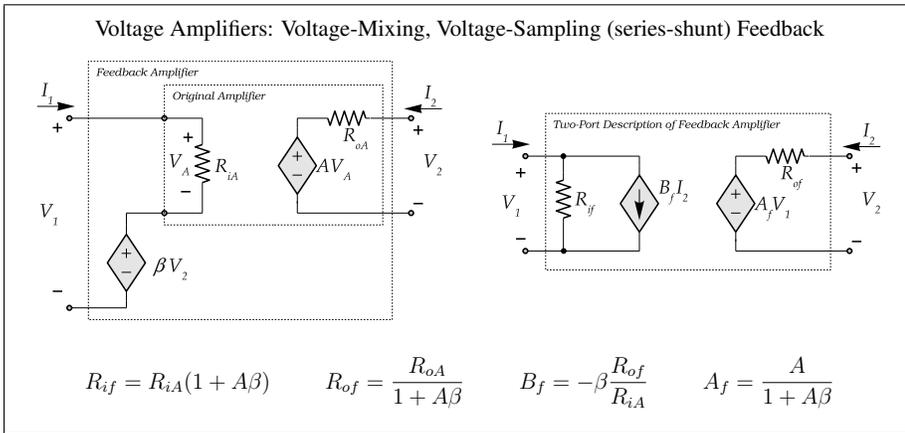
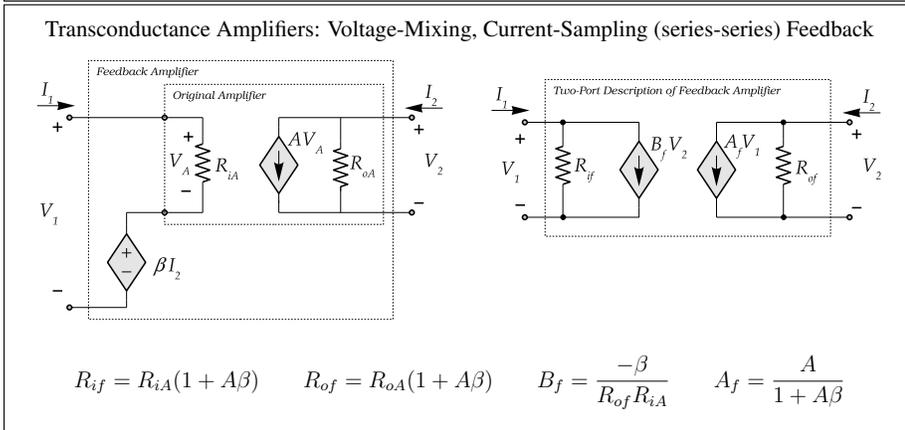


## Two-port Analysis of Feedback Amplifiers



In general (because of the “ $B_f$ ” source), the input resistance of the closed loop system depends upon the external load, and the output resistance of the closed loop system depends upon the driving source resistance. These values are always improved relative to the initial amplifier, but not necessarily to the extent predicted by  $R_{of}$  and  $R_{iA}$ .

If the external load resistance is included as part of the original amplifier (modifying  $A$ ,  $R_{iA}$ , and  $R_{oA}$ ), then the controlled “ $B_f$ ” source will never be active. In this case,  $A_f$  and  $R_{if}$  give the gain and input resistance with the load connected. Be careful trying to use  $R_{of}$ , since  $R_{if}$  and  $A_f$  also change with any change in the external load.



Similarly, if the external driving source resistance is included as part of the original amplifier (modifying  $A$ ,  $R_{iA}$ , and  $R_{oA}$ ), then the controlled “ $B_f$ ” source can be dropped, since the remaining portion of the driving source is ideal. In this case,  $A_f$  and  $R_{oA}$  give the gain and output resistance with the driving source connected. But be careful trying to use  $R_{if}$ , since  $R_{of}$  and  $A_f$  also change with any change in the driving source impedance.

