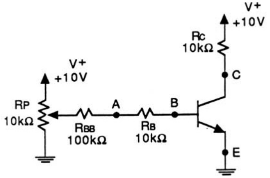
E2.1 Base-Current Bias

Note that the circuit in Fig. 6.3 is *not* a recommended bias design.

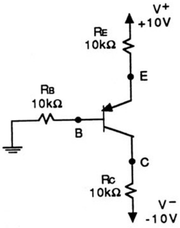


- Connect the circuit as shown in Fig. 6.3, and measure the voltage at node *C*, adjusting potentiometer R_P until V_C = +5 V. Measure the voltages at nodes *A* and *B* with your DVM.

Figure 6.3 A Bad Base-Current-Biasing Circuit

Consider the fact that satisfactory operation of this circuit depends critically on β. As β varies from device to device or with temperature, the voltage V_{CE} will vary greatly, with saturation easily possible for high β.

E3.1 Emitter-Current Biasing

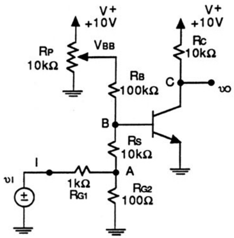


- Connect the circuit as shown in Fig. 6.5, measuring V_B, V_E, V_C and V_{EB} with your DVM. Calculate I_E, I_B, I_C, β, α. Use the direct calculation for α only if R_E and R_B are closely matched or known accurately.
- Lower V^+ to 5 V and repeat all measurements and calculations.

Figure 6.5 A Flexible pnp Biasing Scheme

Consider the obvious dependence of operation of the pnp on emitter current which, for the transistor in the active mode (ie, not saturated), is established by the emitter resistor and the voltage between the base and the emitter supply.

E4.0 The BJT as Amplifier



While the circuit shown in Fig. 6.6 uses a rather bad bias design, being a combination of base-current and base-voltage biasing, it is relatively convenient for the measurement of gain of a particular transistor under stable conditions. Incidentally, the presence of the potentiometer R_P is, generally speaking, a sure sign of less-than-ideal design.

Figure 6.6 A Badly-Biased Amplifier

E4.1 Voltage Gain and Input Resistance

- Connect the circuit as shown in Fig. 6.6, and with υ_i set to zero (or open), adjust R_P so that the dc voltage at *C* is 5 V. Then, with υ_i a sine wave at 1000 Hz, and using your oscilloscope, with external triggering, to measure at nodes *I* and *C*, adjust the input signal amplitude so that υ_c is a sine wave of 1 V peak amplitude. Measure the peak signals at *I*, *A*, and *B*, the latter being quite small.