

167 S28N 130 S28N

	a	b	c	d	e	f	g
S	0 $\angle -90^\circ$	0 $\angle 0^\circ$	0 $\angle +90^\circ$	$\infty \angle +90^\circ$	$\infty \angle 0^\circ$	$\infty \angle -90^\circ$	0 $\angle -180^\circ$
BH	$\infty \angle +90^\circ$	$\infty \angle 0^\circ$	$\infty \angle -90^\circ$	0 $\angle -270^\circ$	0 $\angle 0^\circ$	0 $\angle 270^\circ$	$\infty \angle 180^\circ$

(f-a c-d p's b's) $S=j\omega$ in 160 N10c

$$GH(j\omega) = \frac{K}{j\omega(j\omega+2)(j\omega+1)} = \frac{K}{j\omega(-\omega^2+3j\omega+2)}$$

$$= \frac{K}{j\omega(2-\omega^2+3j\omega)} = \frac{K}{\omega} \frac{1}{-3\omega + (2-\omega^2)j}$$

$$= \frac{K}{\omega} \frac{-3\omega - (2-\omega^2)j}{9\omega^2 + (2-\omega^2)^2} = \frac{K}{\omega} \frac{-3\omega - (2-\omega^2)j}{9\omega^2 + 4 - 4\omega^2 + \omega^4}$$

$$GH(j\omega) = \underbrace{\frac{-3K}{\omega^4 + 5\omega^2 + 4}}_{\text{ANN}} - \underbrace{\frac{K(2-\omega^2)j}{\omega(\omega^4 + 5\omega^2 + 4)}}_{\text{j'W'3}}$$

$\omega \rightarrow 0^+ \quad \begin{pmatrix} 1 \\ 0 \\ c \end{pmatrix}$

$$GH(0) = \frac{-3K}{4} - \infty j \quad (c = 3/r \cdot 3)$$

↑
asymptote

phase crossover
 $\omega^2 = 2$
 $\omega = \pm \sqrt{2}$ rad/sec