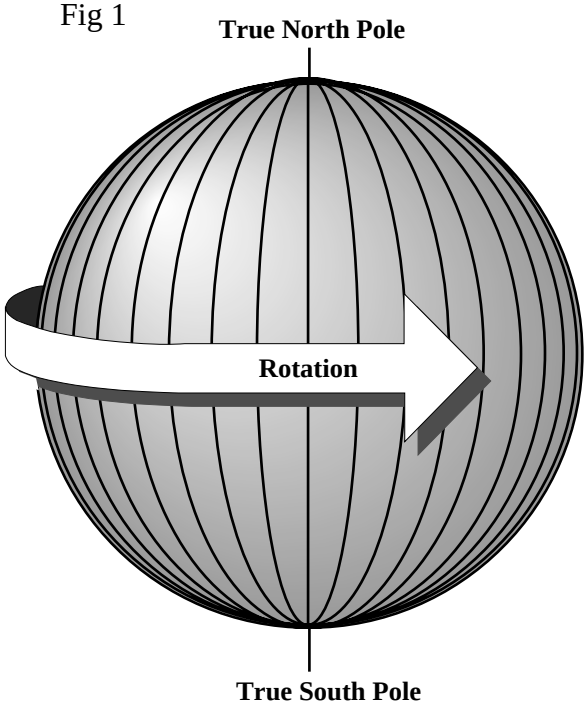
LATITUDE AND LONGITUDE.

The earth rotates in space about an axis. If we imagine the axis to be a line and project it north and south, the points where that line intersects the earth's surface define the true north and true south poles [Fig 1]. If we imagine a cutting plane at right angles to the axis cutting the earth into two equal halves, the intersection of that cutting plane and the earth's surface defines the equator [Fig 2].

Fig 1



The true north and true south poles and the equator form the basis for the grid of latitude and longitude. This grid is used for defining position on the surface of the earth.

The longitude lines are created by introducing a series of cutting planes, each passing through the poles and cutting the earth into two equal halves. The intersection of these cutting planes and the earth's surface produces a set of large circles. The lines formed in this manner are called meridians of longitude [Fig 1].

The latitude lines are created by introducing another series of cutting planes, this time parallel to the equator. The intersection of each of these cutting planes and the earth's surface provides a set of circles each smaller than the equator but parallel to it. The lines formed in this manner are called parallels of latitude [Fig 3].

Every point on the surface of the earth lies on the intersection of a particular parallel and a particular meridian. Every parallel and meridian is numbered and therefore can be used to allocate a particular 'address' to any given position.

Fig 2

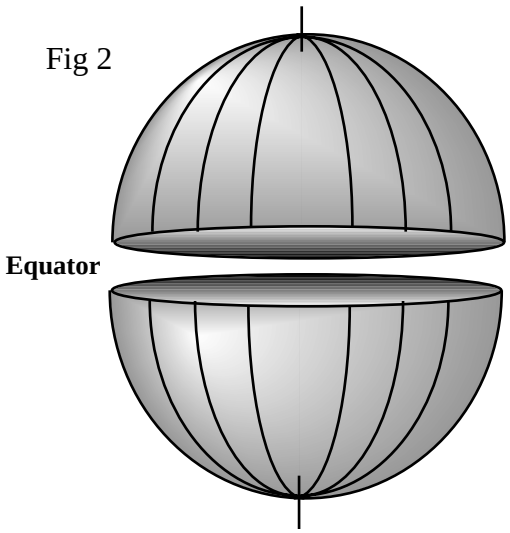
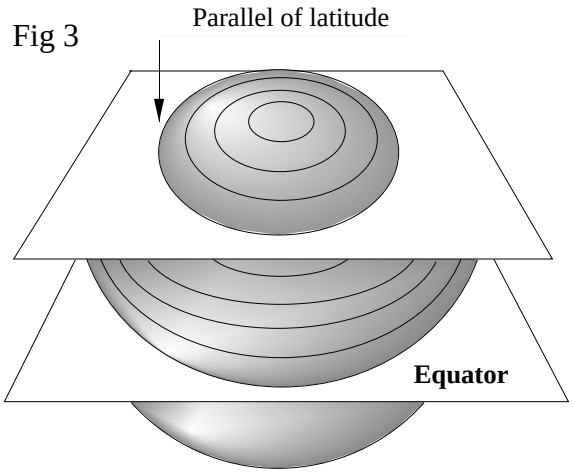


