoy	DBN - Day Beacon
RR - Rear Range	LGB - Lighted Gong Buoy	REG - Regulatory BY.
LB - Lighted Buoy	LWB - Lighted Whistle Buoy	SPD - Speed Buoy
GB - Gong Buoy	LHB - Lighted Horn Buoy	IULB - Inflatable
WB - Whistle Buoy	ULB - Unlighted Buoy	SSIG - Sound Signal
HB - Horn Buoy	ULBB – Unlighted BB Bell Buoy	

In the example shown above the PatoN is an unlighted buoy (ULB).

**Color:** This is the color of the aid. Again an abbreviation. Some examples.

B - Black	BR - Black and Red	RB - Red and Black
G - Green	BW - Black and White	RG - Red and Green
R - Red	GR - Green and Red	RW - Red and White
Y - Yellow	GW - Green and White	WO - White and Orange
		WU - White and Blue

Again if you look at the example above you will see this PATON is white and orange (WO).

**Lt. Char:** These are the characteristics of the light if it is a lighted aid. Lighted aids may be fixed or be lighted in different patterns. This is done so they can be differentiated from one another. This will be covered in more detail later. Our example is not lighted.

**Chart No:** This is the number of the NOAA chart on which the aid will be located. An index of Nautical Charts and their numbers can be found on the NOAA website. You would plot our example PatoN on chart 18751, which is Los Angeles/Long Beach Harbors.

**Operational:** Indicates if aid is permanent or seasonal.

**From and To:** If seasonal, these dates tell you when the buoy is in place. Do not attempt to check a seasonal aid that has not yet been placed or has been removed.

**Depth:** This is the depth of the water where the buoy is located.

**Remarks:** These are remarks from District to you, the verifier. This may give you more information about the aid. You do not write in this space or in any of the space of the heading section. The example tells you this is a white-orange regulatory buoy marked Danger - Hazard.

This first section of the worksheet is to give you, the verifier, all the required information about the PatoN. **Do not make any mark/correction or notes in this Restricted Area. Everything else on the worksheet is for your use.**

## **OBSERVER'S WORKSHEET - INDENTITY**

As the title implies this is where you begin to do your work as a verifier. Note the instruction RETURN THIS COMPLETED PatoN NO LATER THAN ONE WEEK AFTER VERIFICATION. What you are filling out is a legal record and you have observed it on a specific date. If there is a discrepancy and the aid needs to be repaired the Coast Guard has to notify the owner as quickly as possible. If the aid is watching properly your inspection needs to be in the database quickly for reference purposes. It is necessary that your completed forms are back in the hands of the DSO-NS as rapidly as possible.

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**OBSERVER'S WORK SHEET**

RETURN THIS COMPLETED PATON NO LATER THAN ONE WEEK AFTER VERIFICATION

Date: \_\_\_\_\_ Local Time: \_\_\_\_\_ Chart No: \_\_\_\_\_ Edition: \_\_\_\_\_  
Aid Verifier: \_\_\_\_\_ Div: \_\_\_\_\_ Flot: \_\_\_\_\_ ID No.: \_\_\_\_\_  
Aid Verifier Phone #: (\_\_\_\_\_) \_\_\_\_\_ E-Mail: \_\_\_\_\_

**Who, When, Where:** The items to be filled in the above require no explanation. This dedicates who did the verification, when it was done and how you might be reached in the event of further questions.

**OBSERVER WORKSHEET FINDINGS**

**CIRCLE ALL APPROPRIATE**

DISCREPANCY - Explain Below

VERIFICATION - Watching Properly

Light out	Improper characteristi	Broken Lens	Light obscure	Missing
Off station	Number obliterated	Vandalized	Peeling paint	Retro peeling
Sinking	Aid obscured	Damaged	Bird fouling	Other

**YOUR FINDINGS**

In the above section is where you record what you find, and you can find only one of two conditions, the aid is **verified - watching properly**, or it has some **discrepancy**.

Look at the list below that itemizes things that can be wrong with an aid. If none of them are present, then it is watching properly. If you can check one or more problems then it has a discrepancy. However, an aid doing as intended is probably watching properly although it might have some minor problems. If this is the case, then the problems should be noted at the bottom of the form in the Comments section or on the back of the form. A digital photo can be printed on the back of the form that is most helpful in illustrating a situation.

Two of these items in the list of discrepancies need explanation.

**Damaged:** A condition that might occur with a beacon, a fixed aid, damaged from a collision by a boat. The damage may have caused the beacon to lean to one side. It is reportable as a discrepancy if the lean is more than 15 degrees. What is a 15 degree lean? Imagine a clock face with the hour hand pointing at 12, vertical to the surface. A 15 degree change would have the hour hand at 12 and the minute hand at 8.

**Off Station:** Means the aid in this case, probably a floating aid, is not at the Lat/Long. indicated on the PatoN Record. What we are checking are private aids and the care in which they were placed is not known. With floating aids there is also the issue of the watch circle where tide or current may take the aid some distance off its assigned position. Because of this some inexactness in location is allowed. The Key question here is;

### IS THE AID DOING AS INTENDED?

If it is, then an error in position of 250 yards is allowable. A nautical mile is one minute or 2025 yards. There are 60 seconds in a minute. One second equals about 34 yards. Therefore a buoy doing as intended can be 7 seconds off its assigned position if it is doing as intended (7.6 seconds = 250 yards). However,

### IF THE AID IS NOT DOING AS INTENDED,

the allowable distance from the assigned position is 100 yards or 3 seconds (34 x 3 = 102 yards)

**An example.** A White/Orange regulatory buoy indicating a 5 MPH speed limit could be 250 yards off position and it still is telling boaters of the speed limit. Another White/Orange regulatory buoy indicating a sand bar or shoal should not be 250 yards off station because it may pose a danger to boaters by not doing as intended. You should add a written comment in either of these examples.

### LAST SECTION

\*\*\*\*\* CIRCLE THE METHOD THAT YOU USED TO VERIFY THE AID'S POSITION \*\*\*\*\*

Seaman's Eye:	DGPS:	WAAS:	GPS:	LORAN:	Sextant Angles:	Bearings:	Other:
Is the aid performing as intended?: -----						Yes	No
Did you Plot your DGPS, GPS, or LORAN Position on a Chart?: -----						Yes	No
Did you convert GPS LORAN Lat/Long Decimals to Seconds?: -----						Yes	No
(NOTE: PLEASE REPORT THE AIDS LAT/LONG IN DEG MIN' SEC")							
PATON LOCATION Latitude: _____				Longitude : _____			
Further Comments: (Continue on reverse if necessary)							

This last section is self-explanatory. It is very important that you make sure you are **reporting position in degrees, minutes and seconds** and not in degrees, minutes and tenths of minutes. Make sure your GPS is set up to do the former.

