DCircuits2.

DCircuits2 is an application that may be used to determine the base resistance of transistor switch digital circuits, i.e. the base resistance for which a given load current will flow. The program has 2 operating modes:

1. Calculating the base resistance of a given circuit.

A data entry form is used to choose the number of transistors (1, 2 or 3) and to fill in battery voltage, load or load current and the characteristics of the transistor(s). The program then calculates collector and base current(s) and the base resistance(s) for which the load current you entered will flow.

2. Generating transistor switch exercises.

The program chooses random values for battery voltage, load current and transistor's current gain. It's up to the user to calculate the base resistance for which the load current given by the program will flow through the circuit.

Menu "Circuit".

"New calculation".

Start a new base resistance calculation for a 1, 2, or 3 transistor circuit, with battery voltage, load and current gain values chosen by the user.

"New test".

Start a new 1, 2, or 3 transistor circuit exercise. Voltage, load and current gain are randomly generated by the program; the user has to calculated collector and base current and the value of the base resistance for which the given load current will flow.

"Exit".

Exit the application.

Menu "Settings".

"Number of transistors".

The number of transistor switches in the circuit (1, 2 or 3). This setting is for exercise mode only; in calculation mode, the number of transistors is chosen on the data entry form.

"Use all identical transistors".

All transistors will be the same material and have the same current gain value. In calculation mode, transistor characteristics are chosen on the data entry form.

<u>"Ignore base-emitter voltage".</u>

Consider base-emitter voltage being 0V. If this option is unchecked, V_{BE} must be subtracted from the battery voltage when calculating the base resistance (see "Transistor switches" in the "Help" menu for further information).

<u>"Use standard resistor values".</u>

Instead of using the exact resistance value calculated, use the nearest value of standard resistors as sold by manufacturers. In exercise mode, use the "Standard resistors" table in the "Help" menu to find the resistance value to enter instead of the one you calculated.

<u>"Check resistances only".</u>

You do not need to fill in the current values when doing the exercises.

<u>Menu "Help".</u>

<u>"Transistor switches".</u>

Brief description of transistors, transistor switch circuits and the way how to calculate the base resistance.

<u>"Standard resistors".</u>

Table with the resistance values of standard resistors.

<u>"Program help"</u>

This help text.

<u>"Program about".</u>

Brief information about the DCircuits2 program.

<u>Important notes.</u>

1. All values returned by calculation as well as those to be entered by the user in exercise mode have to be specified in mA for currents and kΩ for resistances. Program values are rounded up to 3 decimal digits, thus to avoid "false answer" messages, do the same for the current and resistance values you enter in exercise mode.

2. If a resistance value falls exactly in the middle of a standard resistors interval, the program chooses the lower value of this interval; thus, if R = 6.5kΩ, the answer awaited from the program is 6.2kΩ (and not 6.8kΩ).