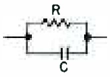
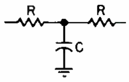
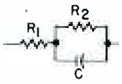
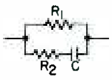
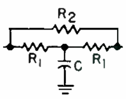
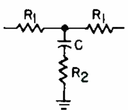
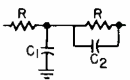
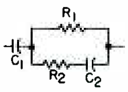
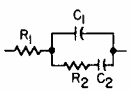
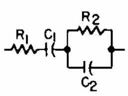
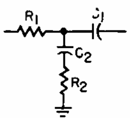
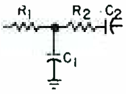
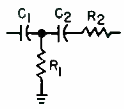
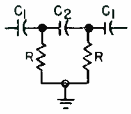
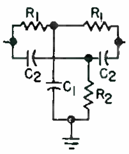
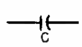
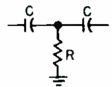
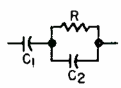
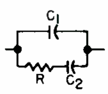
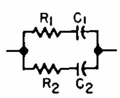
Table I—Transfer Functions of R-C Input and Output Networks

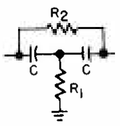
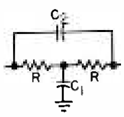
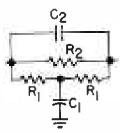
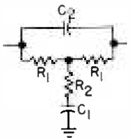
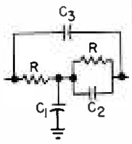
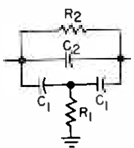
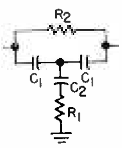
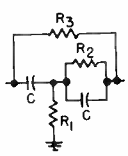
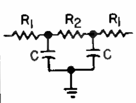
To generate a specific $f(p)$, rewrite $f(p)$ in the form Z_o/Z_i where Z_o and Z_i are each in a form corresponding to a function in the left-hand column. Choose input and output networks in accordance with the diagrams and relations adjacent to the function representing Z_i and Z_o respectively.

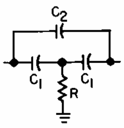
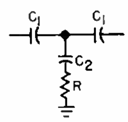
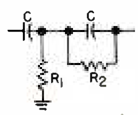
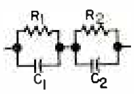
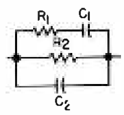
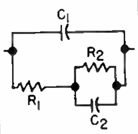
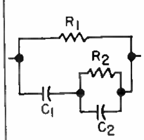
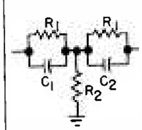
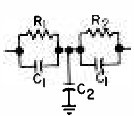
TRANSFER IMPEDANCE FUNCTION	NETWORK	RELATIONS	INVERSE RELATIONS
A		$A=R$	$R=A$
$\frac{A}{1+pT}$		$A=R$ $T=RC$	$R=A$ $C=\frac{T}{A}$
$A(1+pT)$		$A=2R$ $T=\frac{RC}{2}$	$R=\frac{A}{2}$ $C=\frac{4T}{A}$