Further comments can be used to write down the several GPS readings you get. You should read the GPS several times over a few minutes as the output will vary somewhat over time. This space can also be used to record depth, and you must remember that the water depth measured on electronic devices is recording from where the transducer is located, usually on the bottom of the hull. Ask the coxswain how far below the water line the recording is being made and add that to what the depth finder indicates.

### A FEW LAST POINTS ON PatoN RECORDS

**•Know what you are doing before you start** filling out a PatoN Record. Do your plotting and check the Light List and Local Notice to Mariners. Particularly on the first PatoN you check, put down the coffee and donut and get your focus before you put pen to paper.



**•Your work becomes a legal record.** It is possible that you might be called on to testify about your work in a legal proceeding. Should that happen, it would occur perhaps years after you did your work and your memory of the PatoN check will be faint, if you remember it at all. If you were neat and completely filled out the record, you should be alright, but if the record is a mess and even you cannot speak about it with confidence it could affect the outcome of the dispute. ***Your name is on the record, always do your own work, and do it well.***

**•Aid Verifiers under no circumstances should ever climb aboard an aid,** they should ***never attempt to repair or reposition an aid,*** and ***never enter private property*** in an attempt to check an aid. Certain features of an aid may be difficult to check.

**•Fog horns usually are silent if there is no fog.** This means you must wait for a foggy day to check them or to ask the controlling authority to turn on the fog horn when you are ready for the check. To check RACONS and some Radar Reflectors AVs would need an operating Radar onboard.

**•Look over all buoys and beacons carefully.** Damaged solar panels, supporting structures, bird nests, overgrown bushes, etc should be cited.

**•Group of Aids.** It is not uncommon for a number of aids in one area to be placed to serve a single purpose. They are usually regulatory marks that separate uses to certain waters, such as no sail, restricted channel, ski boat or PWC area, etc. ***It is possible that one of more of these marks may have a problem, but in totality as a series they are doing as intended. In such circumstances it may be appropriate to indicate in the comments section that some of these marks need attention rather than indicating a discrepancy.***

•Another issue when checking a series of buoys placed for the same purpose is consistency. ***If possible, a series of buoys should be checked by one verifier. If several AVs are checking a series of buoys it is important that their efforts are coordinated*** by the SO-NS, the coxswain or the AVs themselves so that they are consistent in their reporting.

### **E. Checking Lights**

Aids with lights, obviously, must be checked when lights are illuminated. Because there are different devices on aids that light them you should wait until it is late enough to be sure the light will be on. The light may not come on at sunset, but should be on at Civil Twilight when the sun is six degrees below the horizon, which is usually close to 30 minutes after sunset. On some aids you will have to check them twice, once during daylight and again at night.

You will check several conditions. One is the light missing? Is the light working? Is the light the right color? Can the light be seen from one nautical mile? Is the light exhibiting the correct pattern? Missing or not working are simple observations, but you may have to get close to the aid if it is not illuminated to tell the difference. The color of the light may be distorted by one of several things and you again may have to approach the light to make sure. Some lights may be obscured from certain angles and this will be reported in the Light List. You must check the Light List if you find an obstruction before you comment on the obstruction in the PatoN Record. On obstructions that appear in the Light List you should check to see if the angles in which the light is obstructed are correct.

There are several light patterns:

- F fixed, always on continuous
- Q quick flashing 60 times per minute

## Light Patterns (continued)

FL 2.5 flashes every 2.5 seconds 24 times per minute  
FL 4.0 flashes every 4 seconds 15 times per minute  
FL 6.0 flashes every 6 seconds 10 times per minute  
FL (2) 5 flashes twice every 5 seconds 24 times per minute  
FL (2) 6 flashes twice every 6 seconds 20 times per minute  
FL (2+1) 6 two flashes followed by one every 6 seconds 30 times per minute  
IOS 6 on 3 seconds and off equal time 10 times per minute  
OC 4 on 3 seconds and off one second 15 times per minute  
MO(A) Morse code A ( dot .4 seconds flash dash 2.0 seconds flash )  
30 times over 2 minutes

Checking light patterns is where you use your stopwatch. Check the number of flashes a light shows over one minute. There are some tolerances allowed in flashing lights. Quick flashing lights can be + or - 4 flashes, most others can be + or - 1 flash over a minute. In the Aids to Navigation material you were asked to read before coming to this class, lights are covered in some detail.

### **F. Verifying PatoNs in District 11(SR)**

In 2011 District 11(SR) has been issued over a 1000 PatoN Records that need to be verified or marked as having discrepancies. The PatoNs are located in the District's Southern Region Area of Responsibility that includes Southern California, Nevada and Utah and the entire State of Arizona. They are found inland on the Colorado River Lakes Powell, Mead, Mojave, Havasu and in Yuma. They are also along the Coast from Point Conception to southern San Diego Bay just above the Mexican border including some in the Channel Islands.

The PatoNs are there to assist boaters and, as verifiers, we want to do our work in a timely manner so as many PatoNs as possible are completed before the traditional start of the boating season, which is Memorial Day at the end of May. We want to finish our task before boating seasons ends in September.

## **3. Report of Bridge Survey**

### **A. Purpose of Bridge Surveys**

Bridges are surveyed to check on whether their lighting is operating properly and whether other aids to the boater on the bridge are in good condition. Bridge Survey's check a bridge's lights, fenders, clearance gauges, identification, disrepair, waterway clearance and any temporary structures not previously known.

### **B. Different Type of Bridges**

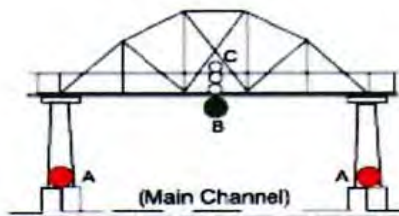
There are two basic types of bridges, either fixed or movable. Within movable bridges there are several different classifications.