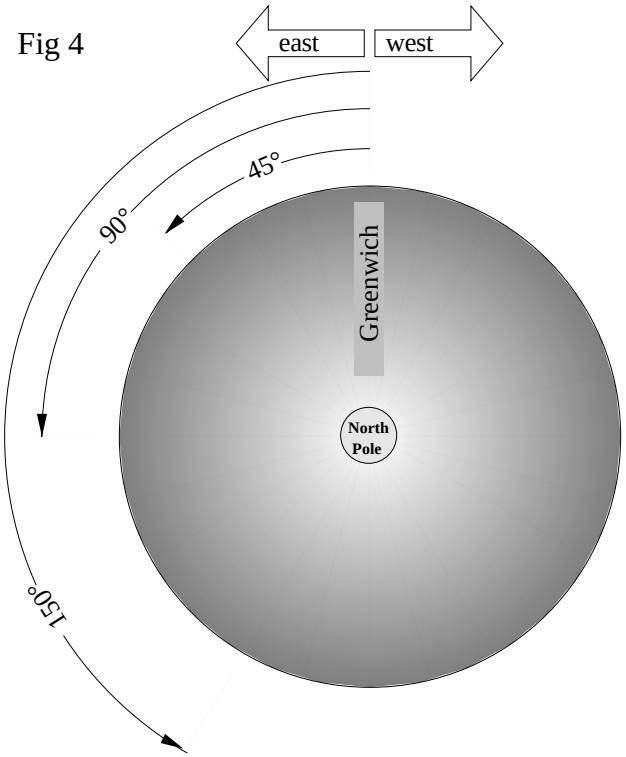
Fig 3



NUMBERING THE MERIDIANS

When viewed from above the north pole, there is no obvious place to begin numbering the meridians since they all look alike and they rotate as the earth rotates. The world has agreed that the meridian which passes through Greenwich in England shall be called the zero or prime meridian.

Fig 4

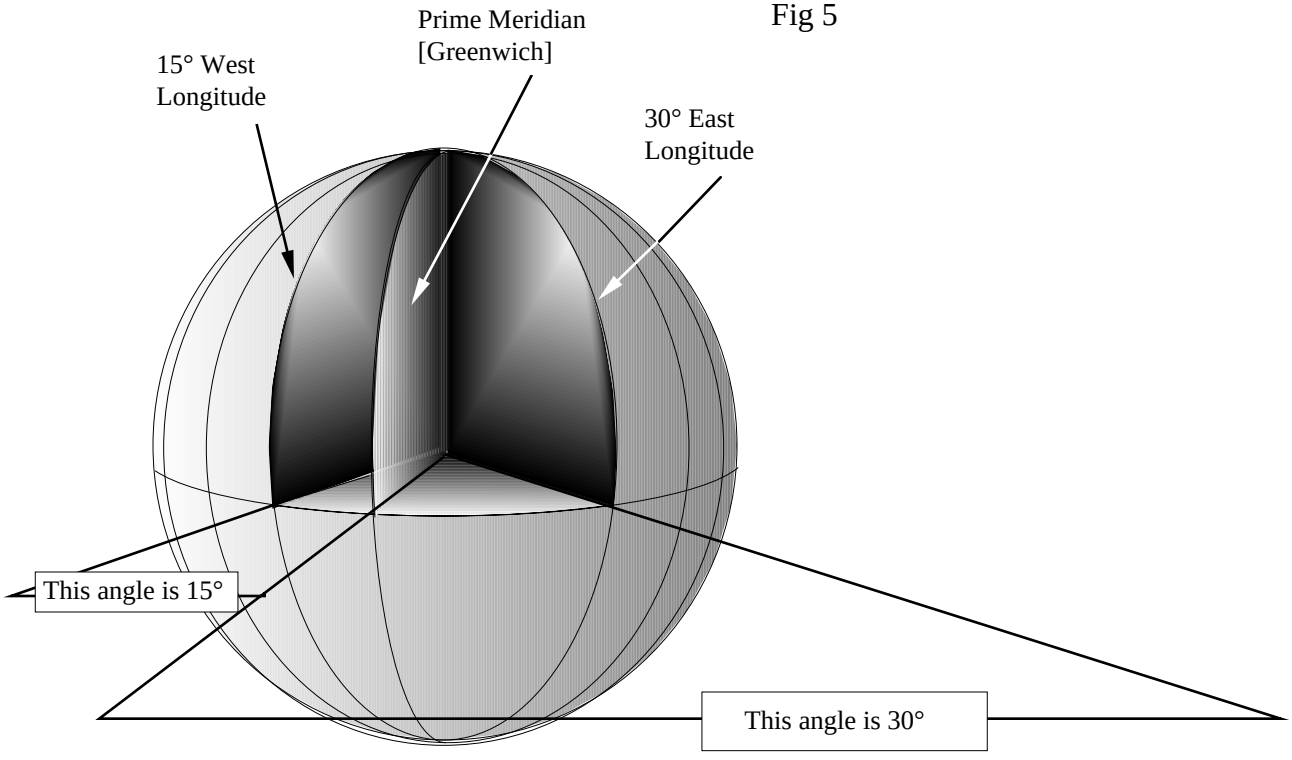


All other meridians are numbered to the east and west according to the angle they make to the prime meridian [Fig 4].

