Chapter 7, Solution 79.

In the circuit in Fig. 7.143, the switch has been in position 1 for a long time but moves instantaneously to position 2 at $t = 0$. Determine $i_0(t)$.

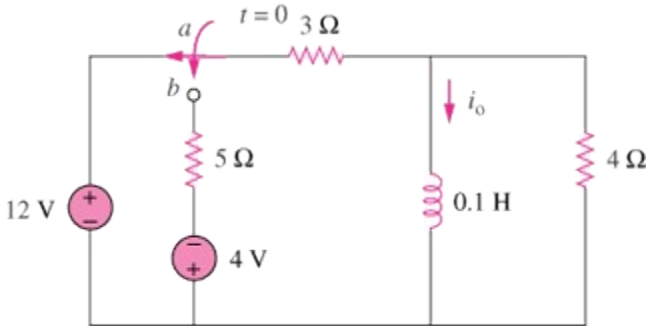

Figure 7.143
For Prob. 7.79.

Solution

When the switch is in position 1, $i_o(0) = 12/3 = 4A$. When the switch is in position 2,

$$i_o(\infty) = -\frac{4}{5+3} = -0.5\,A, \qquad R_{Th} = (3+5)\,//\,4 = 8/3, \qquad \tau = \frac{L}{R_{Th}} = 3/80$$

$$i_o(t) = i_o(\infty) + [i_o(0) - i_o(\infty)]e^{-t/\tau} = \underline{-0.5 + 4.5e^{-80t/3}}\ u(t)A$$