Bascule (double opening leaf lift), Vertical lift, Swing (single or double opening)

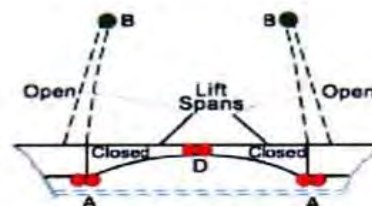
Draw( single opening), Pontoon (floating) and Retracting.

**C. Bridge Lighting and Other Signals**

The information in this paragraph is illustrated with graphics on the next page. Bridge Lighting: In U.S. waters, the Coast Guard prescribes certain combinations of fixed lights for bridges and structures extending over waterways. In general, red lights (A) are used to mark piers and supports, and green lights (B) mark the centerline of the navigable channel through a fixed bridge. If there is more than one channel through the bridge, the preferred route is marked by three white lights (C) placed vertically. Red lights (D) are also used on some lift bridges to indicate the lift is closed, and green lights (E) to indicate that the lift is open to vessel traffic. Double-opening swing bridges are lighted with three lanterns on top of the span structure so when closed red lights (F) are displayed, and when open for navigation will display two green lights (G).



Fixed Bridge



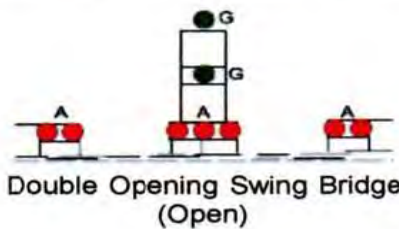
Double Leaf (Lift) Bascule Bridge



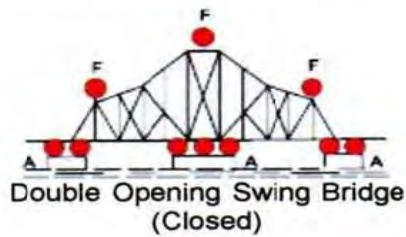
Vertical Lift Span Bridge (Open)



Vertical Lift Span Bridge (Closed)



Double Opening Swing Bridge (Open)



Double Opening Swing Bridge (Closed)

**D. Clearance Gauges** Clearance Gauges are extremely valuable to vessel operators because they indicate the vertical distance (clearance) between the "low steel" of the bridge channel span and the waterline (They do not indicate the depth of water under the bridge). These gauges are permanently fixed to the bridge pier or structure and located on the right side of the channel facing approaching vessels. Each gauge is marked by black numbers and foot marks (lines) on a white background board.

**E. Other Items to be Checked** There are several other items that might need to be checked on a bridge.

Wales (rub rails)	Retro Reflective Panels	Radar Reflectors/RACON
Fog signals	Protective Piers	Painting Channel Obstructions
Signs	Daymarks/Lateral Lights	

## **F. The Report of Bridge Survey**

A sample Bridge Survey follows this discussion two pages on. You will see the Bridge Survey first asks questions about lights, which means you must check bridges when the lights are on as well as during daylight hours. You are asked to check six types of lights, although any bridge may not have all six types of lights. The six lights are; Channel Center, Channel Margin, Pier, Pier Axis, Moveable Span and Preferred Channel, Examples of lights on bridges are found two pages on.

**Channel Center Lights** - Found on fixed bridges (all our D11SR bridges are fixed). They should appear as two 360 degree green lights affixed beneath the span or lip of the bridge. Both lights should be visible from either direction and they may be used as a range to line up on the center of the channel.

**Channel Margin Lights** - Marks the limits of the navigable channel as it passes under the bridge. They should be 180 degree red lights facing the channel as you approach the bridge in the channel.

**Pier Lights** - 180 degree red lights affixed to the bridge piers that face into traffic as you approach the bridge in the navigable channel.

**Pier Axis Lights** - 180 degree red lights fixed to piers on the axis, or turn, facing inward into the channel.

**Moveable Span Lights** - Found on bridges with moveable spans in various configurations required by the bridge design. Lights are red and green indicating the bridge is closed or open. There are no moveable span bridges in D11SR at this time.

**Preferred Channel Lights** - May be found on bridges with multiple lighted navigable channels. The preferred channel will have three white lights vertically stacked above the green light. The Report of Bridge Survey form will indicate which and how many of each light type should be found. You as verifier will be asked for each light; Are Lights Correctly Placed?, Are lights of Proper Color/Arc?, and Are Lights visible for One Nautical Mile? Also on the Survey form are questions about Fog Signals and Racons, the latter, Radar Beacon, requires a radar set to receive.

### **Other Items on Bridge Survey Form**

**Condition of Fenders** - Fenders protect the bridge piers from damage caused by passing vessels. They may have Wales (rub rails attached). They may be of wood or metal and they should be in good repair with no metal parts, such as bolts protruding into the channel or metal on the corners that might damage a vessel. Metal Wales should have non-sparking coatings.

**Condition of Clearance Gauge** - Should be on pier on right hand side of channel and readable 1/2 mile from bridge.

**Bridge Name Shown, Name of Bridge Is, Name Visible** - Self explanatory.

**Impairment of Clearances** - Several questions are on the form that deal with loose items hanging from the bridge or protruding into the channel which cause intended clearances to be reduced. These include any construction material such as ladders, cables, scaffolds, etc. Also among such impediments would be barges or boats moored in the channel or dolphins that have been broken and lean into the channel. Before you check a bridge you should look at the current LNM or listen to BNM to see if temporary conditions exist that impede navigation and have been noted.

**Drawbridges** - There are two questions regarding drawbridges: Is the drawbridge operating and are operating instructions posted? At this time there are no drawbridges in D11SR.



## Report of Bridge Survey Eleventh Coast Guard District Bridge Office

**Instructions**

1. Submit this report to the Auxiliary Coordinator as soon as possible after conducting the survey.
2. The best time to survey bridges is shortly before sunset so you can observe any hazards or discrepancies before dark, then observe the lights after dark.
3. If conducting the survey by land, respect all property rights. **DO NOT TRESPASS.**
4. Auxiliaries do not have law enforcement authority. Take care that your survey is not interpreted as a law enforcement action.
5. Any discrepancy, minor or major, should be reported immediately to the D11 Bridge Office at (510) 437-3516, Monday through Friday, during working hours or to the nearest Coast Guard Sector Command Center, by telephone or radiotelephone, during nights, weekends, and holidays. If in doubt, report it.

