

Polhemus

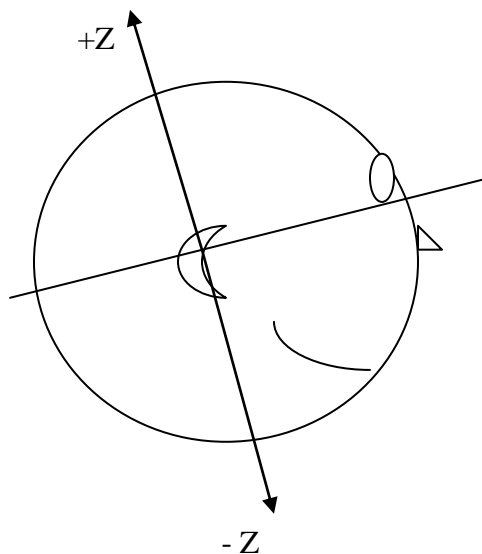
(Under Construction)

Polhemus is a 3D digitizing machine. It works by generating an electro-magnetic field around 4 noncoplanar points. The three receivers/sources and the magnet's center.

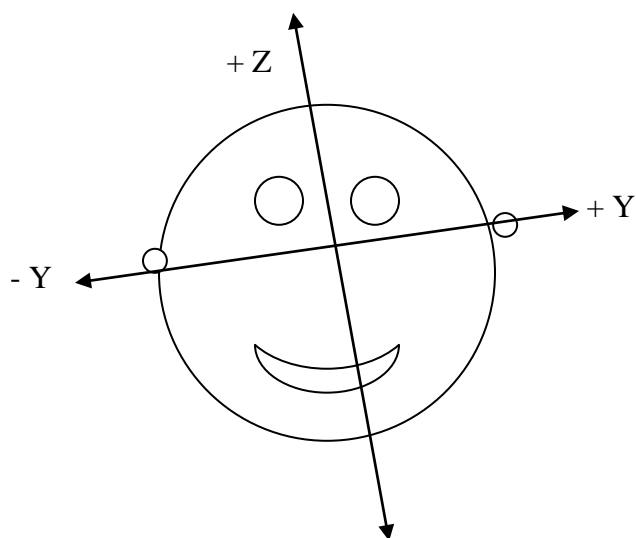
When we run a subject.

We create our own reference frame based on the three fiducial points (the nasion, the left preauricular, and the right preauricular).

First you will digitize the nasion (Na). Then the left preauricular (LP). Then the right preauricular (RP). As you probably know any three nonlinear points constitute a plane. These three points form a plane which will be the $z = 0$ plane. From this plane down is positive and up is negative. Notice that the plane is skewed toward the back of the head. This is because the Na is higher than the LP and RP. Hopefully, you will easily see that Polhemus' reference frame is not the 'normal' reference frame of the room (i.e. up/down, left/right, front/back)



If the PA are not perfectly symmetrical in this plane this will cause the z to be slightly tilted. This is OK.

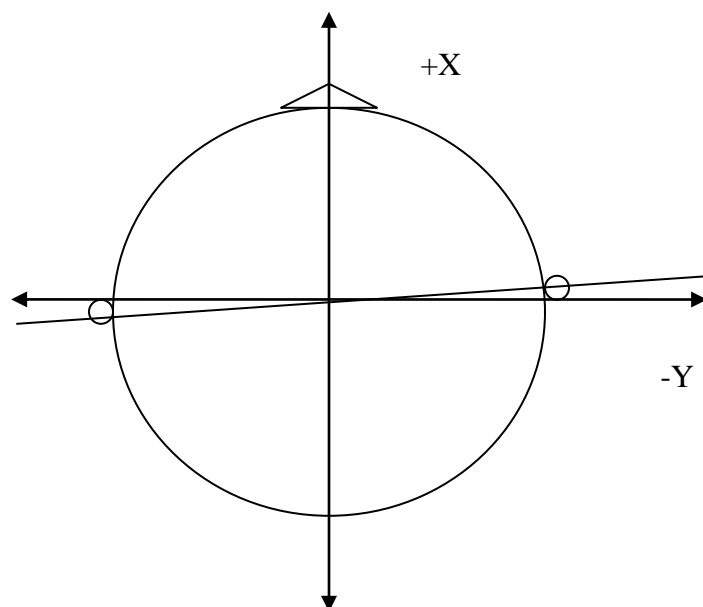


Now we have oriented the planes but where is the reference point?

Looking from above this is what Polhemus does.

Polhemus digitizes the three FP. These will make close to an isosceles triangle but not quite. Polhemus connects the RP and LP with a line. It then finds the midpoint of that line. This is the reference point (0,0,0). It then connect this point to the Na. The line is the x axis. The y axis must be perpendicular to this so it creates a y-axis at the reference point. Notice that this is NOT the same line as the line that connects the praauriculars. The z-axis is then the line perpendicular to this plane at the reference

point.



Check.

When looking at the images.

Nasion should be dead on the reference line of $y = z = 0$.

The LP and RP will be slightly off the $x = 0$ line. (It should be off by less than 10 mm. Ideally it should be less than 5 mm and if you got under 3 mm you can pat yourself on the back.) Differences less than 5 mm are to be expected.

Your montage points should have the same configuration as when you digitized them. If you are working around the midsagittal plane (i.e. looking at both hemisphere) you will probably notice that the points appear to be 'skewed'. This is to be expected. As long as it appears all points have been rotated slightly it's ok (<5 degrees)

Keep in mind that

C.Whalen 10/8/03