



vZOA Training Department

Sep 20, 2020

## Spatial Coordinates in Flight Plans

No fewer than four notation systems are currently used to include points in space in flight plans. This supplementary training document discusses these notations and how to interpret them.

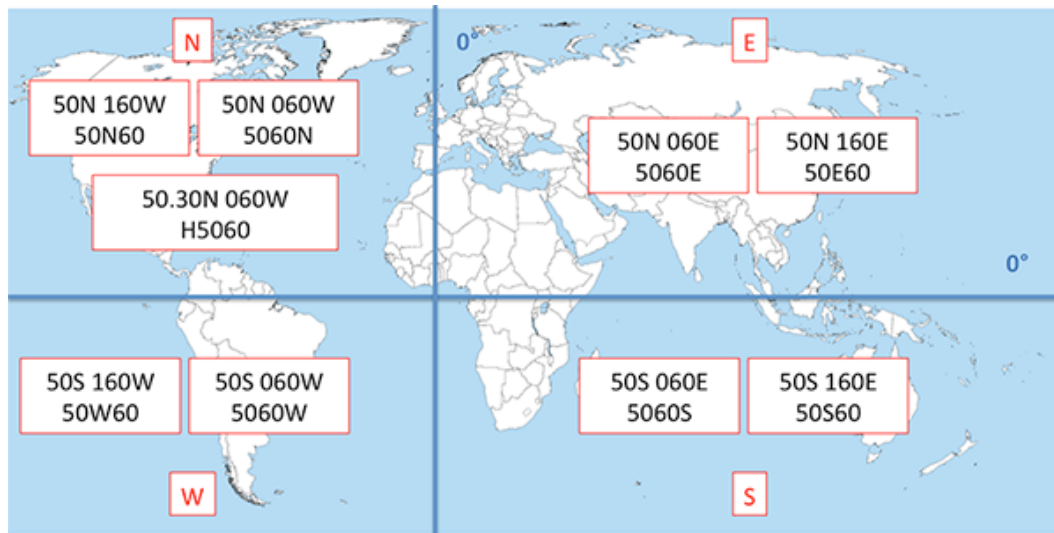
FAA JO7110.10AA Chapter 6 details the requirements for flight plans. There are four ways that a fix may appear in a flight plan:

1. **The name of the fix** - either a navaid identifier or a waypoint name: OSI, ORRCA. This is the normal way you see fixes.
2. **Fix, Radial, Distance (FRD)** - the name of a fix, followed by 3 digits that indicate the radial from that fix and three more digits that indicate the distance from the fix. Center uses this to enter a present position into a route revision. You may see such a fix in random routings or things like marking a clearance limit for firefighting tankers. OAK022011 is FRD form for COLLI intersection on the 022 radial from OAK VOR, 11 miles DME. FRD should not be used as a way to cloak a named fix or airport. Some software will insert slashes, so above may be OAK/22/11 for example.
3. **Latitude/Longitude fixes** - normally these are seen in oceanic routes.
  - A. Oceanic waypoints generally use the 5 letter ICAO fix format. In the northern hemisphere between 100 and 180 degrees west longitude, the fix is written ##N## - where the first two digits are degrees north latitude and the last two digits are the last two digits of the degrees west longitude. So 60N45 is 60 degrees north latitude and 145 degrees west longitude.
    1. Longitude between 0 and 99 west longitude use ####N, so 6045N is 60 degrees north latitude and 45 degrees west longitude.
    2. Further detail is at: [http://www.code7700.com/arinc\\_424\\_shorthand.htm](http://www.code7700.com/arinc_424_shorthand.htm)

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B. Other latitude/longitude fixes are entered as ####/#### with latitude first, a slash, and longitude. In this form the north latitude and west longitude are understood.<sup>1</sup>

A. Example: this route from KSFO to YSSY: GNNRR2 ALANN ADUMM ETECO  
2500N/13500W 2000N/13800W 1500N/14200W 1000N/14500W 0000N/  
16000W WOBY B581 NN TANIL A579 NATLI ABARB RIKNI N774 MARLN

4. **NRS Waypoints** - the Navigational Reference System waypoints were established for random route flight plans in Class A airspace. These waypoints indicate the ARTCC the waypoint is in with the first two letters of the waypoint. For ZOA waypoints it starts with KO - the K indicates continental USA, O means ZOA. Then two digits indicate latitude - but not the actual latitude. Instead it's in increments of 3 and translate to latitude in a complex way. The last item is a coded letter that skips every other letter and indicates longitude. There is a waypoint every 10 minutes of latitude and every 1 degrees of longitude.

