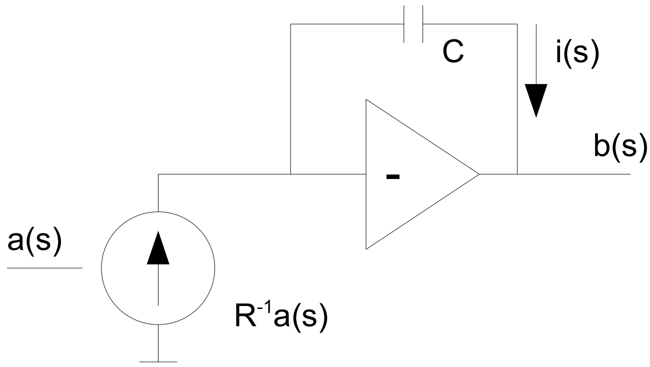
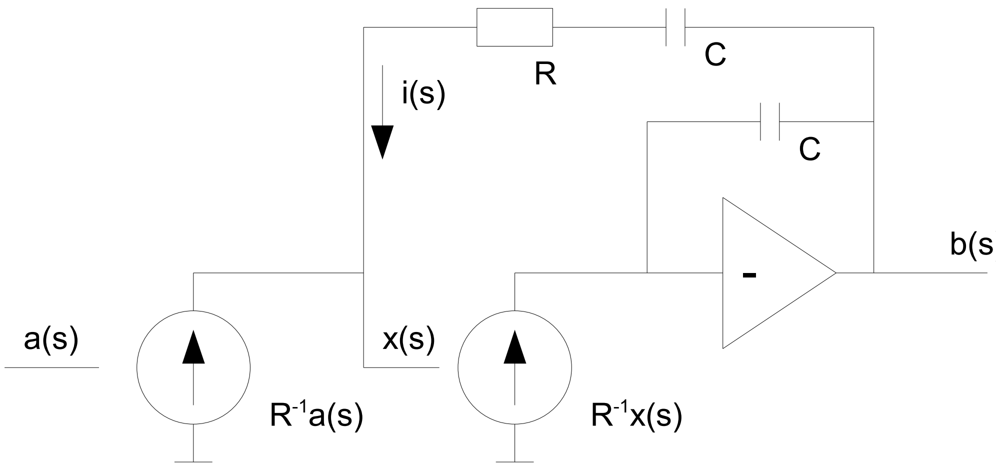
Matthias Baumann, April 2013

Integrator (VAS) with preceeding transconductance stage



$$b(s) = -x_c(s)\,i(s) = -\frac{1}{sC}\,i(s) = -\frac{1}{sRC}\,a(s)$$
$$G(s) = \frac{b(s)}{a(s)} = -\frac{1}{sRC}$$

Additional Miller compensation loop with matched zero



$$b(s) = -\frac{1}{sRC}\,x(s)$$
$$i(s) = \frac{b(s) - x(s)}{R + (sC)^{-1}} = sC\,\frac{b(s)(1 + sRC)}{1 + sRC} = sCb(s)$$

$$a(s) = -Ri(s) = -sRCb(s)$$
$$G(s) = \frac{b(s)}{a(s)} = -\frac{1}{sRC}$$

The new transfer function is of first order, if all elements are perfectly matched. The closed-loop transfer function of the „inner“ loop remains first-order, since the impedance at *x(s)* is theoretically infinity. Thus, the series of *R* and *C* does not influence its *G(s)*. The trick with the voltage divider (see matzes-amp.pdf in post #1) helps to translate that to reality.