$A\left(\frac{1+p\theta T}{1+pT}\right)$ $\theta<1$		$A=R_1+R_2$ $T=R_2C$ $\theta=\frac{R_1}{R_1+R_2}$	$R_1=A\theta$ $R_2=A(1-\theta)$ $C=\frac{T}{A(1-\theta)}$
		$A=R_1$ $T=(R_1+R_2)C$ $\theta=\frac{R_2}{R_1+R_2}$	$R_1=A$ $R_2=\frac{A\theta}{1-\theta}$ $C=\frac{T(1-\theta)}{A}$
$A\left(\frac{1+pT}{1+p\theta T}\right)$ $\theta<1$		$A=\frac{2R_1R_2}{2R_1+R_2}$ $T=\frac{R_1C}{2}$ $\theta=\frac{2R_1}{2R_1+R_2}$	$R_1=\frac{A}{2(1-\theta)}$ $R_2=\frac{A}{\theta}$ $C=\frac{4T(1-\theta)}{A}$
		$A=2R_1$ $T=\left(R_2+\frac{R_1}{2}\right)C$ $\theta=\frac{2R_2}{2R_2+R_1}$	$R_1=\frac{A}{2}$ $R_2=\frac{A\theta}{4(1-\theta)}$ $C=\frac{4T(1-\theta)}{A}$
		$A=2R$ $T=\frac{R}{2}(C_1+C_2)$ $\theta=\frac{2C_2}{C_1+C_2}$	$R=\frac{A}{2}$ $C_1=\frac{2T(2-\theta)}{A}$ $C_2=\frac{2T\theta}{A}$
$\frac{1}{pB}\left[\frac{(1+pT_1)(1+pT_3)}{1+pT_2}\right]$ $T_1<T_2<T_3$		$B=C_1$ $T_2=(R_1+R_2)C_2$ $T_1T_3=R_1R_2C_1C_2$ $T_1+T_3=R_1C_1+R_2C_2+R_1C_2$	$R_1=\frac{T_1+T_3-T_2}{B}$ $R_2=\frac{T_1T_3(T_1+T_3-T_2)}{B(T_3-T_2)(T_2-T_1)}$ $C_1=B$ $C_2=\frac{B(T_3-T_2)(T_2-T_1)}{(T_1+T_3-T_2)^2}$
		$B=C_1+C_2$ $T_2=R_2\left(\frac{C_1C_2}{C_1+C_2}\right)$ $T_1T_3=R_1R_2C_1C_2$ $T_1+T_3=R_1C_1+R_2C_2+R_1C_2$	$R_1=\frac{T_1T_3}{BT_2}$ $R_2=\frac{(T_1T_2+T_2T_3-T_1T_3)^2}{BT_2(T_3-T_2)(T_2-T_1)}$ $C_1=\frac{BT_2^2}{T_1T_2+T_2T_3-T_1T_3}$ $C_2=\frac{B(T_3-T_2)(T_2-T_1)}{T_1T_2+T_2T_3-T_1T_3}$
		$B=C_1$ $T_2=R_2C_2$ $T_1T_3=R_1R_2C_1C_2$ $T_1+T_3=R_1C_1+R_2C_2+R_2C_1$	$R_1=\frac{T_1T_3}{BT_2}$ $R_2=\frac{(T_3-T_2)(T_2-T_1)}{BT_2}$ $C_1=B$ $C_2=\frac{BT_2^2}{(T_3-T_2)(T_2-T_1)}$
		$B=C_1$ $T_2=R_2C_2$ $T_1T_3=R_1R_2C_1C_2$ $T_1+T_3=R_1C_1+R_2C_2+R_1C_2$	$R_1=\frac{T_1T_3}{BT_2}$ $R_2=\frac{T_1T_2T_3}{B(T_3-T_2)(T_2-T_1)}$ $C_1=B$ $C_2=\frac{B(T_3-T_2)(T_2-T_1)}{T_1T_3}$

TRANSFER IMPEDANCE FUNCTION	NETWORK	RELATIONS	INVERSE RELATIONS
$\frac{1}{pB}(1+pT_1)(1+pT_2)$ $T_1\neq T_2$		$B=C_2$ $T_1T_2=R_1R_2C_1C_2$ $T_1+T_2=R_1C_1+R_2C_2+R_1C_2$	$R_1=\frac{(\sqrt{T_1}-\sqrt{T_2})^2}{B}$ $R_2=\frac{\sqrt{T_1T_2}}{B}$ $C_1=\frac{B\sqrt{T_1T_2}}{(\sqrt{T_1}-\sqrt{T_2})^2}$ $C_2=B$