<u>NAME OF BRIDGE</u> 2nd Street Bridge	<u>LATITUDE</u> 33° 45.4' N	<u>LONGITUDE</u> 118° 07.0' W
<u>NAME OF WATERWAY</u> Alamitos Bay	<u>MILES ABOVE MOUTH</u> 1.4	<u>TYPE OF BRIDGE</u> Fixed
<u>NAME/ADDRESS OF BRIDGE OWNER</u> City of Long Beach 333 West Ocean Blvd Long Beach, CA 90801	<u>NAME ADDRESS OF BRIDGE OPERATOR (if different)</u>	

Fill out the section below and annotate the picture on the reverse. Show north arrow or direction of current

TYPE OF LIGHTS	Number of Lights	Are Lights Correctly Placed?	Are Lights of Proper Color/Arc?	Are Lights Visible for 1 Nautical Mile	State Condition of Lights
Channel Center Lights	2				
Margin of Channel Lights	0				
Pier Lights	4				
Pier Axis Lights	0				
Moveable Span Lights	0				
Preferred Channel Lights	0				
OTHER FEATURES	How Many?	LLNR	Characteristic	Range	Working Properly?
Fog Signals	0	N/A	N/A	N/A	
RACONS	0	N/A	N/A	N/A	

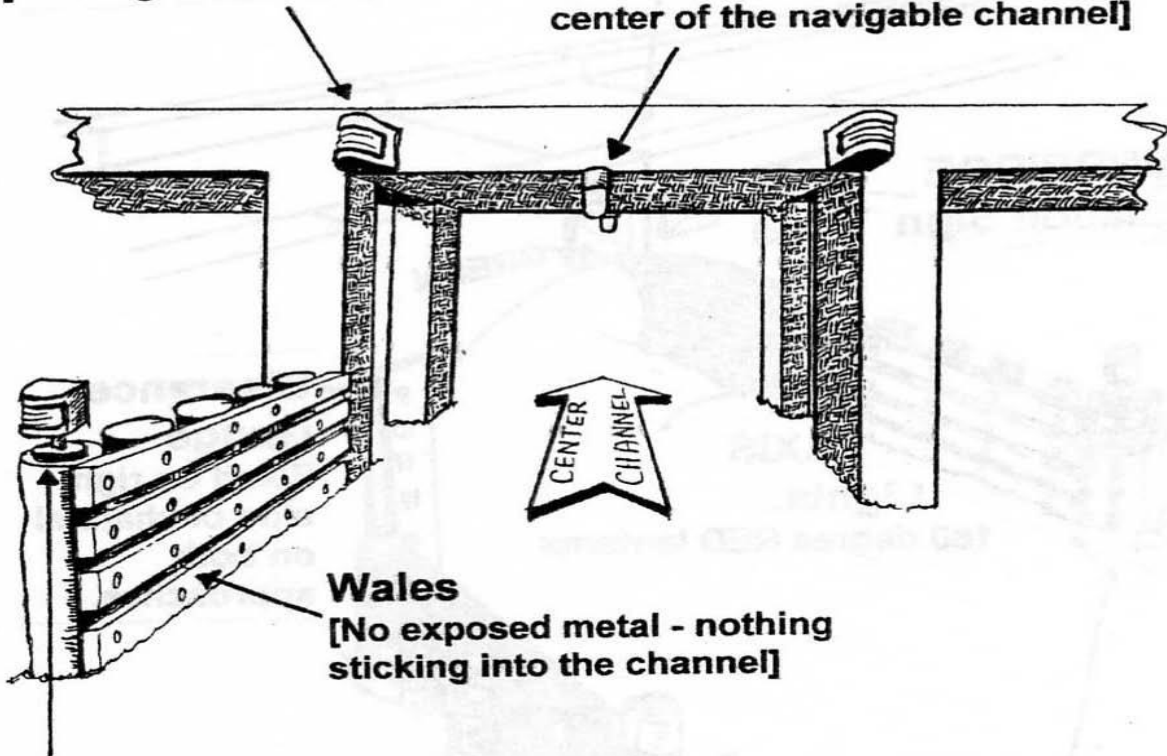
Condition of fenders:	Condition of Vertical Clearance Gauges:
Is the bridge name shown?	What name is shown?
	Is sign visible to mariners?
Are Navigational clearances impaired by disrepair, cables, etc?	
Are Navigational Clearances impaired by an accumulation of debris?	
Is there any equipment (i.e. barges, scaffolds) in the navigation spans that are not listed in the LNM/BNM?	
If a drawbridge, is it capable of operating? Are the operating regulations and radio call sign posted?	
Is there evidence of bridge or fender damage that might be from vessels?	

<u>Date and Time of Survey</u>	<u>Name and Member Number</u>	<u>Home Telephone Number</u>
	<u>Signature of Surveyor</u>	<u>Auxiliary File Number</u> 01

# FIXED BRIDGES

**Axis or Margin Lights**  
[180 degree lanterns]

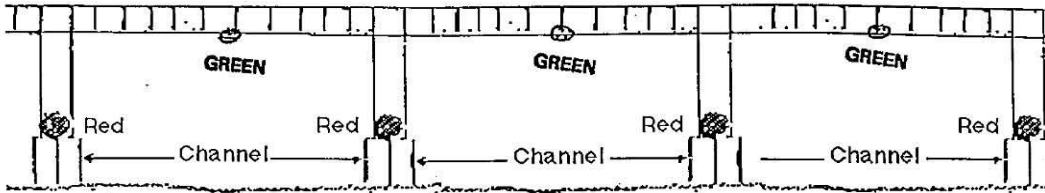
**Center Channel Lights**  
[360 degree Green lanterns  
forming a range under the  
lip of bridge and marking the  
center of the navigable channel]



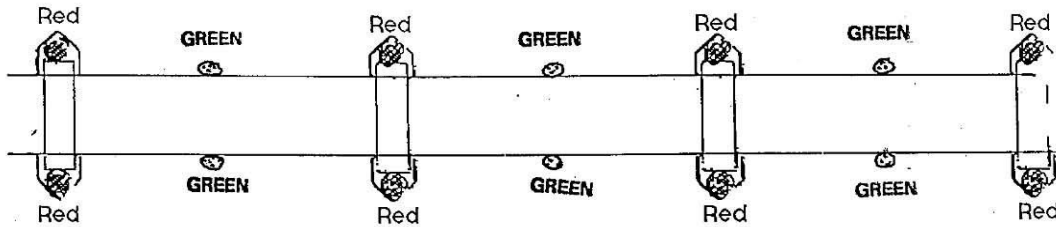
**Wales**  
[No exposed metal - nothing  
sticking into the channel]

