EJEMPLO 1-11 Sea el sistema que aparece en la figura 1-27. Se desea hallar la función de transferencia de lazo cerrado $C(s)/R(s)$ utilizando la fórmula de Mason.

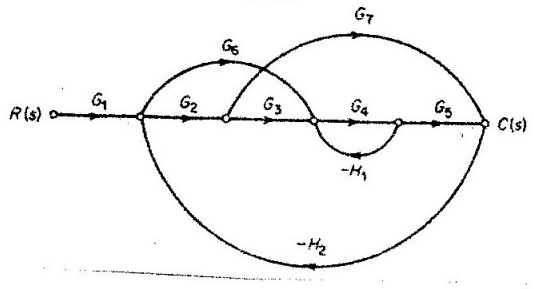

Figura 1-27 Gráfico de flujo de señal de un sistema.

Trayectorias directas:

$P_1 = G_1 G_2 G_3 G_4 G_5$; $P_2 = G_1 G_6 G_4 G_5$; $P_3 = G_1 G_2 G_7$.

Lazos cerrados:

$L_1 = -G_2 G_3 G_4 G_5 H_2$; $L_2 = -G_6 G_4 G_5 H_2$; $L_3 = -G_7 H_2 G_2$

$L_4 = -G_4 H_1$.

$\Delta = 1 - (L_1 + L_2 + L_3 + L_4) + L_3 L_4$ (L_3 y L_4 disjuntas)

$\Delta_1 = 1$; $\Delta_2 = 1$; $\Delta_3 = 1 - L_4$ (la trayectoria P_3 es disjunta respecto L_4).

$\Delta = 1 - L_1 - L_2 - L_3 - L_4 + L_3 L_4$

$$\frac{C(s)}{R(s)} = \frac{1}{\Delta}\left(P_1 \Delta_1 + P_2 \Delta_2 + P_3 \Delta_3\right) = \frac{1}{\Delta}\left[P_1 + P_2 + P_3(1 - L_4)\right] = \frac{C(s)}{R(s)}$$

$$\Delta = 1 + G_2 G_3 G_4 G_5 H_2 + G_4 G_5 G_6 H_2 + G_2 G_7 H_2 + G_4 H_1 + (G_2 G_7 H_2 \cdot G_4 H_1)$$

$$\Delta = 1 + G_2 G_3 G_4 G_5 H_2 + G_4 G_5 G_6 H_2 + G_2 G_7 H_2 + G_4 H_1 + G_2 G_4 G_7 H_1 H_2$$

$$P_1 + P_2 + P_3 - P_3 L_4 = G_1 G_2 G_3 G_4 G_5 + G_1 G_4 G_5 G_6 + G_1 G_2 G_7 + G_1 G_2 G_7 G_4 H_1$$

$$\frac{C(s)}{R(s)} = \frac{G_1 G_2 G_3 G_4 G_5 + G_1 G_4 G_5 G_6 + G_1 G_2 G_7 (1 + G_4 H_1)}{1 + G_4 H_1 + G_2 G_7 H_2 + G_4 G_5 G_6 H_2 + G_2 G_3 G_4 G_5 H_2 + G_2 G_4 G_7 H_1 H_2}$$