$\frac{1}{pB}\left[\frac{(1+pT_1)(1+pT_2)}{p\sqrt{T_1T_2}}\right]$ $T_1\neq T_2$		$B=C_2$ $T_1T_2=R_1R_2C_1C_2$ $T_1+T_2=R_1C_1+R_2C_2+R_1C_2$	$R=\frac{(\sqrt{T_1}-\sqrt{T_2})^2}{B}$ $R_2=\frac{\sqrt{T_1T_2}}{B}$ $C_1=\frac{B\sqrt{T_1T_2}}{(\sqrt{T_1}-\sqrt{T_2})^2}$ $C_2=B$
$\frac{1}{pB}\left[\frac{(1+pT_1)(1+pT_2)}{p^2T_1T_2}\right]$ $T_1<T_2$		$B=\frac{C_1C_2}{C_1+2C_2}$ $T_1=RC_1$ $T_2=R(C_1+2C_2)$	$R=\frac{T_1(T_2-T_1)}{2BT_2}$ $C_1=\frac{2BT_2}{T_2-T_1}$ $C_2=\frac{BT_2}{T_1}$
$A\left(\frac{1+pT_1}{1+p^2T_1T_2}\right)$	 $R_1C_1=4R_2C_2$	$A=2R_1$ $T_1=\frac{R_1C_1}{2}=2R_2C_2$ $T_2=R_1C_2$	$R_1=\frac{A}{2}$ $R_2=\frac{AT_1}{4T_2}$ $C_1=\frac{4T_1}{A}$ $C_2=\frac{2T_2}{A}$
$\frac{1}{pB}$		$B=C$	$C=B$
$\frac{1}{pB}(1+pT)$		$B=C$ $T=RC$	$R=\frac{T}{B}$ $C=B$
$\frac{1}{pB}\left(\frac{1+pT}{pT}\right)$		$B=\frac{C}{2}$ $T=2RC$	$R=\frac{T}{4B}$ $C=2B$
$\frac{1}{pB}\left(\frac{1+pT}{1+p\theta T}\right)$ $\theta<1$		$B=C_1$ $T=R(C_1+C_2)$ $\theta=\frac{C_2}{C_1+C_2}$	$R=\frac{T(1-\theta)}{B}$ $C_1=B$ $C_2=\frac{B\theta}{1-\theta}$
		$B=C_1+C_2$ $T=RC_2$ $\theta=\frac{C_1}{C_1+C_2}$	$R=\frac{T}{B(1-\theta)}$ $C_1=B\theta$ $C_2=B(1-\theta)$
$\frac{1}{pB}\left[\frac{(1+pT_1)(1+pT_3)}{1+pT_2}\right]$ $T_1<T_2<T_3$		$B=C_1+C_2$ $T_1=R_1C_1$ $T_2=(R_1+R_2)\left(\frac{C_1C_2}{C_1+C_2}\right)$ $T_3=R_2C_2$	$R_1=\frac{T_1(T_3-T_1)}{B(T_2-T_1)}$ $R_2=\frac{T_3(T_3-T_1)}{B(T_3-T_2)}$ $C_1=\frac{B(T_2-T_1)}{T_3-T_1}$ $C_2=\frac{B(T_3-T_2)}{T_3-T_1}$

(Continued on page 148)

Table I *(continued)*—Transfer Functions of R-C Input and Output Networks

TRANSFER IMPEDANCE FUNCTION	NETWORK	RELATIONS	INVERSE RELATIONS
$A\left(\frac{1+pT_1}{1+pT_1+p^2T_1T_2}\right)$		$A = R_2$ $T_1 = 2R_1C$ $T_2 = \frac{R_2C}{2}$	$R_1 = \frac{AT_1}{4T_2}$ $R_2 = A$ $C = \frac{2T_2}{A}$
$A\left(\frac{1+pT_2}{1+pT_1+p^2T_1T_2}\right)$		$A = 2R$ $T_1 = 2RC_2$ $T_2 = \frac{RC_1}{2}$	$R = \frac{A}{2}$ $C_1 = \frac{4T_2}{A}$ $C_2 = \frac{T_1}{A}$