**Pier Lights**  
[180 degree RED lanterns  
facing bridge approach]

Secondary Observer(s): \_\_\_\_\_ Aux. #: \_\_\_\_\_  
 \_\_\_\_\_ Aux. #: \_\_\_\_\_  
 \_\_\_\_\_ Aux. #: \_\_\_\_\_  
 \_\_\_\_\_ Aux. #: \_\_\_\_\_

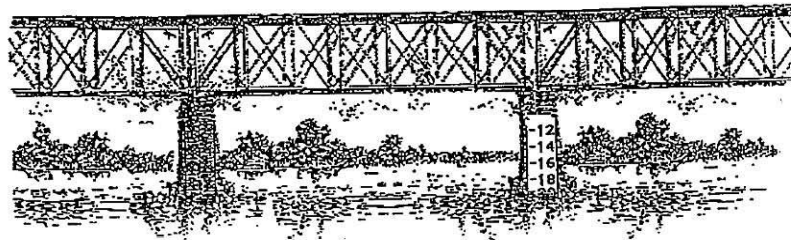


NORTH ARROW

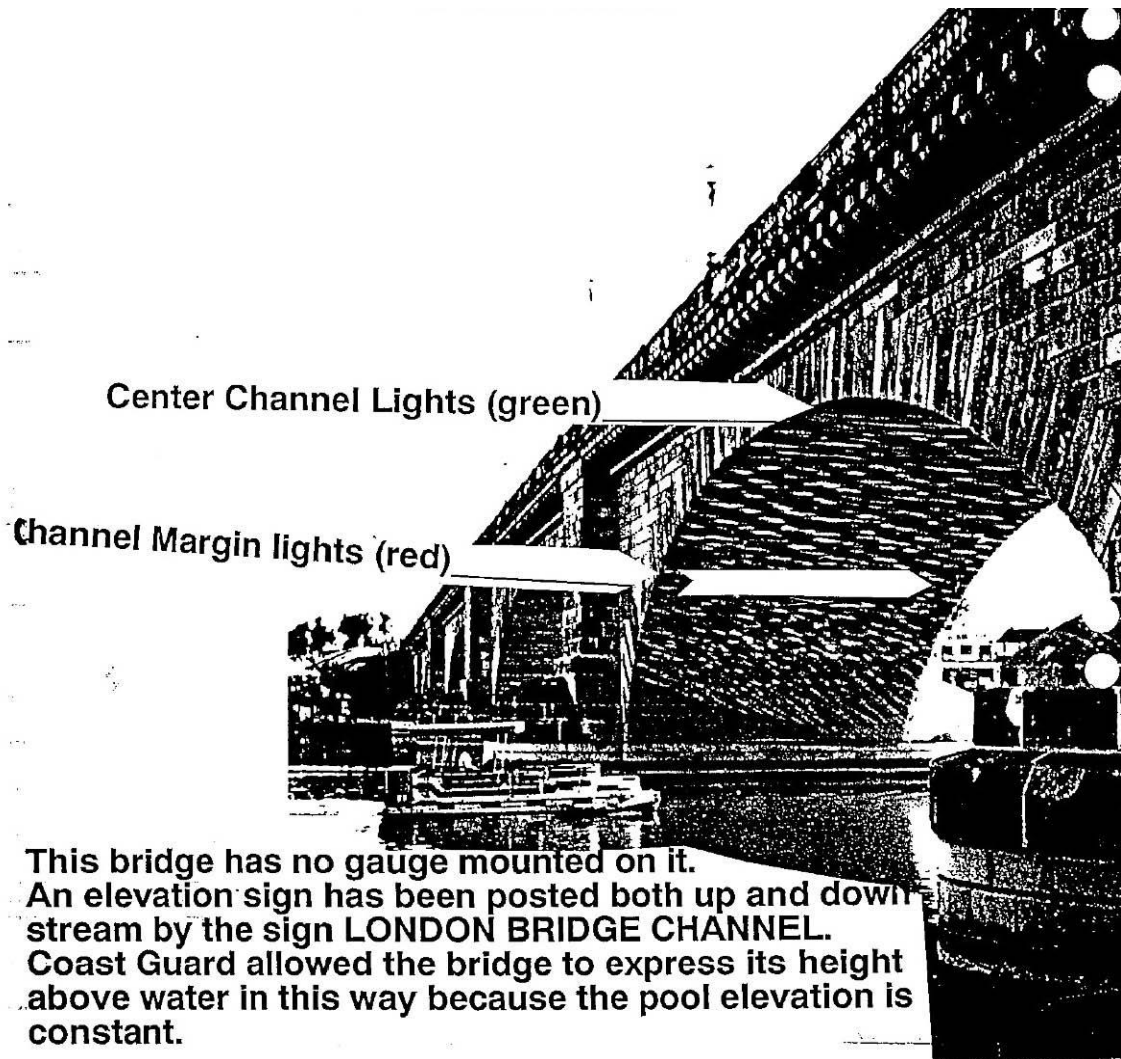


FIXED BRIDGE  
 (3 MARKED NAVIGATION OPENINGS)  
 (NO AXIS LIGHTS)

Comments: \_\_\_\_\_



**Reverse Side of Bridge Survey Form** - On the back side of the form you will typically find a drawing of the bridge and its lighting. Two views are shown, one at water level as you would approach the bridge and an aerial view looking down on the bridge showing lighting on both sides. Many will also have a drawing of the clearance gauge. This example is the reverse side of the Bridge Survey form for the Needles Highway Bridge over the Colorado River. If the bridge design is atypical, such as the London Bridge on the Colorado River (shown on the next page), additional drawings may be provided to help the verifier.



### **G. Work Flows for Bridge Survey Forms**

Bridge Surveys are handled the same way as PatoN Records. Distribution of the Forms is: District to DSO-NS to SO-NS to FSO-NS, Coxswain and/or Verifier. The return follows a different route sending the forms directly to the DSO-NS with a Transmittal form which is kept by the DSO-NS.

