УДК 621.396:621.372

METHOD OF FORMING THE GALILEO ALMANAC IN YUMA FORMAT

Oleksandr Zakhvataev

National Aviation University, Kyiv

Scientific advisor – Valeriy Konin, Sc.D., Prof.

Keywords: almanac, YUMA format, Galileo.

Introduction. The almanac of global navigation satellite systems is a set of data with the help of which satellite coordinates can be calculated in a navigation receiver. The most common almanac data format is the YUMA format. Data in this format are presented for GPS on the site [1], and QZSS on the site [2]. There is no almanac in YUMA format for the Galileo system. Since the joint use of several systems has become widespread, it is relevant to use the almanac data in one format.

The goal of the work is to create an almanac of the Galileo system in the YUMA format.

Method for solving the task. Galileo almanac data can be obtained directly from messages from navigation receivers that have this option. Typically these messages are represented in binary or ASCII code. Since the message format is known, the almanac data can be converted to YUMA format. In this way, private data can be obtained to solve the current problem. The Galileo almanac in YUMA format can be obtained using the database [3], where the almanac is presented in XML format. Data is provided from 05/03/2019 and is updated every 2-5 days.

We have developed a program that converts the almanac database code into the YUMA format. The program reads the almanac, resets old and converts new data, reads it from each satellite and writes it in YUMA format.

Using the above method, the Galileo almanac was obtained. For illustration, Fig.1 shows an almanac of one Galileo satellite from the database and in YUMA format.

Fig.1. Almanac: a-from the database [3], b-converted to YUMA

Calculated and experimental data obtained from the transformed almanac are shown in Fig.2 and Fig.3.
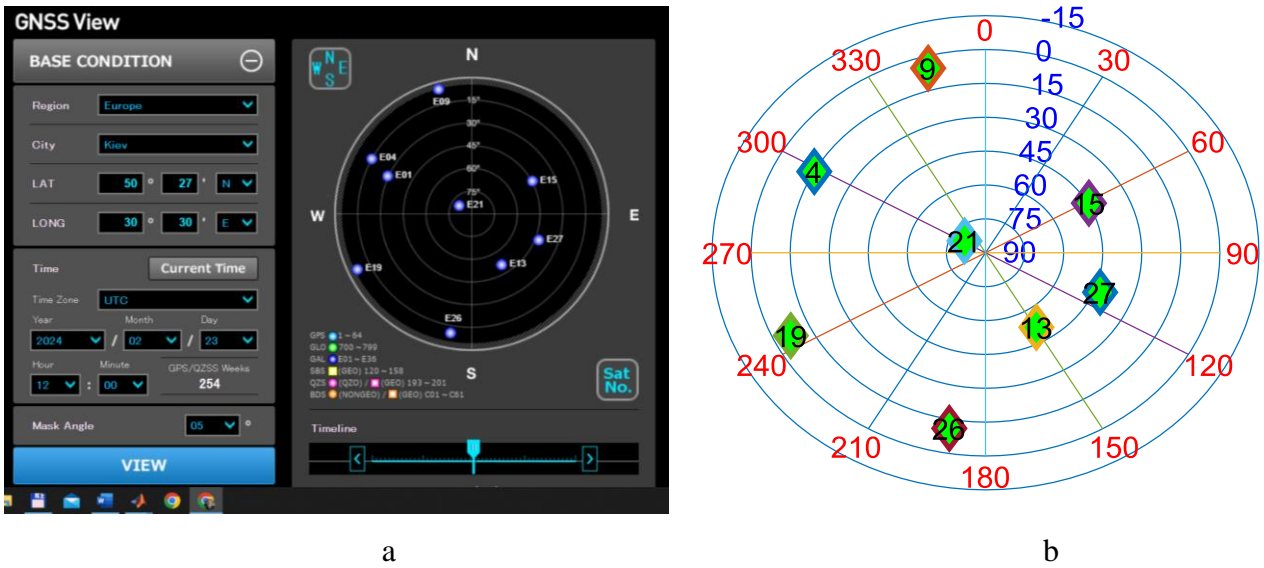

a   b

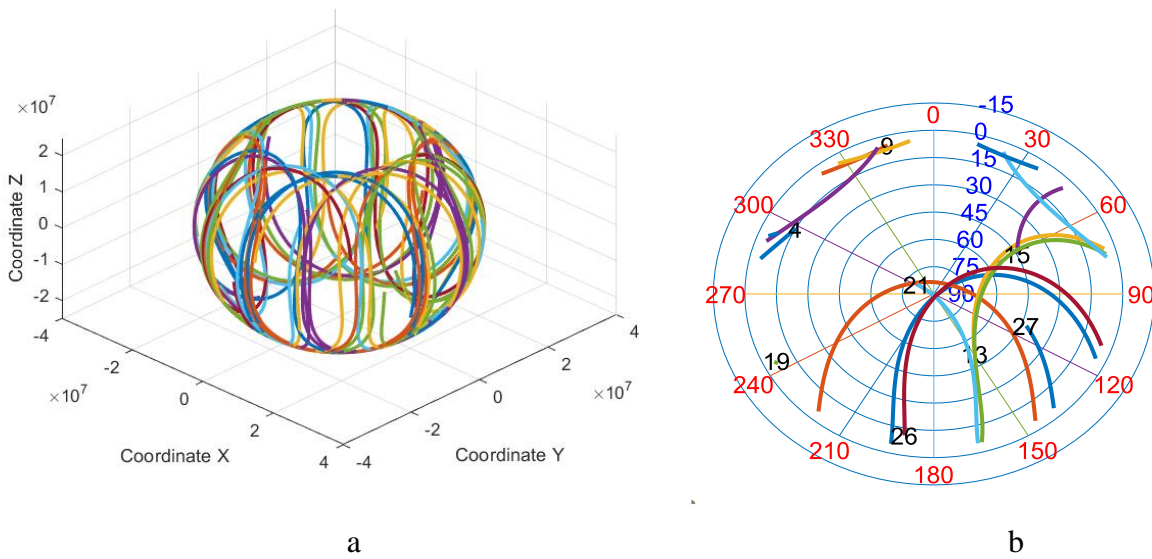Fig.2. Diagrams of visible satellites: a - from the site [2], b - calculated

a   b

Fig.3. Characteristics of Galileo satellites: a - orbits, b - "traces" of visible satellites

Conclusion

For the first time, Galileo almanac data was obtained in YUMA format.

This work was carried out while studying the course "Global Navigation Satellite Systems" at the National Aviation University.

References:

1. https://www.navcen.uscg.gov/archives - GPS almanac.
2. https://sys.qzss.go.jp/dod/en/archives/pnt.html - Japanese site.
3. https://www.gsc-europa.eu/product-almanacs - Galileo almanac.