$$\dot{x}(t) = Ax(t) + B_w w(t) \quad (9.34a)$$

$$m(t) = C_m x(t) + D_{mw} w(t) \quad (9.34b)$$

$$e(t) = \hat{y}(t) - C_y x(t) \quad (9.34c)$$

Figure 9.4 is correct.

$$\dot{\tilde{x}}(\tau) = A^T \tilde{x}(\tau) + C_m^T \tilde{m}(\tau) - C_y^T \tilde{e}(\tau) \quad (9.35a)$$

$$\tilde{w}(\tau) = B_w^T \tilde{x}(\tau) + D_{mw}^T \tilde{m}(\tau) \quad (9.35b)$$

$$\tilde{\hat{y}}(\tau) = \tilde{e}(\tau) \quad (9.35c)$$

Figure 9.6 is correct.

Full Information controller for 9.35:

$$\dot{\tilde{x}}(\tau) = \left[A^T - C_m^T \tilde{G}(\tau)\right]\tilde{x}(\tau) - C_y^T \tilde{e}(\tau); \quad (9.37a)$$

$$\tilde{m}(\tau) = -\tilde{G}(\tau)\tilde{x}(\tau). \quad (9.37b)$$

$$\dot{\tilde{x}}(\tau) = \left[A^T - C_m^T \tilde{G}(\tau)\right]\tilde{x}(\tau) + C_y^T \tilde{e}(\tau); \quad (9.37a)$$

$$\tilde{m}(\tau) = \tilde{G}(\tau)\tilde{x}(\tau). \quad (9.37b)$$

$$\tilde{G}(\tau) = C_m \tilde{Q}(\tau) \quad (9.38)$$

Convert equation 9.37 to the adjoint system.

$$\dot{\hat{x}}(t) = \left[A - \tilde{G}^T(t_f - t)C_m\right]\hat{x}(t) + \tilde{G}^T(t_f - t)m(t);$$

$$e(t) = C_y \hat{x}(t)$$

$$G(t) = \tilde{G}^T(t_f - t)\,, \quad (9.40)$$

$$\dot{\hat{x}}(t) = A\hat{x}(t) + B_u u(t) + G(t)\left\{m(t) - C_m \hat{x}(t)\right\}; \tag{9.41a}$$

$$\hat{y}(t) = C_y \hat{x}(t) \tag{9.41b}$$

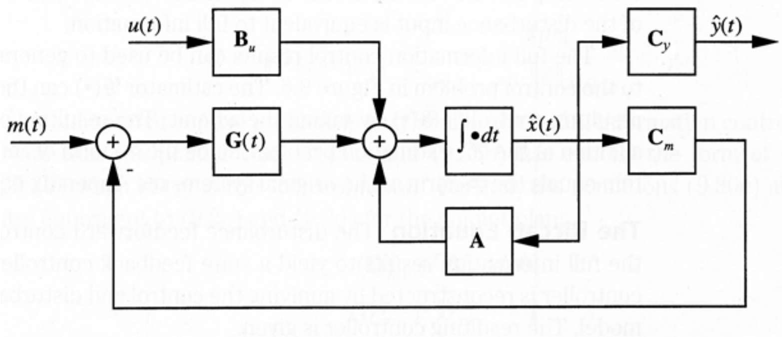

FIGURE 9.7 The $\mathcal{H}_\infty$ optimal estimator