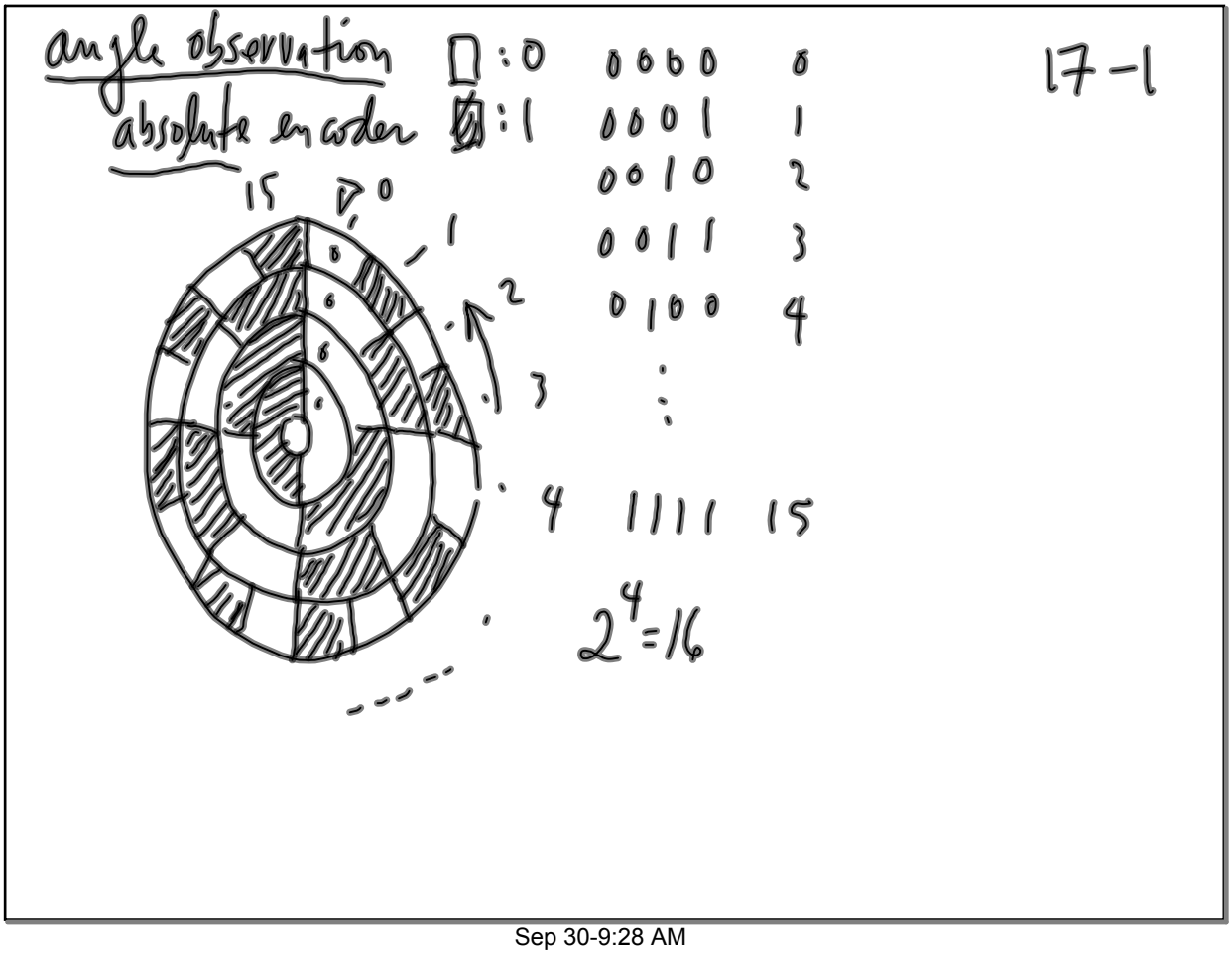

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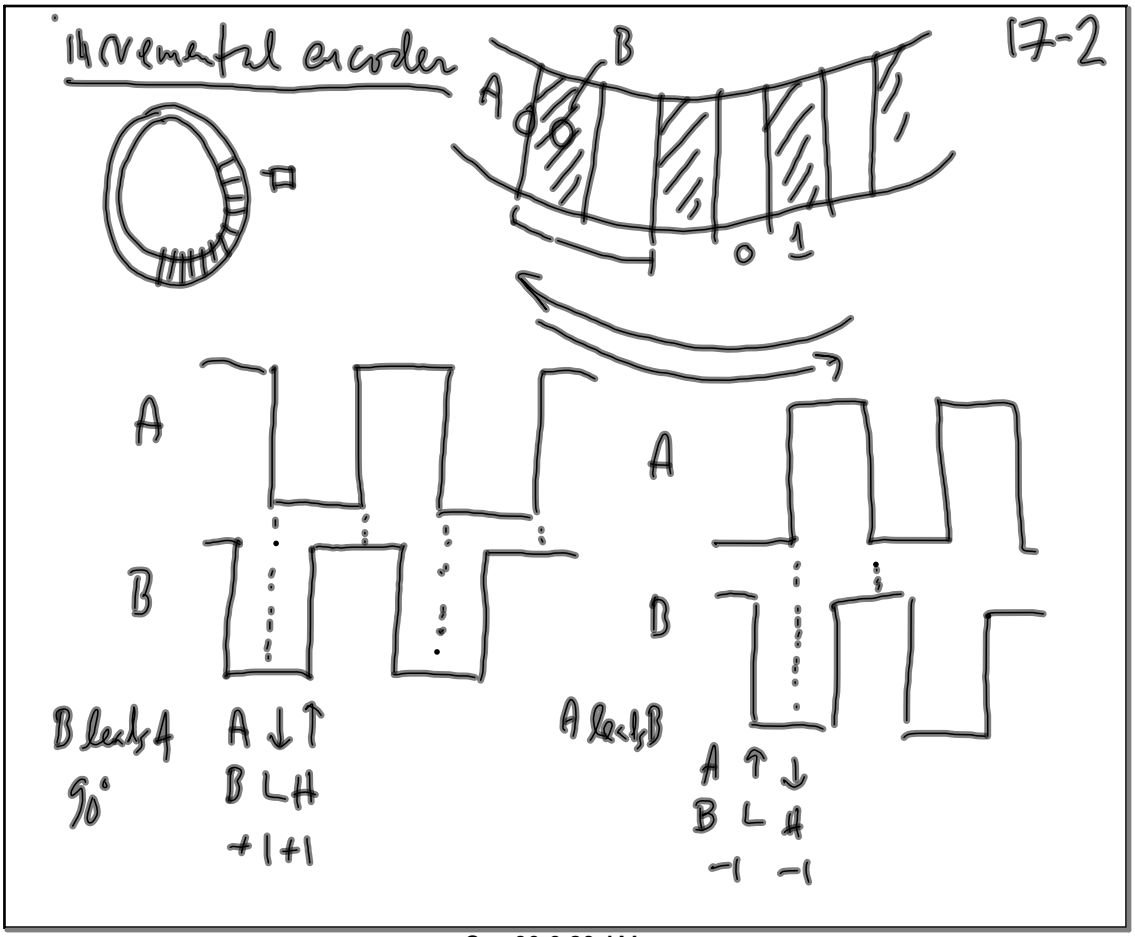

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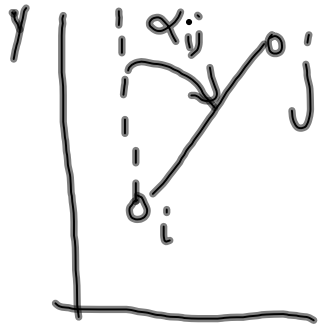
azimuth observation

17-3



$$\alpha_{ij} = \tan^{-1}\left(\frac{x_j - x_i}{y_j - y_i}\right)$$

$$F_\alpha = \alpha_{ij} - \tan^{-1}\left(\frac{x_j - x_i}{y_j - y_i}\right) = 0$$

$$\Delta x = x_j - x_i \qquad \Delta y = y_j - y_i$$

$$\frac{\partial F_\alpha}{\partial x_i} = -\frac{1}{1+\left(\frac{\Delta x}{\Delta y}\right)^2}\cdot\frac{1}{\Delta y}(-1) \equiv$$

$$\frac{\partial F_\alpha}{\partial x_j} = \frac{-\Delta y}{\Delta x^2 + \Delta y^2} = \frac{\Delta y}{\Delta x^2 + \Delta y^2} = \frac{\Delta y}{D_{ij}^2}$$

$$\frac{\partial F_\alpha}{\partial y_i} = -\frac{1}{1+\left(\frac{\Delta x}{\Delta y}\right)^2}(-1)\frac{\Delta x}{\Delta y^2}(-1) \equiv = \frac{-\Delta x}{\Delta x^2 + \Delta y^2} = \frac{-\Delta x}{D_{ij}^2}$$

$$\frac{\partial F_\alpha}{\partial y_j} = \frac{+\Delta x}{\Delta x^2 + \Delta y^2}$$

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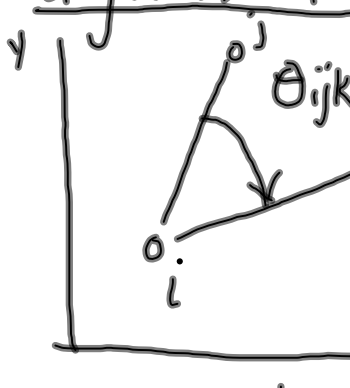
angle observation

