



**Covering Aids to Navigation, Bridges, & Chart Updating Activity with
Accuracy - Credibility – Professionalism and Service to the Coast Guard & NOAA
December, 2012 - NAVIGATION SYSTEMS NEWSLETTER**

Navigation Documents *(that you never have to correct or manually update)* are now available to you free!

Most navigational documents and catalogs are now available on the First Northern Web Site at www.uscgaan.com. Gone are the day of tedious updates and corrections. Check them out!

NOAA Charts – Open/CPN NOAA Charts are available on the First Northern Navigation System web site. There are full instructions for downloading all of the First District charts- from Maine to New Jersey to the Canadian border. The webmaster puts the updated charts on the web site every two weeks. Bring your PC to the January District Conference on Saturday for free chart downloads. You can also learn about adding a GPS/WAAS attachment to your PC to make it into a chart plotter. The attachment only costs between \$35 to \$50. You are able to establish waypoints and routes on these charts, and much more. And, you print out chartlets for attachment to e-mails and be able to reference the chart number, date of the chart and last LNM info with ease.

ON-LINE NOAA Charts – Access the latest versions of all the NOAA Charts from the First Northern web site. These charts reference the last LNM used for their update. However, they do not have the features provided by the Open/CPN chart system.

LNM – LOCAL NOTICE TO MARINERS - The LNM has been available on the Internet for a while now. You can arrange to have the Coast Guard send you a copy every week by e-mail. Note that NOAA updates their charts from this document so you now only have to save a few weeks until these updates appear on your Open/CPN charts.

CORRECTED LIGHT LIST – Gone are the days of searching through old LNMs to see if you missed update entry for your old manual Light List. A corrected Light List is now available on the First Northern Navigation Systems web site. The last LNM used to update it is printed at the top of each page. You can save a bundle of paper by just printing out the few pages that you need for a patrol and feel confident that you data are up to date.

COAST PILOTS are now being updated weekly to the last LNM and are available every Tuesday. Save a bundle of paper by just downloading the pages that you want when you need them.

CHART No. 1 – is also available on line. Just download it to your PC and reference it as needed. No need to buy this document or print it out.

Join the First Northern AVs who are enjoying this free service. Pass the word to your instructors and Boat Crew staff. Start moving toward the future of navigation and save yourself much time and money by using these free services.

BOSTON HARBOR NOTICE:

The Coast Guard has received reports of periodic GPS reception problems occurring east of Boston Harbor in the vicinity of Boston Lighted Whistle Buoy B. Vessels experiencing this problem have witnessed reception problems on single and multiple GPS units. A low level interference source has been detected on the L1 GPS frequency (1575.42 MHz) in the vicinity of Boston Harbor.

Mariners experiencing reception issues on their GPS receivers are requested to contact the Coast Guard Navigation Center at (703) 313-5900 or via email at tis-pf-nisws@uscg.mil with the model of the affected unit, the duration of the reception issue, and the position the interference was first noticed and when the problem was corrected. Mariners are urged to use caution while transiting the area.

A 50% LOSS OF AID VERIFIERS IS POSSIBLE FOR 2013

It looks like the District 1 Northern Region will be losing about **50% of our Aid Verifiers for 2013.** The bulk of this tragic loss will be for loss of currency or failure to perform a minimum of two ATON, PATON or Bridge reports during 2012. Loss of currency will mean that you will lose your PATON System Access Codes. **These AVs have until 12/31** to submit their activity to AUXDATA using a “7030 AUXDATA Activity report.” If you have been active this year, please get your AUXDATA report submitted right away.

AVs, which have been inactive for five years, will lose their AV qualification and they will have to completely re-qualify to the new AV/PQS.

AVs, which have been inactive for over two years, will have to attend an AV Workshop or WebEX training session in order to become familiar with the latest PATON and Bridge Reporting Systems.

