and

$$R'_{\text{out}} = \infty \tag{10–37}$$

The result of (10–37) is based on the assumption of an ideal current source for the $g_m v_{be}$ generator. In practice, there is a large dynamic resistance in parallel with this current source, but it will be approximated as an infinite resistance.

Let R_{in} and R_{out} represent the input and output resistances of the *composite circuit*. We have

$$R_{\text{in}} = \frac{v_i}{i_i} = R_B \| r_\pi = R_1 \| R_2 \| r_\pi \tag{10–38}$$

and

$$R_{\text{out}} = R_C \tag{10–39}$$

The result of (10–38) indicates that the net input resistance of the complete amplifier circuit is simply the parallel combination of the three resistances R_1, R_2, and r_π. Although the transistor output is assumed to be an ideal current source, the result of (10–39) indicates that the output resistance of the composite circuit is the collector resistance R_C. Because of the typical moderate size of R_C, the assumption of (10–37) is usually valid, since the effect of the transistor dynamic resistance on R_{out} will often be insignificant.

The quantities R_{in} and R_{out} are generally the most meaningful of the input and output resistance quantities, since they predict the net effects of the complete circuit. However, when special attention is focused only on the transistor itelf, R'_{in} and R'_{out} are useful.

For this amplifier and other configurations to be discussed in this chapter and in Chapter 11, most of the effects of source and load interactions will be momentarily disregarded until the basic properties of the amplifiers themselves are established. The effects of source and load interactions, as well as combinations of the basic amplifier configurations, are considered in Chapter 12.

Recall the unstabilized common-emitter amplifier of Section 10–2, which was used to qualitatively analyze amplifier operation with a load line. If a small-signal ac circuit were constructed for that circuit, it would have exactly the same form as the stabilized circuit except that R_B in the simpler circuit represents one resistance instead of a parallel combination. This equivalence is due to the fact that the emitter stabilizing resistance R_E is bypassed for signals, and thus the emitter appears at signal ground.

EXAMPLE 10–7 The schematic diagram of a certain *RC*-coupled common-emitter amplifier is shown in Figure 10–12(a). **(a)** Determine the dc operating point current I_C and the three