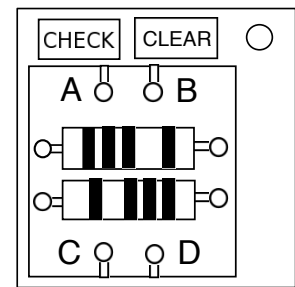


## On the Subject of Resistors

*"It is easier to resist at the beginning than at the end."*

– Leonardo da Vinci, on procrastination

The module contains 2 input pins (**A** and **B**), 2 resistors, and 2 output pins (**C** and **D**). Follow the rules to make the correct connections. To make a connection, click one pin and then another. Press **CLEAR** to remove all connections.



1. Take the first digit of the bomb's serial number (or 0 if there are no digits).  
The *primary input* is **A** if even, **B** if odd.

2. Take the last digit of the bomb's serial number (or 0 if there are no digits).  
The *primary output* is **C** if even, **D** if odd.

3. The *target resistance* in  $\Omega$  is calculated as follows:

1. Take the first two digits of the bomb's serial number.

e.g. 2E7X19 → 27, ZJ3MLN → 3, ABCDEF → 0

2. For each battery present on the bomb (up to a max of 6), multiply by 10.

4. Connect the primary input to the primary output, with the target resistance.

5. If a lit **FRK** indicator is present, also connect the primary input to the other (secondary) output, with the target resistance. (*If this applies, the two outputs can be connected with any resistance.*)

6. If step 5 did not apply and at least 1 *D cell battery* is present, connect the secondary input to the secondary output, with  $0\Omega$  resistance.

7. Press **CHECK** when finished to check the solution. All input/output pairs not mentioned should be disconnected.

Consult the following page to learn how to produce the target resistance.

## Producing resistance

An input and output can be connected via one of five paths.

1. **No resistors**,  $0\Omega$  of resistance.

2. **Top resistor**.

3. **Bottom resistor**.

4. **Both resistors in serial**.

i.e. input  $\rightarrow$  top resistor  $\rightarrow$  bottom resistor  $\rightarrow$  output

The combined resistance is the sum of the individual resistances.

5. **Both resistors in parallel**.

i.e. input  $\rightarrow$  top resistor, input  $\rightarrow$  bottom resistor,

top resistor  $\rightarrow$  output, bottom resistor  $\rightarrow$  output

The combined resistance is less than either of the individual resistances.

*For the curious... it's:  $1 / (1 / (\text{top resistance}) + 1 / (\text{bottom resistance}))$*

*Don't worry, this won't be on the test!*

## Reading resistors

Each resistor has a sequence of three colored bands, indicating a two-digit number and a multiplier. A fourth band indicates a tolerance value (not used).

The fourth band is separated by a gap from the first three. Resistors can be rotated; take care to read the bands in the correct direction.

Color	First Band	Second Band	Multiplier
Black	0	0	$1\Omega$
Brown	1	1	$10\Omega$
Red	2	2	$100\Omega$
Orange	3	3	$1,000\Omega$
Yellow	4	4	$10,000\Omega$
Green	5	5	$100,000\Omega$
Blue	6	6	$1,000,000\Omega$
Violet	7	7	$10,000,000\Omega$
Gray	8	8	—
White	9	9	—
Gold	—	—	$0.1\Omega$
Silver	—	—	$0.01\Omega$

For example, **Green Violet Yellow** indicates  $57 \times 10,000\Omega = 570,000\Omega$ .