Example: This route from KSFO to EGLL uses NRS waypoints (underlined) until entering oceanic space: SNTNA2 ORRCA FMG KU81O KP18A VBI ELVEL

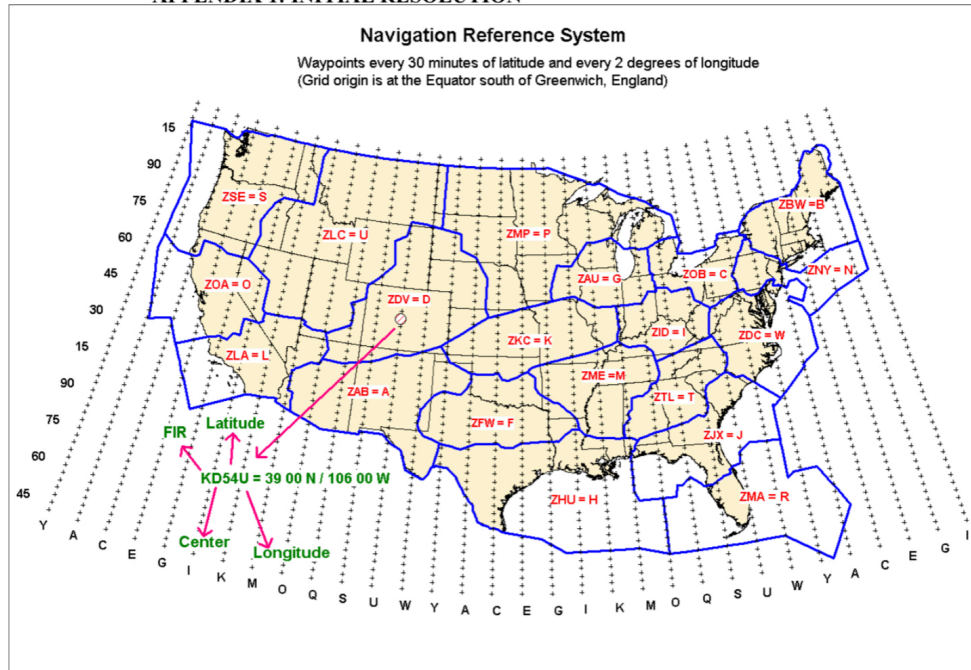
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<sup>1</sup> Details: from 7110.10

*Latitude/Longitude. Consists of nine-to-twelve characters entered as follows: The latitude must appear as the first component as four numbers (trailing zeros required) followed by an optional letter "N" or "S." If the optional letter is omitted, north is understood. Latitude must be separated from longitude with a slash (/) element separator. Longitude must appear as the second component as four or five digits (trailing zeros required, leading zero optional) followed by an optional letter "W" or "E." If the optional letter is omitted, west is understood.*

5300N/08000W 5430N/07000W CUDDY 5700N/05000W 5800N/04000W  
5800N/03000W 5700N/02000W PIKIL SOVED LUTOV KELLY L10 WAL UY53  
NUGRA BNN1B

#### APPENDIX 1: INITIAL RESOLUTION



KD54U is spoken on the frequency: "Kilo Delta Fifty-four-Uniform," "Kilo Delta Five-Four-Uniform," "KD Fifty-Four-Uniform," or, "KD Five-Four-Uniform."

#### How does this relate to our radar clients?

Except for the named fixes and nav aids, these fixes are not easily worked with in VRC, vSTARS, and vERAM. Real world flight data most likely would change these to more convenient forms unless they are being used for oceanic/polar routes.

NRS waypoints are shown on the Enroute High charts at the intersections of the latitude/longitude grid lines. For example KO45E is very close to KCCR.

## **References**

JO7110.10AA 6-3-4 (6) [https://www.faa.gov/documentLibrary/media/Order/7110.10AA\\_FSS\\_Basic\\_8-15-19\\_SIGNED\\_\(DOCU\).pdf](https://www.faa.gov/documentLibrary/media/Order/7110.10AA_FSS_Basic_8-15-19_SIGNED_(DOCU).pdf)

AIRINC 424 shorthand system: [http://www.code7700.com/arinc\\_424\\_shorthand.htm](http://www.code7700.com/arinc_424_shorthand.htm)

NRS waypoint presentation: [https://www.faa.gov/air\\_traffic/nas\\_redesign/ha\\_redesign/media/NRS\\_Description-Rev\\_A.pdf](https://www.faa.gov/air_traffic/nas_redesign/ha_redesign/media/NRS_Description-Rev_A.pdf)