

**GPS Learning Guide, Revised Edition**  
**Errata and Updates**  
May 22, 2007

**Chapter 1 – GPS History and Evolution**

Paragraph 6

After 2<sup>nd</sup> sentence (*This costal navigation ...*), add: **“Radiobeacons were first installed and maintained in the 1920s by the United States Coast Guard. At one time there were approximately 200 radiobeacons deployed along the United States coastline and inland waters. Today there are only two radio beacons still in service; Ediz Hook (near Port Angeles) in Washington State and Barbars Point (on Oahu) in Hawaii.”**

Next to last sentence (*United States radiobeacons ...*), change to read: **“... , with the last RDF stations decommissioned in the late 1990s and ceased operations, except for the two previously mentioned, on 30 September 1997.”**

Paragraph 9

Delete last sentence (*The designation “C” ...*).

Global - Change “Loran” to **“Loran-C”**.

Paragraph 13

Change to read: **“A Loran-C position fix has an absolute accuracy of 0.25 nautical miles (approximately 440 yards) with a probability of 95%. It has a repeatable accuracy (returning to a know place a second time) of 18 to 90 meters.”**

Paragraph 14

2<sup>nd</sup> sentence (*This system is ...*), change to read: **“The first system was ...”**

In last sentence (*In some parts ...*), change “may be” to **“was”**.

Paragraph 19

In 7<sup>th</sup> sentence (*The first operational ...*), add **“(SV PRN 14)”** after “Block II GPS satellite”.

Paragraph 20

At end of paragraph, add a new sentence that reads: **“However, the Standard Positioning System (SPS) portion of GPS is freely available for use by anyone with a GPS receiver.”**

Paragraph 22

Change last sentence (*As a result ...*), to read: **“As a result, the accuracy of the SPS signal is now: horizontal 13 meters, vertical 22 meters and time 40 nanoseconds with 95% probability.”**

Paragraph 23

In last sentence (*SPS is the ...*), change “30 feet” to “**13 meters horizontal**”.

At end, add new sentence that reads: “**Typically SPS fix accuracy is from 6 to 10 meters.**”

Paragraph 24

Delete 5<sup>th</sup> sentence (*The DGPS correction ...*).

At end, add new sentence that reads: “**The DGPS correction signal improves the accuracy of a GPS fix to less than 10 meters and typically to 3 meters.**”

Paragraph 25

Change last sentence (*The WAAS correction ...*), to read: “**The WAAS correction signal improves the accuracy of a GPS fix to 2 to 3 meters through the Continental United States.**”

Paragraph 32

Change last sentence (*The absolute accuracy ...*), to read: “**The absolute accuracy of a Loran-C fix is 0.25 nm (approximately 440 yards).**”

Paragraph 34

In 1<sup>st</sup> sentence (*Global Positioning System ...*), change “1992” to “**1993**”.

In 3<sup>rd</sup> sentence (*When SA was ...*), change “10” to “**13**”.

In last sentence (*Wide Area Augmentation ...*), change “under 5” to “**2 to 3**”.

## Chapter 2 – Basic Piloting and Nautical Charts

No Errata or Updates.

## Chapter 3 – GPS Theory

Paragraph 1

In first sentence (*GPS is a ...*), change “second-generation” to “**third-generation**”.

Insert after 2<sup>nd</sup> sentence: “**Recently there have been more than 24 GPS Satellites on orbit; 21 active and 3 spare is a minimum constellation**”.

Paragraph 2

In 2<sup>nd</sup> sentence (*Figure 11 is ...*), delete the phrase “and an annotated sketch”.

Paragraph 3

In 6<sup>th</sup> sentence (*Figure 12 shows ...*), delete the phrase: “, and their resulting ground tracks on the earth’s surface”.

Paragraph 4

In 6<sup>th</sup> sentence (*Note that the ...*), change “50 Hz” to “**50 MHz**”.

Paragraph 7

Delete first two sentences.

