Table 3.2 *Steady State Errors*

System Type (Number of $s = 0$ numerator roots of the error transmittance T_E)	Steady State Error to Step Input $r(t) = Au(t)$ $R(t) = A/s$	Steady State Error to Ramp Input $r(t) = Atu(t)$ $R(s) = A/s^2$	Steady State Error to Parabolic Input $r(t) = \frac{1}{2}At^2u(t)$ $R(s) = A/s^3$	Steady State Error to Input $r(t) = \frac{1}{6}At^3u(t)$ $R(s) = A/s^4$
0	$AT_E(0)$	∞	∞	∞
1	0	$A \lim_{s\to 0}\left[\frac{T_E(s)}{s}\right]$	∞	∞
2	0	0	$A \lim_{s\to 0}\left[\frac{T_E(s)}{s^2}\right]$	∞
3	0	0	0	$A \lim_{s\to 0}\left[\frac{T_E(s)}{s^2}\right]$
⋮				

Table 3.3 *Steady State Error of Unity Feedback Systems in Terms of Error Coefficients*

System Type	Steady State Error to Step Input $R(s) = A/s$	Steady State Error to Ramp Input $R(s) = A/s^2$	Steady State Error to Parabolic Input $R(s) = A/s^3$	Steady State Error to Input $R(s) = A/s^4$
0	$\frac{A}{1+\kappa_0}$	∞	∞	∞
1	0	$\frac{A}{\kappa_1}$	∞	∞
2	0	0	$\frac{A}{\kappa_2}$	∞
3	0	0	0	$\frac{A}{\kappa_3}$
⋮				

Table 3.5 *Ziegler–Nichols Compensation*

Compensator	Values
P	$K_p = 0.5\, K_{po}$
PI	$K_p = 0.45\, K_{po}$ $T_i = 0.83\, T_o$
PID	$K_p = 0.6\, K_{po}$ $T_i = 0.5\, T_o$ $T_d = 0.125\, T_o$

Table 3.6 *Chien–Hrones–Reswick Compensator*

(a) Values for $R = T_g/T_u$

Compensator	R
P	$R > 10$
PI	$7.5 < R < 10$
PID	$3 < R < 7.5$
Higher order	$R < 3$

(b) CHR Compensation

Compensator	Overdamped	20% Overshoot
P	$K_p = 0.3R/K_g$	$K_p = 0.7R/K_g$
PI	$K_p = 0.35R/K_g$ $T_i = 1.2T_g$	$K_p = 0.6R/K_g$ $T_i = T_g$
PID	$K_p = 0.6R/K_g$ $T_i = T_g$ $T_d = 0.5T_u$	$K_p = 0.95R/K_g$ $T_i = 1.35T_g$ $T_d = 0.47T_u$