### **H. Bridge Surveys in D11SR**

Bridge Survey forms are sent to the DSO-NS in January each year. They are distributed immediately to the SO-NS. District wants all bridges completed before April 30th. In 2011 there are 30 bridges to be checked in D11SR. One each in Oxnard and Dana Point, two in San Diego, Three in Alamitos Bay, four in Anaheim Bay/Huntington Harbor, five in Newport and fourteen on the Colorado River. There are also a number of bridges in the District that the Auxiliary does not check.



## 4. Important Forms and Maintaining Qualification

### A. Forms

We have discussed some of the forms you will be dealing with and there are others you should know. A brief review of these forms and examples of these forms follow. Examples of these forms will be presented at the workshop.

**Form 2554 Private Aids to Navigation Application** - this application is used to establish and maintain, discontinue, change or transfer ownership of an aid. The AV may see this form as it is sometimes circulated FYI.

**Form NS-AN04 Aids to Navigation Report** - This form is similar to the PatoN Record and Bridge Survey. With a PatoN Record or Bridge Survey you, as an AV, are directed to a specific aid or bridge to determine if it is watching properly or has a discrepancy. Form 7054 is used when you, or any Auxiliarists, finds a discrepant aid or bridge that is in need of repair. This form is also used if you find an unauthorized PatoN. This form is used in reporting a "come upon" problem. This completed form is then mailed to the DSO-NS within three days. A sample of the form is attached.

**REMEMBER:** For all ***Federal Aids and Private Aids listed in the Light List, critical discrepancies should be reported immediately by radio or cell phone to the local Coast Guard Station or Sector. (Make sure that they log it)***

**Critical discrepancies** include:

- Light obscured, extinguished or improper rhythm
- Buoy sinking, capsized, submerged, stranded, adrift, off station or missing
- Aids vandalized or in process of being vandalized
- Aids damaged by vessel collision

Collapsed bridge structures, fender systems or channel obstructions

**Urgent discrepancies** (should be ***reported by telephone.***) Urgent includes:

- Daymarks missing, damaged or vandalized
- Non operational sound signals
- Dim lights and lights partially obscured by dayboards
- Bridge Light outages, non operating moveable bridges
- Private aids that are hazard to navigation

**Routine discrepancies** are ***reported by mail*** and are to be made on all Federal and Private Aids. Such discrepancies involve deterioration of the aids materials such as delamination of dayboard, faded paint or numbers/letters, rotting wooden supports, retroreflective material peeling, etc. Also natural problems like birds nests, excessive bird fouling, aids obscured by foliage. In addition any aid off vertical by 15° or more and unauthorized aids are discrepant. Form 7054 is used here.

**NOAA form 77-5 - USCG Aux - NOS Cooperative Chart Updating Program and the Small Craft Facility Report** - This form is used as the title implies.

**Form 7030 - Mission Activity Report** - This is the standard mission reporting form and is required if your activity as an AV is to be entered in AuxData where you receive credit. Form 7030 and the instructions on how to fill it out are available on the Auxiliary website.

Your work as an AV falls under one of three codes;  
*30 Federal aids, 31 Private aids and 32 Bridges.*

If you are on an Operational Facility, on Patrol, and under orders when you do your verifying, **your Coxswain reports your time on the patrol.** Remember the Coxswain is recording your "on the water" time on patrol. Once you return to port and have secured the patrol, you may start your 1-hour allowance for completing the AtoN paperwork (only 1 hour). If you are doing AtoN work as a non-ordered mission you still use this form to record your time and the number of aids you checked. When on a mission that you are not under orders, you can use any means of transportation, such as your own auto. However, if you fail to file a Form 7030, then you and your flotilla get no credit for the work you have done, and you may lose your certification. In our district we use a combination Form-7030 and an AtoN transmittal form, which when properly filed will give you full credit for your mission. A sample of the form "D11s-NS1 (8/10)" is attached.

**B. Maintaining Certification** - Each district sets its own standards for qualifying and maintaining qualification. Initial qualification is achieved by taking an AV Workshop, passing a test, which is based on the workshop, completing ICS 100/700 and having a BQ or AX status. In D11(SR) to maintain your qualifications you must complete three aid checks each year. They can be PatoN Records or Bridge Surveys or some combination of the two. If you miss this number, then in the subsequent year you must do enough work to bring your two-year total to six. If you fail to do so, you must go through the workshop and test again. All AVs are required to repeat the workshop and test every 5 years to renew their qualification.

## **5. Small Craft Facility and Chart Updating**

Changes in the Chart Updating program were instituted in 2007. Previously Chart Updating was a part of the Aids to Navigation Verifiers training and included "Adopt a Chart" program for groups (flotillas) of qualified Auxiliarists. The new system does away with the Adopt a Chart program and opens Chart Updating to any Auxiliarist. The new system also places a much greater emphasis on accuracy, requiring information on all measuring devices such as GPS and depth finders. To help those interested in doing this work a new study guide has been published and worksheets have been developed. All this activity still passes through the DSO-NS for a quality check. For training in the new chart updating program Auxiliarists should contact their DSO-NS through their Division SO-NS and Flotilla FSO-NS.

**6. Review of the Day** We start assuming all of you have a good basic knowledge of the first four items, 1 through 4.

1. **The U.S. Aids to Navigation System** - things you should know

- A. What it is intended to do?
- B. The difference between buoys and beacons
- C. PatoNs and their three Classes
- D. IALA (International Association of Lighthouse Authority)
- E. Conventional Direction of Buoyage
- F. Lateral marks, colors, shapes, lights, number and letters
- G. Preferred Channel Marks
- H. Daybeacons and Minor lights
- I. Safe Water Marks, colors, lights
- J. Isolated Danger Marks, colors, lights
- K. Ranges
- L. Oil Well Structure lights
- M. Difficulties in seeing lights
- N. Light colors, rhythms
- O. Lighthouses
- P. Seasonal Aids
- Q. Bridge Lights

2. **GPS Characteristics**

- A. How does it work?
- B. DGPS and WAAS
- C. Degree, Minute, Second, Nautical Mile, Statute Mile, Yards
- D. Decimal minutes vs. Seconds
- E. Accuracy

3. **Navigation**

- A. Latitude, Longitude. Plotting
- B. LOP, Fix
- C. Bearing, Relative Bearing
- D. True, Magnetic and Compass Reading
- E. Dividers, Drawing Compass, Parallel Rulers, Compass Rose

4. **Publications**

- A. Nautical Charts, publisher, dates, Index, number, scale
- B. Coast Pilot, what and where to obtain
- C. Local Notice to Mariners, what and where to obtain
- D. Light List, what and where to obtain
- E. Forms, what and where to obtain

