AMERADA PETROLEUM CORPORATION
P. O. BOX 2040
TULSA 2, OKLAHOMA

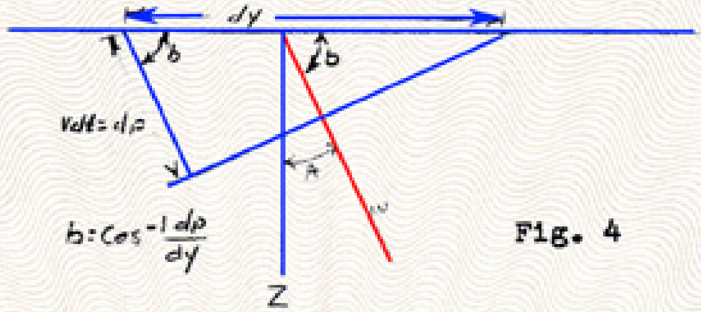

Fig. 4

In the derivation of the values of sin A and cos A, we will first need to know the direction angles a,b,and c. We have already determined angle a as <u>$\cos^{-1} dp/dx$.</u>

The relationship of the increase in path length to the distance between average recording points will hold in the same manner for the "T" , and this relationship is <u>dp/dy.</u>

It is apparent from Fig. 4 that angle b is $\cos^{-1} dp/dy$, where b is the angle which the line w makes with the Y axis.

Since we cannot determine angle c from observed data, we must derive its value from the other two, keeping in mind that angle c is the angle which the line w makes with the vertical or Z axis. From analytic geometry the relationship of the direction angles is:

$$\cos^2 a + \cos^2 b + \cos^2 c = 1$$

then: $$\cos c = \sqrt{1 - \cos^2 a - \cos^2 b} \quad \text{.................(12)}$$

After determining the cosines of the direction angles, it follows from Fig. 3 that:

$$\left.\begin{aligned} Yd &= w\cos b \\ Zd &= w\cos c \\ Xd &= X - w\cos a \end{aligned}\right\} \quad \text{..........................(13)}$$

Also from Fig. 3 it is apparent that $\sin A = \frac{MR}{LR}$

but MR = Yd and $LR = \sqrt{(MR)^2 + (LM)^2}$ or $\sqrt{Yd^2 + Zd^2}$

then sin A becomes $$\frac{Yd}{\sqrt{Yd^2 + Zd^2}} \quad \text{.................(14)}$$