$$\mathbf{x}_k = \mathbf{\Phi}_{k-1}\mathbf{x}_{k-1} + \mathbf{B}_{k-1}\mathbf{u}_{k-1} + \mathbf{w}_{k-1} \tag{3.16}$$

$$\mathbf{z}_k = \mathbf{H}_k\mathbf{x}_k + \mathbf{v}_k\,, \tag{3.17}$$

$$\mathbf{w}_k \sim \mathcal{N}(0, \mathbf{Q}_k)\,, \tag{3.18}$$

$$\mathbf{v}_k \sim \mathcal{N}(0, \mathbf{R}_k)\,, \tag{3.19}$$

$$\mathbf{Q}_k = \mathrm{E}[\mathbf{w}_k\mathbf{w}_k^T]\,, \tag{3.20}$$

$$\mathbf{R}_k = \mathrm{E}[\mathbf{v}_k\mathbf{v}_k^T]\,, \tag{3.21}$$

$$\hat{\mathbf{x}}_k^- = \mathbf{\Phi}_{k-1}\hat{\mathbf{x}}_{k-1} + \mathbf{B}_{k-1}\mathbf{u}_{k-1}\,, \tag{3.22}$$

$$\hat{\mathbf{x}}_k = \hat{\mathbf{x}}_k^- + \mathbf{K}_k[\mathbf{z}_k - \mathbf{H}_k\hat{\mathbf{x}}_k^-]\,. \tag{3.23}$$

$$\mathbf{K}_k = \mathbf{P}_k^-\mathbf{H}_k^T[\mathbf{H}_k\mathbf{P}_k^-\mathbf{H}_k^T + \mathbf{R}_k]^{-1}\,, \tag{3.24}$$

$$\mathbf{P}_k^- = \mathbf{\Phi}_{k-1}\mathbf{P}_{k-1}\mathbf{\Phi}_{k-1}^T + \mathbf{Q}_{k-1} \tag{3.25}$$

$$\mathbf{P}_k = [\mathbf{I}_n - \mathbf{K}_k\mathbf{H}_k]\mathbf{P}_k^-\,. \tag{3.26}$$