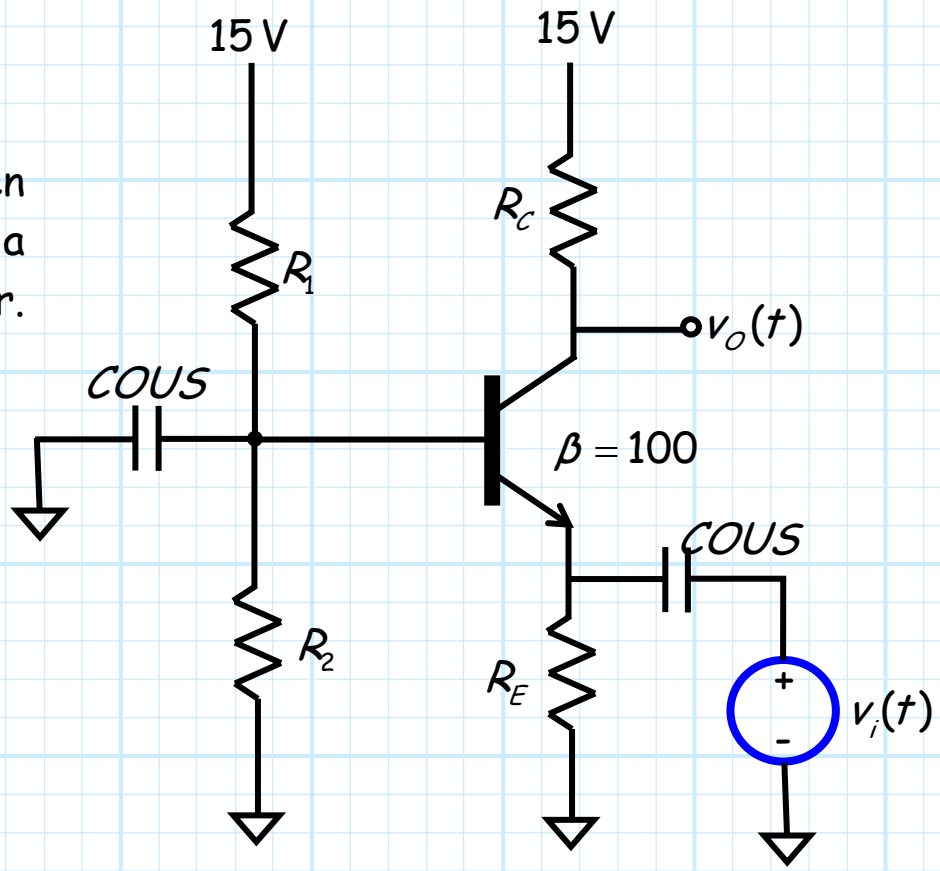
The Common-Base Amplifier

The final amplifier type is the **common-base** amplifier.

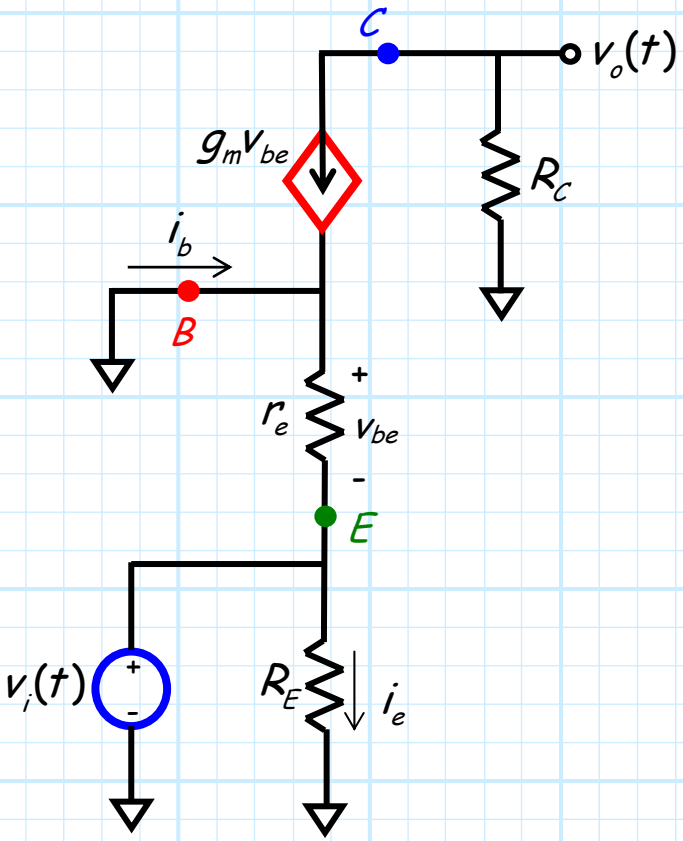
As with the other amplifier types, the name indicates that the **base** terminal is **at small-signal ground**.