$A\left[\frac{1+pT_3}{1+pT_1+p^2T_1T_2}\right]$ $T_2 > \frac{T_1}{4}$ (Complex roots) $T_3 > T_2$		$A = \frac{2R_1R_2}{(2R_1+R_2)}$ $T_1 = \frac{R_1(R_1C_1+2R_2C_2)}{2R_1+R_2}$ $T_2 = \frac{R_1R_2C_1C_2}{R_1C_1+2R_2C_2}$ $T_3 = \frac{R_1C_1}{2}$	$R_1 = \frac{AT_3^2}{2[T_3^2-T_1(T_3-T_2)]}$ $R_2 = \frac{AT_3^2}{T_1(T_3-T_2)}$ $C_1 = \frac{4[T_3^2-T_1(T_3-T_2)]}{AT_3}$ $C_2 = \frac{T_1T_2}{AT_3}$
		$A = 2R_1$ $T_1 = R_2C_1+2R_1C_2$ $T_2 = \frac{R_1(R_1+2R_2)C_1C_2}{R_2C_1+2R_1C_2}$ $T_3 = \left(R_2+\frac{R_1}{2}\right)C_1$	$R_1 = \frac{A}{2}$ $R_2 = \frac{AT_1(T_3-T_2)}{4[T_3^2-T_1(T_3-T_2)]}$ $C_1 = \frac{4[T_3^2-T_1(T_3-T_2)]}{AT_3}$ $C_2 = \frac{T_1T_2}{AT_3}$
		$A = 2R$ $T_1 = R(C_2+2C_3)$ $T_2 = \frac{RC_3(C_1+C_2)}{C_2+2C_3}$ $T_3 = \frac{R}{2}(C_1+C_2)$	$R = \frac{A}{2}$ $C_1 = \frac{2[2T_3^2-T_1(T_3-T_2)]}{AT_3}$ $C_2 = \frac{2T_1(T_3-T_2)}{AT_3}$ $C_3 = \frac{T_1T_2}{AT_3}$
$A\left[\frac{1+pT_3}{1+pT_1+p^2T_1T_2}\right]$ $T_2 > \frac{T_1}{4}$ (Complex roots) $T_3 < T_1$		$A = R_2$ $T_1 = 2R_1C_1+R_2C_2$ $T_2 = \frac{R_1R_2C_1(C_1+2C_2)}{2R_1C_1+R_2C_2}$ $T_3 = 2R_1C_1$	$R_1 = \frac{AT_3^2}{4[T_1T_2-T_3(T_1-T_3)]}$ $R_2 = A$ $C_1 = \frac{2[T_1T_2-T_3(T_1-T_3)]}{AT_3}$ $C_2 = \frac{(T_1-T_3)}{A}$
		$A = R_2$ $T_1 = \frac{C_1(2R_1C_2+R_2C_1)}{2C_1+C_2}$ $T_2 = \frac{R_1R_2C_1C_2}{2R_1C_2+R_2C_1}$ $T_3 = \frac{2R_1C_1C_2}{(2C_1+C_2)}$	$R_1 = \frac{AT_3^2}{4[T_1T_2-T_3(T_1-T_3)]}$ $R_2 = A$ $C_1 = \frac{2T_1T_2}{AT_3}$ $C_2 = \frac{4T_1T_2[T_1T_2-T_3(T_1-T_3)]}{AT_3^2(T_1-T_3)}$
		$A = R_3$ $T_1 = \frac{R_1(2R_2+R_3)C}{R_1+R_2}$ $T_2 = \frac{R_2R_3C}{(2R_2+R_3)}$ $T_3 = \frac{2R_1R_2C}{(R_1+R_2)}$	$R_1 = \frac{AT_3^2}{2[2T_1T_2-T_3(T_1-T_3)]}$ $R_2 = \frac{AT_3}{2(T_1-T_3)}$ $R_3 = A$ $C = \frac{2T_1T_2}{AT_3}$
$A(1+pT_1)(1+pT_2)$ $T_1 < T_2$		$A = 2R_1+R_2$ $T_1 = \left(\frac{R_1R_2}{2R_1+R_2}\right)C$ $T_2 = R_1C$	$R_1 = A\left(\frac{T_2-T_1}{2T_2}\right)$ $R_2 = A\frac{T_1}{T_2}$ $C = \frac{2T_2^2}{A(T_2-T_1)}$

TRANSFER IMPEDANCE FUNCTION	NETWORK	RELATIONS	INVERSE RELATIONS
$\frac{1}{pB}\left(\frac{1+p\theta T}{1+pT}\right)$ $\theta < 1$		$B = C_2$ $T = RC_1\left(\frac{2C_2+C_1}{C_2}\right)$ $\theta = \frac{2C_2}{2C_2+C_1}$	$R = \frac{T\theta^2}{4B(1-\theta)}$ $C_1 = \frac{2B(1-\theta)}{\theta}$ $C_2 = B$