5. **The Process of Aid Verification**

- A. Who, what, and when

6. **Things you will need to have as an AV**

7. **The PatoN Record Form**

- A. A line by line review
- B. Work quality, timeliness

8. **The Bridge Survey Form**

- A. A line by line review

9. **Maintaining Qualifications**

10. **Chart Updating**



**End of Study Guide**

## Combined AtoN Transmittal and AuxData Reporting Form

Department of Homeland Security United States Coast Guard D11s-NS1 (8/10)		U.S. Coast Guard Auxiliary <b>ACTIVITY REPORT - MISSION</b>		Division	Flotilla		
				MISSION DATE:			
<b>Section I</b>		TYPE OF RESOURCE	X	Unit/Individual		( dd mmm yy)	
<b>Section II TIME &amp; MISSION</b>							
Always record START TIME, MISSION, and FINISH TIME (See Mission Types) AtoN mission types: Federal Aid: type 30, Private Aid: type 31, and Bridges: type 32							
	START	Change 1	Change 2	Change 3	FINISH		
TIME							
MISSION							
<b>Section III ACTIVITY LOG DETAILS</b>							
Location:			OPCON:				
<i>Report your count here</i>		Federal (30)		Private (31)		Bridges (32)	
Aids Discrepant							
Aids Watching Properly							
<b>Section IV CREW ASSIGNMENTS (Only one per AtoN Mission)</b>							
Member ID			Last Name and Initials				
<b>Section V Aid Inspection Report</b>							
(List each aid number and indicate with an "X" as either Watching Properly (Ver) or Discrepant (Dis))							
	Aid Number	Ver	Dis		Aid Number	Ver	Dis
1					11		
2					12		
3					13		
4					14		
5					15		
6					16		
7					17		
8					18		
9					19		
10					20		
<b>Section VI REMARKS</b>							
Date Submitted	DD MMM YYYY			Submitting Member's Name (print)			Report Number

8/7/2010 grr

## Combination AtoN Transmittal And AuxData Reporting Form

### General

- 1 This form is used to report the AtoN/PatoN Inspections and may be used only for mission types 30-Federal AtoNs, 31-Private Aids and 32-Bridges. This information will be reported to the Aids to Navigations operations in Alameda, CA and AuxData. Your work needs to be neat, accurate and professional in presentation.
- 2 Enter your division and flotilla, as well as, date of the mission using the format of (dd mmm yy).

### Section I - Type of Resource (automatic as unit/individual)

#### Section II - Time & Mission

- 1 Enter start time and finish time of mission (1-hour maximum)
- 2 Enter type of mission (only 30-Federal, 31-Private or 32-Bridge types are allowed)

#### Section III - Activity Log Details

- 1 Enter location of the mission (be specific, not just Sector LA/LB or Sector SD)
- 2 Enter OPCON (normally the Aids to Navigation LA/LB "11-?????")
- 3 Enter the number of aids you found discrepant under their proper type
- 4 Enter the number of aids "watching properly" under their proper type  
(steps 3 and 4 give you numerical credit for the aids you inspected)

#### Section IV - Crew Assignments

- 1 Enter your member number and your name (only one name is allowed)

#### Section V - Aid Inspection Report

- 1 Enter the Aid Number of the aid inspected and indicating its status with an "X"  
("Ver"= watching properly or "Dis"= Discrepant), only 20 aids per page

#### Section VI - Remarks

- 1 Enter any special comments that you wish to make about this group of Aids that you have inspected
- 2 Enter Date Submitted, member's Name printed and Report number

Make 2 copies, one for the DSO-NS and one for your IS Officer. Attach your AtoN/PatoN worksheets to the DSO-NS copy and send **directly** to the DSO-NS. Send the IS Officer copy to your FSO-IS for routing and posting to AuxData. Do make sure that you receive credit for the mission in AuxData. Results may be viewed in AuxInfo.