For example, a COUS between base and ground make **this** a **common-base** amplifier.



Look at the base terminal

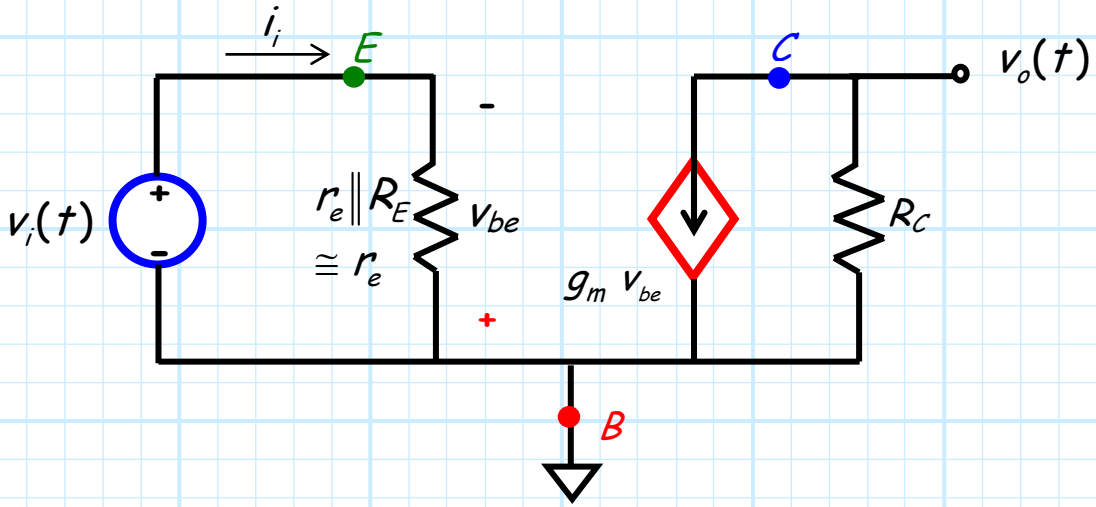
The **small-signal circuit** of this common-base amplifier is most easily analyzed using the **T-model**.



Clearly, the **base** is connected to **small-signal ground**!

The input resistance: very interesting

Rearranging this circuit:



The interesting feature of this amplifier is its **input** and **output** resistances.

It is apparent from the small-signal circuit that the **input resistance** is:

$$R_{in} = r_e \| R_E \cong r_e$$

And the output resistance is:

$$R_{out} = R_C$$

It's so darn small!

Recall that the **small-signal emitter resistance**:

$$r_e = \frac{V_T}{I_e}$$

is typically **very small**.

For **example**, if $I_e = 10\ mA$, then $r_e = 2.5\Omega$!

Therefore, since the input resistance R_{in} of this common-base amplifier is equal to the small-signal emitter resistance r_e, the **input resistance** of this **common-base** amplifier is likewise **very small**!

Recall the ideal current amplifier

Q: *A **small** input resistance!? I thought a **large** input resistance is **ideal**.*

A: Are **large** input resistance **is** desirable for an ideal **voltage** amplifier.

However, recall that a **small** input resistance is desirable for the ideal **current** amplifier!

Thus, common-base amplifiers are very useful as an **input stage** in a **current amplifier**.