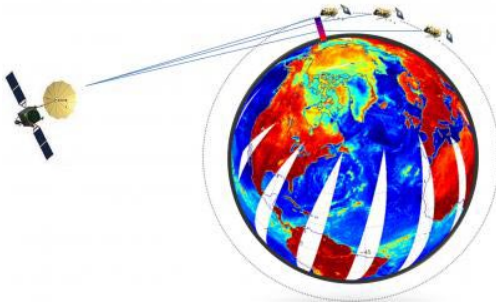
It only takes two reports in AUXDATA to hold onto your AV qualifications. Recently, every AV was sent a report that specified their current AV status. This status will be re-evaluated in mid-January at which time your AV status will be updated for 2013 based on your 2012 performance. There are a lot of bridges out there that can be reported.

This is not a punitive campaign. It is very important that AV generate highly accurate and professional reports to the Coast Guard and NOAA. Part of the DSO-NS’s job is to insure that every active AV is well trained and knowledgeable about the ATON, PATON and Bridge reporting guidelines.

Direct any questions about this program or your status to the DSO-NS 013 at FrankJLarkin@verizon.net. If you have been active servicing any part of the ATON, PATON and Bridge programs in support of the Coast Guard in 2012 but have not performed any underway activity, please let me know so I don't delete your qualifications.

Reminder:

2013 AV Qualification Training begins on Tuesday evening, December 4 at 7:50 PM. There are still a few slots left. If you have some members who want to participate in the Aid Verification program in 2013, have them contact the DSO-NS 013 at FrankJLarkin@verizon.net right away.



What factors influence your GPS' accuracy?

An important message for all mariners.

GPS accuracy is dependent on a wide variety of factors coming together at the particular spot where you plan to take a fix. They include distortion of GPS signals as they travel through the ionosphere and errors in the position (ephemeris data) transmitted by GPS satellites. Here are some factors AVs will probably find most significant in their everyday settings.

The Number and Position of GPS Satellites

Accuracy is heavily influenced by being able to view signals from many GPS satellites instead of just a few. Positions reported by your GPS receiver are more accurate when it is using at least 5 or 6 satellites and not just three or four. Fixes taken for PATON and Chart Updating purposes must be taken with a ***marine grade*** GPS set that is reading four or more satellites that will be evidenced by your GPS set operating in 3D and with low estimated position error reading (EPE).

The position of satellites being used is also significant. Your fix is likely to be more accurate if the satellites you are using are further apart (their signals coming to you from widely different directions). 90-degree angles produce the most accurate positions. This is also reflective in EPE-Estimated Position Errors readings of 12 feet or less and between 1 and 2 HDOP (Horizontal Dilution of Position) readings on DGPS sets operating in 3D.

Moving Around / Ephemeris Data

If you're moving around, the group of satellites that your GPS receiver is able to use will probably change as you pass by buildings, hills and other obstructions. You'll get better accuracy if your receiver has already acquired ephemeris data from most of the satellites that are currently over your area. That way, the GPS can quickly switch to using other satellites as signals shift in and out of view (rise and set). Here are some tips that can help you achieve accuracy consistently:

- Keep your GPS set operating while you are taking fixes rather than shutting it on and off between each fix.
- Be sure the hand-held GPS' antenna is kept oriented upward between fixes. Garmin units have their antenna located on the top of the unit. When traveling between positions avoid the habit of lowering the GPS set to your side with the antenna pointing down. This practice can cause a huge EPE error and you have to wait for the GPS to settle down before taking another fix. Putting your GPS back in its holder when not in use will keep the unit always at the ready.
- Also, since the GPS satellites are located south of our New England location, keep away from the northern side of tall buildings and other objects that can block the GPS' view of the satellites.

WAAS Corrections

GPS receivers can gain additional accuracy by applying WAAS corrections to data that they are receiving from GPS satellites. Where available, WAAS provides corrections for errors in a particular satellite's timing and orbital data as well as localized corrections for distortions caused by the ionosphere. For greater accuracy, it is important that GPS sets, used for PATON and Chart Updating fixes, should contain WAAS and that, during the pre-underway check, the AV must insure that WAAS is enabled.

GPS Receiver Quality

The quality of algorithms and circuitry used for processing satellite signals has an impact on accuracy. Most consumer grade receivers can do a pretty good job at getting your position within about 25 feet much of the time. For taking fixes for PATONs and Chart Update reporting, you must be using a GPS set designed for marine use. Other devices that have GPS capability are not accurate enough for AV use and do not provide the proper evidence that is necessary for your data to be used for updating a Federal record.