		$B = \frac{C_1^2}{2C_1+C_2}$ $T = RC_2$ $\theta = \frac{2C_1}{2C_1+C_2}$	$R = \frac{T\theta^2}{4B(1-\theta)}$ $C_1 = \frac{2B}{\theta}$ $C_2 = \frac{4B(1-\theta)}{\theta^2}$
		$B = \left(\frac{R_1}{R_1+R_2}\right)C$ $T = R_2C$ $\theta = \frac{2R_1}{R_1+R_2}$	$R_1 = \frac{T\theta^2}{2B(2-\theta)}$ $R_2 = \frac{T\theta}{2B}$ $C = \frac{2B}{\theta}$
$A\left[\frac{1+pT_2}{(1+pT_1)(1+pT_3)}\right]$ $T_1 < T_2 < T_3$		$A = R_1+R_2$ $T_1 = R_1C_1$ $T_2 = \left(\frac{R_1R_2}{R_1+R_2}\right)(C_1+C_2)$ $T_3 = R_2C_2$	$R_1 = \frac{A(T_2-T_1)}{T_3-T_1}$ $R_2 = \frac{A(T_3-T_2)}{T_3-T_1}$ $C_1 = \frac{T_1(T_3-T_1)}{A(T_2-T_1)}$ $C_2 = \frac{T_3(T_3-T_1)}{A(T_3-T_2)}$
		$A = R_2$ $T_2 = R_1C_1$ $T_1T_3 = R_1R_2C_1C_2$ $T_1+T_3 = R_1C_1+R_2C_2+R_2C_1$	$R_1 = \frac{AT_2^2}{(T_3-T_2)(T_2-T_1)}$ $R_2 = A$ $C_1 = \frac{(T_3-T_2)(T_2-T_1)}{AT_2}$ $C_2 = \frac{T_1T_3}{AT_2}$
		$A = R_1+R_2$ $T_2 = \left(\frac{R_1R_2}{R_1+R_2}\right)C_2$ $T_1T_3 = R_1R_2C_1C_2$ $T_1+T_3 = R_1C_1+R_2C_2+R_2C_1$	$R_1 = \frac{AT_2^2}{T_1T_2+T_2T_3-T_1T_3}$ $R_2 = \frac{A(T_3-T_2)(T_2-T_1)}{T_1T_2+T_2T_3-T_1T_3}$ $C_1 = \frac{T_1T_3}{AT_2}$ $C_2 = \frac{(T_1T_2+T_2T_3-T_1T_3)^2}{AT_2(T_3-T_2)(T_2-T_1)}$
		$A = R_1$ $T_2 = R_2(C_1+C_2)$ $T_1T_3 = R_1R_2C_1C_2$ $T_1+T_3 = R_1C_1+R_2C_2+R_2C_1$	$R_1 = A$ $R_2 = \frac{A(T_3-T_2)(T_2-T_1)}{(T_1+T_3-T_2)^2}$ $C_1 = \frac{T_1+T_3-T_2}{A}$ $C_2 = \frac{T_1T_3(T_1+T_3-T_2)}{A(T_3-T_2)(T_2-T_1)}$
$A\left[\frac{1+pT_2}{(1+pT_1)(1+pT_3)}\right]$ $T_2 < T_1 < T_3$		$A = 2R_1+\frac{R_1^2}{R_2}$ $T_1 = R_1C_1$ $T_2 = \left(\frac{R_1R_2}{R_1+2R_2}\right)(C_1+C_2)$ $T_3 = R_1C_2$	$R_1 = \frac{AT_2}{(T_1+T_3)}$ $R_2 = \frac{AT_2^2}{(T_1+T_3)(T_1+T_3-2T_2)}$ $C_1 = \frac{T_1(T_1+T_3)}{AT_2}$ $C_2 = \frac{T_3(T_1+T_3)}{AT_2}$
$A\left[\frac{1+pT_2}{(1+pT_1)(1+pT_3)}\right]$ $T_1 < T_3 < T_2$		$A = R_1+R_2$ $T_1 = R_1C_1$ $T_2 = \frac{R_1R_2}{R_1+R_2}(2C_1+C_2)$ $T_3 = R_2C_1$	$R_1 = \frac{AT_1}{(T_1+T_3)}$ $R_2 = \frac{AT_3}{(T_1+T_3)}$ $C_1 = \frac{(T_1+T_3)}{A}$ $C_2 = \frac{(T_1+T_3)}{A}\left(\frac{T_2}{T_3}+\frac{T_2}{T_1}-2\right)$