Add these sentences at start of this paragraph: **“Second generation Block IIA satellites weight approximately 2,000 pounds. Their Solar Panels generate 700 watts of electricity and the satellite and its solar panels measure over 17 feet. The design life of a Block IIA satellite is 7.5 years with a mean mission duration of 6 years.”**

Paragraph 11

In 4<sup>th</sup> sentence (*As covered in ...*), change “10” to “13”.

Paragraph 16

Delete last sentence (A “cold-start ... )

Add three new sentences at end that read: “Most GPS receivers today are 12-channel. A “cold start” for a 12-channel GPS receiver may take a couple of minutes to get almanac data for all GPS satellites. A “cold-start” is when the GPS receiver has either been off for several months or moved more than 750 miles.”

Paragraph 18

In last sentence (*The time required ...*), add “**country or**” between “which” and “state”.

Paragraph 23

Delete last sentence (*Figure 19 illustrates ...*).

Paragraph 25

Add this sentence at the end of this paragraph: **“This figure is a two dimensional illustration of a three dimensional problem; because only three satellites are used, the solution is only for time, latitude and longitude.”**

Paragraph 48

Change this paragraph to read: **“SPS, which uses only the L1 frequency, has an inherent accuracy of 13 meters 95% of the time (typically 6 to 10 meters); PPS, which uses both the L1 and encrypted L2 frequencies has a better accuracy. Differential GPS (DGPS) has an inherent accuracy of less than 10 meters 95% of the time (typically 3 meters). Wide Area Augmentation System (WAAS) improves GPS fix accuracy to 2 to 3 meters horizontally 95% of the time.”**

Add at end of paragraph: “GPS Time was ahead of Universal Time (UTC) by 14 seconds on 1 Jan 2006. GPS transmits an “UTC Offset” value and most GPS receivers use it to accurately display UTC time”.

Paragraph 49

Change last sentence (*However a GPS ...*), to read: **“However a GPS fix with the standard positioning system is typically accurate only to 6 to 10 meters; even WAAS is typically accurate only to 2 to 3 meters.”**

Figure 20

Change SPS accuracy to 13 m (was 30 m).

Change WAAS Accuracy to 2-3 m (was 3-5 m).

## Chapter 4 – Using Your GPS Receiver

No Errata or Updates

## Chapter 5 – GPS Navigation

Paragraph 12

Insert a dash in front of sentence that starts “*If position is to a thousandths ...*” and make it the start of a new sub-paragraph.

Paragraph 21 last line

Change to read: “**changes, in 45 minutes and 55 seconds.**”

Paragraph 33

Replace entire paragraph with new one that reads: “**When using the highway page (Figure 33) steer toward the center of the highway display or toward the black vertical bar on the compass. Figure 33 indicates that you are slightly off course to your next waypoint (MOW-SHOAL) and that you should come right seven degrees. It also shows that at your next waypoint (MOW-SHOAL) you will basically continue straight ahead to waypoint (R4-PATAPSC).**”

Paragraph 36, last sub paragraph, 2<sup>nd</sup> sentence (*Remember Navigational Rule ...*)

Change to read: “**Remember Navigation Problem Question 5: ...**”

Paragraph 39

In 2<sup>nd</sup> and 3<sup>rd</sup> sentences - Change SPS accuracy, with SA turned off to “**13 meters**” (was 10)

In last sentence, last line - Change WAAS accuracy to “**2 to 3 meters**” (was 3 to 5)

Paragraph 47, 2<sup>nd</sup> sentence (*Figure 35 illustrates ...*)

Change to read: “**Figure 34 illustrates ...**”

## Chapter 6 – Integrating the GPS with other Electronic Navigation Tools

No Errata or Updates.

## Chapter 7 – Installation and Maintenance

Paragraph 2

Replace the 4<sup>th</sup> sentence (*The ideal location ...*) with: “**Practically screening of one small segment (under 15 degrees) will have minimal impact on your GPS coverage and accuracy. This author’s GPS antenna is located within three-inches of a one-inch diameter stainless steel bimini support member. Practical GPS degradation is minimal and the Dilution of Precision figure is normally less than one. The ideal location is at the lowest point on the boat with a clear view of the horizon in all directions.**”