Operational Accuracy

There are important techniques that an AV can use to enhance the accuracy of a GPS fix.

1. **Location of the GPS antenna** – The Latitude and Longitude read out on a GPS is originating from the position of the GPS' antenna. On larger vessels, the antenna could be mounted 20 or more feet from the side of the vessel where the PATON is typically positioned alongside the OPFAC. Use of a high-grade marine hand-held GPS is recommended with the fix being taken as close to the PATON as is safely possible.
2. **Effect of Wind** – Very windy days affect the accuracy of the fix making it difficult to get the vessel close enough to the PATON and to hold it there while the fix and depth reading are taken. Avoid verifying PATONs on very windy days.

3. **Compensating for external effects on the PATON** – The actual permitted position of a PATON is the location of the mooring or anchor that holds the aid to the bottom. The aid itself floats around the mooring in what is called a “Watch Circle.” Unfortunately, AVs are never allowed to touch a private aid so the aid cannot be pulled up to short stay to determine the exact position of the mooring as the Coast Guard does with Federal aids. On the positive side, we know that a floating private aid will always be located down wind or down current from the position of its mooring. Therefore, we should always take the fix up wind or up current in order to improve the odds of being closer to the actual mooring. Current trumps wind when these two forces are opposing.

Taking a fix down wind or current just increases the distance that you are away from the aid’s mooring. This could be enough to cause an aid to plot as off station. The off station criteria are:

- **Fixed PATONS** – more than **25** feet from the permitted position.
- **Floating Lateral PATONS** – more than **50** feet from the permitted position.
- **Floating Regulatory Buoys** – more than **300** feet from the permitted position.

Accuracy Statements

Every fix submitted by an AV for a PATON or a Chart Update must be accompanied with an Accuracy Statement. This statement contains the evidence for the accuracy of the data being reported by the GPS set when the fix was taken. Fixes reported without this supporting evidence are considered suspect and are usually cannot be used to correct Federal records. An Accuracy Statement provides the following evidence in support of a fix.

- The **manufacturer’s name** and **model number** of all electronic measuring equipment being used is provided. This establishes that the AV is using correct marine grade equipment.
- The statement **shows how the GPS set(s) was pre-checked for operational accuracy** before getting underway or before starting a PATON or Chart Updating event.
- The statement provides **evidence of the operational accuracy of the GPS while on-scene** as the fix was being taken.
- The statement indicates **the distance that the fix was taken from the PATON** or object.

A typical Accuracy Statement is shown below. Store this statement on your Desktop and then cut and paste it to a 7054 AV Verification Report or Chart Update report. It is a simple matter to correct this statement for a particular fix rather than re-typing it. The items in bold copy are the items in the statement that may change with each report.

ACCURACY STATEMENT

1. A **Garmin GPS 76** GPS with **WAAS enabled**, operating in **3D Differential** was used to fix the position of the aid. On-scene **EPE** was **8.0 feet**. Pre-underway accuracy was checked at the dock against **two other GPS sets**.
2. A **Hummingbird Wide 100** echo sounder was used to take the depth. Pre-underway accuracy was performed **at the dock with a hand held echo sounder**. Correction for the transducer was **0.8** feet. The on-scene Substation was **NEPONSET RIVER on BOSTON**.
3. The reported fix and depth were taken approximately **10** feet from the aid.

Selective Availability Error

It should be mentioned that the U.S. government has the ability to degrade the accuracy of GPS signals using Selective Availability. This was an issue prior to May 1, 2000. However, it's not expected that this will ever be used again on a global basis.

CAVEATS

Finally, you should now understand that the use of any non-marine grade GPS is problematic since its accuracy is always questionable without any supporting evidence. Do not use cell phones, cameras, automotive GPS' or other devices that are not designed specifically for marine use.

Forward any questions or comments to DSO-NS Frank Larkin at FrankJLarkin@verizon.net



“It’s always a lot easier to not have to respond to a boating accident that has already been prevented by Navigation Systems volunteers!”

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Distribution is encouraged to other members of the Coast Guard and Auxiliary*