17.4



$$\theta_{ijk} = az_{ik} - az_{ij}$$

$$\theta_{ijk} = \tan^{-1}\left(\frac{\Delta x_{ik}}{\Delta y_{ik}}\right) - \tan^{-1}\left(\frac{\Delta x_{ij}}{\Delta y_{ij}}\right)$$

$$F_\theta : \theta_{ijk} - \tan^{-1}\frac{\Delta x_{ik}}{\Delta y_{ik}} + \tan^{-1}\frac{\Delta x_{ij}}{\Delta y_{ij}}$$

$$\frac{\partial F_\theta}{\partial x_i} : -\frac{1}{1+\left(\frac{\Delta x_{ik}}{\Delta y_{ik}}\right)^2}\cdot\frac{1}{\Delta y_{ik}}(-1) + \frac{1}{1+\left(\frac{\Delta x_{ij}}{\Delta y_{ij}}\right)^2}\frac{1}{\Delta y_{ij}}(-1)$$

$$\frac{\Delta y_{ik}}{\Delta x_{ik}^2 + \Delta y_{ik}^2} - \frac{\Delta y_{ik}}{\Delta x_{ij}^2 + \Delta y_{ij}^2}$$

subscript should be ij

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$\frac{\partial F_\theta}{\partial x_j} = \frac{\delta y_{ij}}{D_{ij}^2}$, $\frac{\partial F_\theta}{\partial x_k} = -\frac{\delta y_{ik}}{D_{ik}^2}$

x, y, D, D^2 : 17.5

evaluate at current value of approximation

$\frac{\partial F_\theta}{\partial y_i} = -\frac{\delta x_{ik}}{D_{ik}^2} + \frac{\delta x_{ij}}{D_{ij}^2}$

$\delta x_{ik} = x_k - x_i$

$\delta x_{ij} = x_j - x_i$

$\frac{\partial F_\theta}{\partial y_j} = -\frac{\delta x_{ij}}{D_{ij}^2}$

Right hand side vector

$f = -F(l, x^0)$

$\frac{\partial F_\theta}{\partial y_k} = \frac{\delta x_{ik}}{D_{ik}^2}$

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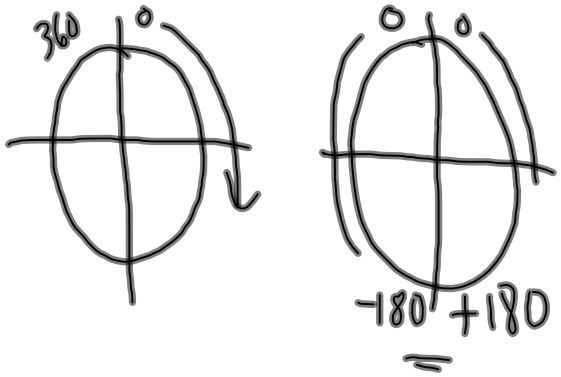


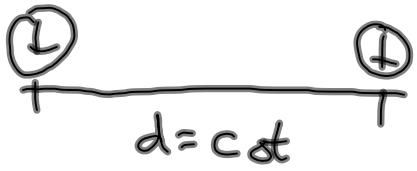
17.6

be aware of discontinuity & fix by add or subtract 2π

measuring distances :

steel tape

time of flight T.O.F.



1 way ranging

clock synchronization

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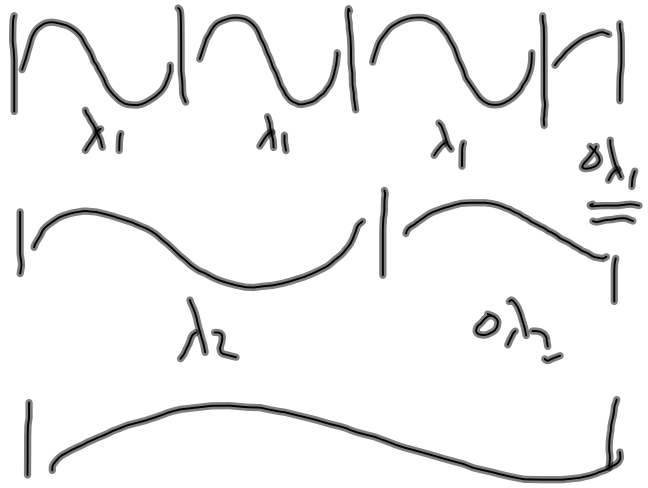
2 way ranging

17-7

T.O.F.

$d = \frac{1}{2} c \delta t$

phase is more common terrestrial



$D = M_1 \lambda_1 + \delta\lambda_1$

$D = M_2 \lambda_2 + \delta\lambda_2$

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