5.16 CASCADED SYSTEMS

The two-port systems approach is particularly useful for cascaded systems such as that appearing in Fig. 5.69, where A_{v_1}, A_{v_2}, A_{v_3}, and so on, are the voltage gains of each stage *under loaded conditions*. That is, A_{v_1} is determined with the *input impedance to* A_{v_2} *acting as the load on* A_{v_1}. For A_{v_2}, A_{v_1} will determine the signal strength and source impedance at the input to A_{v_2}. The total gain of the system is then determined by the product of the individual gains as follows:

$$A_{v_T} = A_{v_1} \cdot A_{v_2} \cdot A_{v_3} \cdots \tag{5.93}$$

and the total current gain is given by

$$A_{i_T} = -A_{v_T} \frac{Z_{i_1}}{R_L} \tag{5.94}$$