

RTCA Special Committee 186, Working Group 3
ADS-B and TIS-B 1090 MHz Extended Squitter Data Link MOPS
Meeting #13

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Geodetic Coordinate Definitions

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SUMMARY
Bill Harman pointed out to me that a definition of “longitude” seems to be missing from Appendix A, where the CPR algorithms are defined. In this Working Paper, I propose that definitions of <i>latitude</i> , <i>longitude</i> , and <i>geodetic height</i> be added to Appendix B, and that Appendix B be expanded to explain these definitions in more detail.

Section Number	Changes
§B.2	Add definitions for <i>latitude</i> , <i>longitude</i> , and <i>geodetic height</i> .
§B.3	New section containing illustrations of latitude, longitude, and geodetic height and their representations.

B.0 Acronyms and Definition of Terms

B.2 Definition of Terms

<<Add the following definitions. >>

Altitude, Barometric – See *barometric altitude*.

Altitude, Geometric – See *geometric height*.

Geometric height - The minimum altitude above or below a plane tangent to the earth's ellipsoid as defined by WGS84. <<This definition remains unchanged.>>

Latitude - In this document, “latitude” always means “WGS-84 geodetic latitude.” That is, the latitude of a point is the angle that a line that passes through that point, and that is normal to the WGS-84 ellipsoid, makes with the equatorial plane of that ellipsoid. North latitudes are positive, and south latitudes are negative.

Longitude - In this document, “longitude” always means “WGS-84 geodetic longitude.” That is, the longitude of a point is the angle between the plane of that point's local geodetic meridian and the plane of the WGS-84 prime meridian (the meridian of Greenwich). East longitudes are positive, and west longitudes are negative.

B.3

Illustrations of Geodetic Coordinate Definitions

B.3.1

Latitude, Longitude, and Geodetic Height

Figure B.3.1-A illustrates the definitions of the geodetic coordinates: latitude (f), longitude (l), and geodetic height (h).

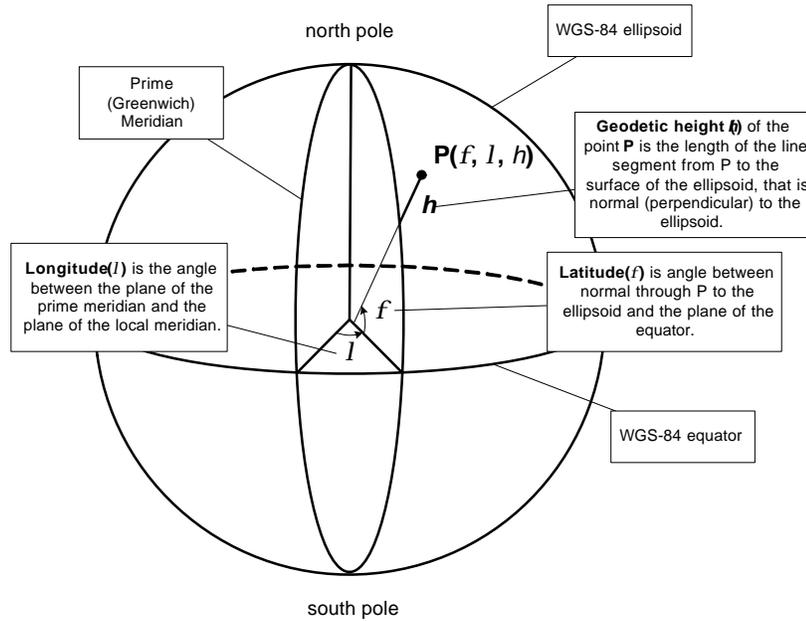


Figure B.3.1-A: Geodetic Coordinate Definitions.

Figure B.3.2 illustrates the definition of latitude in more detail by showing the WGS-84 ellipsoid with a very exaggerated eccentricity.