<b>DEPARTMENT OF HOMELAND SECURITY U.S. COAST GUARD ANSC 7054</b>		<b>U.S. COAST GUARD AUXILIARY NS-AN04 Aid to Navigation Report</b>			Check the report type: <input type="checkbox"/> AtoN Report. (Mission 30) <input type="checkbox"/> PAtON Report. (Mission 31) <input type="checkbox"/> BRIDGE Report (Mission 32)	
<b>SECTION 1 - MEMBER INFORMATION</b>						
MEMBER NUMBER		LAST NAME, FIRST NAME AND INITIAL		TELEPHONE NUMBER		UNIT (DIST/DIV/FLOT)
DATE OBSERVED	TIME OBSERVED	OPCON		E-MAIL ADDRESS		
<b>SECTION 2 - COAST GUARD NOTIFICATION</b>						
USE ONLY WHEN YOU REPORT DIRECTLY BY PHONE, RADIO OR E-MAIL TO A CG UNIT.						
COAST GUARD UNIT NOTIFIED		TIME REPORTED	DATE REPORTED	COMMUNICATION METHOD USED FOR REPORTING TO CG UNIT		
<b>SECTION 3 - AID IDENTIFICATION</b>						
AID OWNERSHIP - check one: <input type="checkbox"/> COAST GUARD <input type="checkbox"/> PRIVATE <input type="checkbox"/> USACE <input type="checkbox"/> NOAA						
LLNR	OFFICIAL NAME OF AID BEING REPORTED-Reference the Light List.		AID NUMBER	MILE MARKER	CHART NO.	ED CHART DATE
<b>SECTION 4 - HORIZONTAL AND VERTICAL LOCATIONS</b>						
FOLLOW THE GUIDELINES IN THE FEDERAL SHORT RANGE AID TO NAVIGATION STUDY GUIDE						
LATITUDE [DD-MM-SS.SS N]	LONGITUDE [DDD-MM-SS.SS W]	GPS DATUM	METHOD USED TO TAKE FIX	QC CHECK	QC READING	U/M
OFFICIAL NAME OF LOCATION		GPS MANUFACTURER AND MODEL NUMBER		GPS OPERATION	CHT. DEPTH	U/M
					0 FT	Not Used FT
METHOD USED FOR DEPTH	MANUFACTURER AND MODEL NUMBER	OBSERVED DEPTH	TRNSDCR. CORR.	HEIGHT OF TIDE	CORR. DEPTH	TIME OF OBSERVATION
		FT	FT	FT	FT	
<b>SECTION 5 - AID TO NAVIGATION CHARACTERISTICS</b>						
CHECK OFF EACH CHARACTERISTIC THAT DESCRIBES THE AID.						
TYPE OF AID <input type="checkbox"/> Floating Buoy	<input type="checkbox"/> Fixed Structure	<input type="checkbox"/> Lighted	<input type="checkbox"/> Sound capability	<input type="checkbox"/> Electronic devices	<input type="checkbox"/> Radar reflector	
TYPE OF BUOY <input type="checkbox"/> Wood	<input type="checkbox"/> Metal	<input type="checkbox"/> Foam	<input type="checkbox"/> Plastic	<input type="checkbox"/> Other, explain in Comments.		
STRUCTURE MAKEUP <input type="checkbox"/> Wood	<input type="checkbox"/> Metal	<input type="checkbox"/> Single Pile	<input type="checkbox"/> Multiple Pile	<input type="checkbox"/> Dolphin	<input type="checkbox"/> Other, use comments	
COLOR OF LIGHT <input type="checkbox"/> Red	<input type="checkbox"/> Green	<input type="checkbox"/> White	<input type="checkbox"/> Yellow	<input type="checkbox"/> Other, explain in Comments. <input type="checkbox"/> Other, use comments		
SOUNDING DEVICE <input type="checkbox"/> Bell	<input type="checkbox"/> Gong	<input type="checkbox"/> Horn	<input type="checkbox"/> Whistle	<input type="checkbox"/> Electronic Explain "Other" in comments		
ELECTRONIC DEVICE <input type="checkbox"/> RACON	<input type="checkbox"/> Fog Detector	<input type="checkbox"/> Wind Generator	<input type="checkbox"/> Electrical Transformer Sta.	<input type="checkbox"/> Meteorological Station	<input type="checkbox"/> Wind Measuring Mast	
<b>SECTION 6 - DISCREPANCIES OBSERVED ON AID TO NAVIGATION</b>						
CHECK OFF EACH DISCREPANCY THAT YOU OBSERVE ON THE AID.						
<b>CRITICAL DISCREPANCIES</b>		<b>URGENT DISCREPANCIES</b>		<b>ROUTINE DISCREPANCIES</b>		
Communicate to CG ANT by fastest means.		Communicate to CG ANT by phone or E-mail.		Report by E-mail or govt. mail within 24 hrs.		
1 <input type="checkbox"/> Shrouded or covered with ice.	2 <input type="checkbox"/> Improper light characteristics	3 <input type="checkbox"/> Light is obscured.	4 <input type="checkbox"/> Light is extinguished.	5 <input type="checkbox"/> Lantern is damaged. (Photo)	6 <input type="checkbox"/> Buoy is sinking. (Photo)	7 <input type="checkbox"/> Buoy is submerged.
8 <input type="checkbox"/> Buoy has capsized. (Photo)	9 <input type="checkbox"/> Aid is off station.	10 <input type="checkbox"/> Aid is missing.	11 <input type="checkbox"/> Buoy is adrift.	12 <input type="checkbox"/> Buoy is stranded. (Photo)	13 <input type="checkbox"/> RACON is not operating.	14 <input type="checkbox"/> RACON shows improper characteristics
15 <input type="checkbox"/> Radio Beacon is not operating.	16 <input type="checkbox"/> Radio Beacon has timing error.	17 <input type="checkbox"/> Aid was vandalized. (Photo)	18 <input type="checkbox"/> An object obstructs the light. (Photo)	19 <input type="checkbox"/> Aid's structure has collapsed. (Photo)		
		1 <input type="checkbox"/> Light burning dim or showing reduced intensity. 2 <input type="checkbox"/> Light is partially obscured by dayboards. 3 <input type="checkbox"/> Dayboard(s) is missing. (Photo) 4 <input type="checkbox"/> Dayboard(s) is damaged. (Photo) 5 <input type="checkbox"/> Sound signal failure observed. 6 <input type="checkbox"/> Battery box is missing. (Photo) 7 <input type="checkbox"/> Battery box is damaged. (Photo) 8 <input type="checkbox"/> Fog Signal is inoperative.		1 <input type="checkbox"/> Aid is obscured by foliage or brush. (Photo) 2 <input type="checkbox"/> Dayboard is faded so color of aid is compromised. 3 <input type="checkbox"/> Extensive bird fowling on aid. (Photo) 4 <input type="checkbox"/> Aid is damaged by collision. (Photo) 5 <input type="checkbox"/> Paint deterioration so color of aid is compromised. 6 <input type="checkbox"/> Dayboard(s) is delaminating. (Photo) 7 <input type="checkbox"/> Numbers or letters on aid are obliterated. (Photo) 8 <input type="checkbox"/> Extensive deterioration or rotting on structure. (Photo) 9 <input type="checkbox"/> Aid is leaning more than 15 degrees. (Photo) 10 <input type="checkbox"/> Vent Valve discrepancy. (Photo) 11 <input type="checkbox"/> Vent Pipe discrepancy. (Photo) 12 <input type="checkbox"/> RADAR Reflector discrepancy. (Photo) 13 <input type="checkbox"/> Tapper(s) discrepancy on a Sound Signal.		
		<b>Pages 35 through 37 of the Federal Short Range Aid to Navigation Study Guide contain a more detailed explanation of each of these discrepancies.</b>				
		<b>DOCUMENTATION AND SPECIFICATION CHECKS</b>				
		1 <input type="checkbox"/> Aid is documented correctly. 2 <input type="checkbox"/> Observed aid does not match the aid's description in the Light List. Explain in Comments. 3 <input type="checkbox"/> Observed PATON does not match its permit specifications. (Photo) 4 <input type="checkbox"/> Observed aid does not match the symbols and abbreviations for this aid on the NOAA chart. (Photo) 5 <input type="checkbox"/> Observed aid does not comply with the IALA-B Aid to Navigation System. (Photo) (Explain in Comments) 6 <input type="checkbox"/> Observed aid does not comply with the data shown in the Coast Pilot. Explain in Comments.				
<b>SECTION 10 - COMMENTS</b>						
<b>SECTION 11 - REPORT DISTRIBUTION</b>						
This form does not have E-Mail capability at this time. Use for record only.						
DATE SUBMITTED						
FORWARD TO:						
COPY TO:						
COPY TO:						