When great accuracy is required in defining a position each degree [°] is subdivided into 60 sub-divisions called minutes ['] and each of these can be further subdivided into 60 seconds ["].

In some modern satellite navigation systems [GPS], degrees and decimal points of a degree are used eg 153.6° instead of 153°36'.

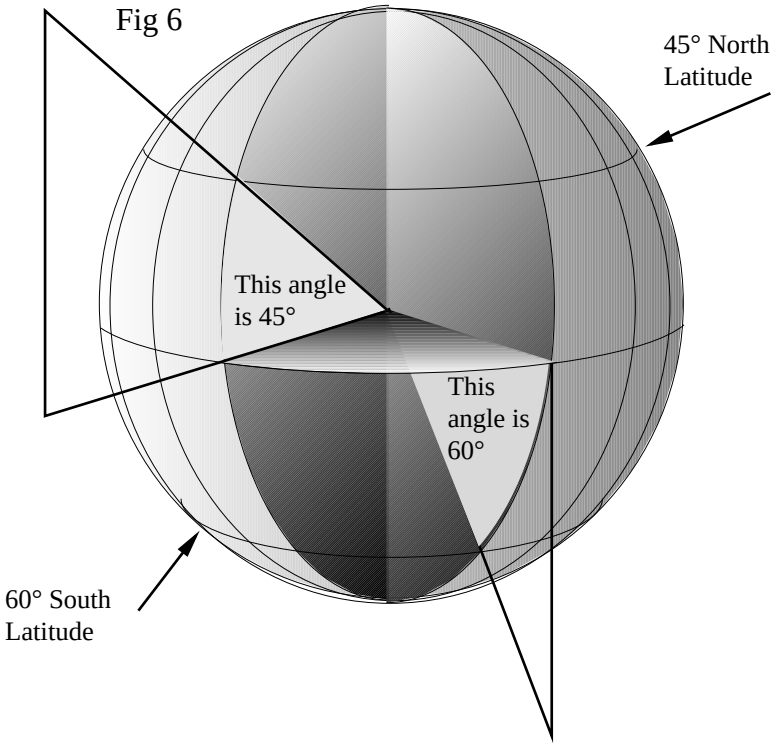
Fig 5



NUMBERING THE PARALLELS

Unlike the meridians, the parallels of latitude form circles of different sizes on the surface of the earth. The largest of these is the equator and it is chosen as the datum from which the parallels are numbered.

Fig 6

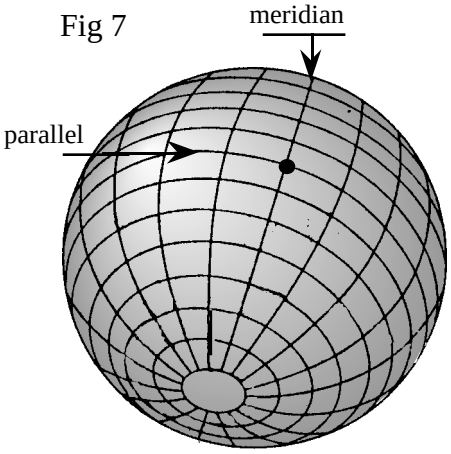


The parallels are numbered north and south of the equator according to the angle formed between the plane of the equator and a line from any point on that parallel to the centre of the earth [Fig 6].

When great accuracy is required in defining a position each degree is subdivided into 60 subdivisions called minutes and each of these can be further subdivided into 60 seconds. In some modern satellite navigation systems degrees and decimal points of a degree are used eg 28.4° instead of 28°24'.

The latitude and longitude grid can be used to define any point on the earth's surface by the parallel of latitude and meridian of longitude passing through it [Fig 7]. The numbers describing the particular meridian and parallel are called the **co-ordinates** of that point.

Fig 7



The ability to accurately plot the position of a point given its co- ordinates, or to determine the co-ordinates of any given point is a requirement for any pilot.

You will find the co-ordinates of every aerodrome in the ERSA publication. I suggest that you try this exercise now to convince yourself that you have a good grasp of the system.

EXERCISE N1

Look up the co-ordinates of various aerodromes in your area in ERSA and plot them on your World Aeronautical Chart [WAC].

Find the co-ordinates of various aerodromes in your area from your WAC and then check ERSA to see how accurate your answer is.