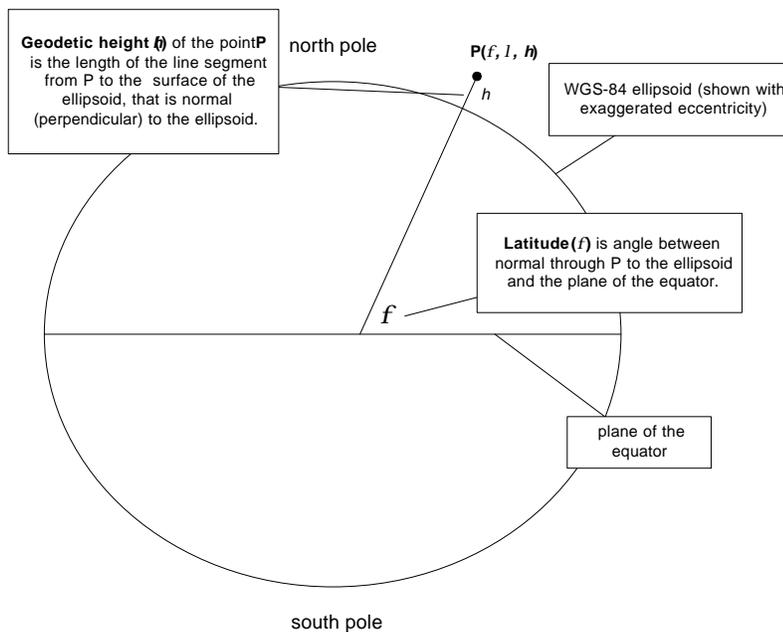


Figure B.3.1-B. Latitude Definition.

B.3.2 / Latitude and Longitude Representations

Latitude and longitude are angles, and so may be represented in various angular units of measure: radians, degrees, or circles. One important way of representing angles is as binary fractions of a circle (“angular weighted binary,” or AWB). Many avionics position data sources use ARINC 429 data buses to deliver such angular parameters as latitude, longitude, and heading, and the binary ARINC 429 data words use the angular weighted binary notation for representing angles.

Figure B.3.2 illustrates how latitude and longitude are represented using radians, degrees, and binary fractions of a circle.

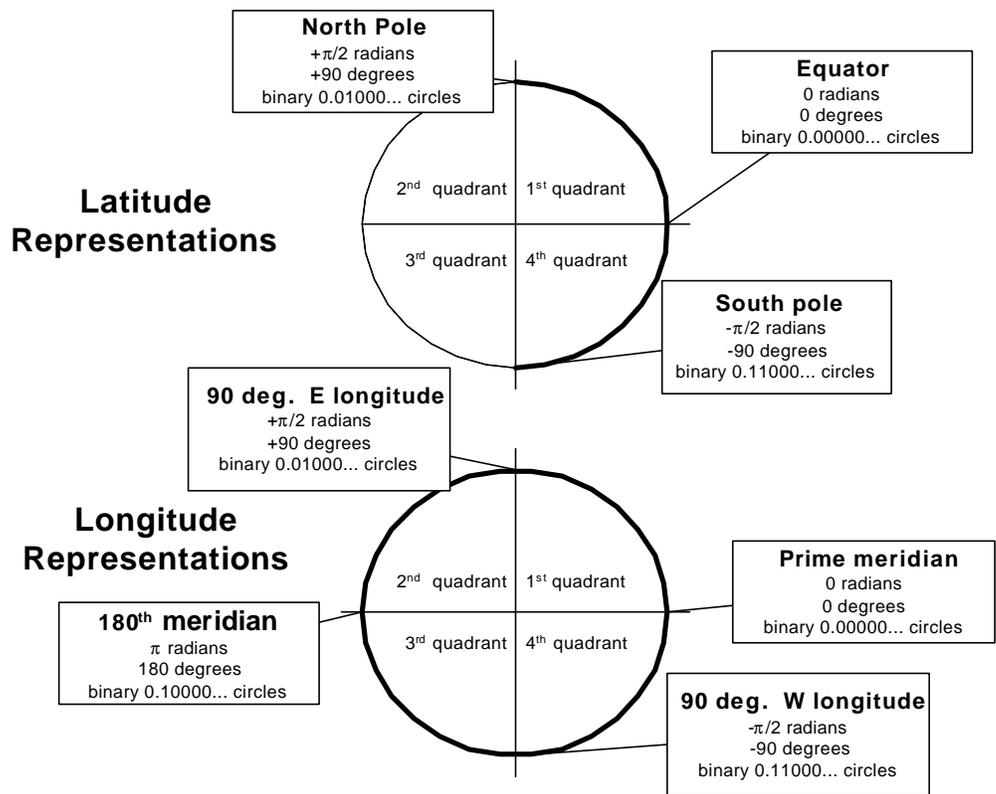


Figure B.3.2. Representations of Latitude and Longitude.