PROB 4.8
PART (C)

GAUSS-MARKOV

$$\dot{x}(t) = A(t)x(t) + B(t)u(t) + w(t)$$
$$y(t) = C(t)x(t) + v(t)$$

$$\underline{X}_k = [x^I \; v_x^I \; y^I \; v_y^I \; z^I \; v_z^I]^T$$
$$\underline{U}_k = [a_x^I \; a_y^I \; a_z^I]^T$$
$$\underline{Z}_k = [x^I \; y^I \; z^I]^T$$
$$\epsilon_p = [\epsilon_x \; \epsilon_y \; \epsilon_z]^T \rightarrow R_p = \begin{bmatrix} 10^{-4} & 0 & 0 \\ 0 & 10^{-4} & 0 \\ 0 & 0 & 10^{-4} \end{bmatrix}$$

$$\epsilon_a = [\epsilon_{ax} \; \epsilon_{ay} \; \epsilon_{az}]^T \rightarrow R_a = \begin{bmatrix} 0.025 & 0 & 0 \\ 0 & 0.025 & 0 \\ 0 & 0 & 0.025 \end{bmatrix} \delta(t)$$

WITH,

$$A = \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \quad \& \quad B = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$W = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad \epsilon_A = W \epsilon_a$$

$$C = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$

$$V = \underbrace{\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}}_{V} \epsilon_p = V \epsilon_p$$

$$R_V = V R_p V^T \quad \& \quad R_W = \Omega R_a \Omega^T$$

FOR THE RECURSIVE NAVIGATOR:

→ SEE CODE!

* IN APPENDIX, PART C