$Q = \sigma^2 = 0.35^2 = 0.1225$

$$M = \begin{bmatrix} \alpha_1 \delta^2_{rot1} + \alpha_2 \delta^2_{trans} & 0 & 0 \\ 0 & \alpha_3 \delta^2_{trans} + \alpha_4(\delta^2_{rot1} + \delta^2_{rot2}) & 0 \\ 0 & 0 & \alpha_1 \delta^2_{rot2} + \alpha_2 \delta^2_{trans} \end{bmatrix}$$

Where:

$* \alpha_1 = 0.05(\text{turning noise})$
$* \ \alpha_2 = 0.001(\text{movement noise, quadratic dependence})$
$* \ \alpha_3 = 0.05(\text{translation noise})$
$* \ \alpha_4 = 0.01(\text{noise from errors in turning})$

Substituting: $u = [0, 10, 0]^T$:

$$M = \begin{bmatrix} 0.05^2 \cdot 0^2 + 0.001^2 \cdot 10^2 & 0 & 0 \\ 0 & 0.05^2 \cdot 10^2 + 0.01^2(0^2 + 0^2) & 0 \\ 0 & 0 & 0.05^2 \cdot 0^2 + 0.001^2 \cdot 10^2 \end{bmatrix}$$

$$M = \begin{bmatrix} 0.05^2 & 0 & 0 \\ 0 & 0.05^2 & 0 \\ 0 & 0 & 0.05^2 \end{bmatrix}$$

$$G_t = \frac{\partial g(x_{t-1}, u_t, \epsilon_t)}{\partial x_{t-1}} \Bigg|_{\mu_{t-1}, \epsilon_t = 0} = \begin{bmatrix} 1 & 0 & -\delta_{trans} \sin(\theta + \delta_{rot1}) \\ 0 & 1 & \delta_{trans} \cos(\theta + \delta_{rot1}) \\ 0 & 0 & 1 \end{bmatrix}$$

$$V_t = \frac{\partial g(x_{t-1}, u_t, \epsilon_t)}{\partial u_t} \Bigg|_{\mu_{t-1}, \epsilon_t = 0} = \begin{bmatrix} -\delta_{trans} \sin(\theta + \delta_{rot1}) & \cos(\theta + \delta_{rot1}) & 0 \\ \delta_{trans} \cos(\theta + \delta_{rot1}) & \sin(\theta + \delta_{rot1}) & 0 \\ 1 & 0 & 1 \end{bmatrix}$$

$$H_t = \frac{\partial h(x_t)}{\partial x_t}$$

$$z = h(x_t) = \text{atan2}(m_y - y, m_x - x) - \theta$$

Where:

$* \ (x, y, \theta)$— current state of the robot,
$* \ (m_x, m_y)$— coordinates of the landmark,
$* \ z$— measured angle to the landmark.

$$H_t = \begin{bmatrix} \frac{-(m_y - y)}{(m_x - x)^2 + (m_y - y)^2} & \frac{(m_x - x)}{(m_x - x)^2 + (m_y - y)^2} & -1 \end{bmatrix}$$