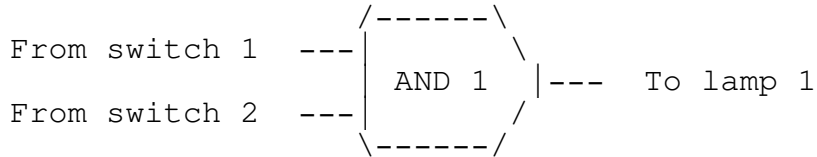Logic Simulator Example 1 : A Two Input AND Gate

In this first example we are going to wire-up an AND gate to two
switches with the output shown on a lamp:


```
                         /------\
   From switch 1  ---|        \
                        |  AND 1  |---  To lamp 1
   From switch 2  ---|        /
                         \------/
```


We must decide which device number to use (there are many devices
of the 2-input AND gate type available on the simulated board).
For the current example we will choose to use device number 1.

Also we must decide which switches to use as inputs to the
system, in this case we will use switches 1 and 2 to provide the
inputs to the AND gate. The output will be shown on lamp number
1.

To enter the logic board simulator type

LOGIC

and press the RETURN key.

After the start-up screen containing the copyright message, a
second screen which includes some boxes should appear.

To make the appropriate connections to the AND gate shown above,
we must inform the computer as to which inputs must be connected
to which outputs. For example, the first connection we might wish
to make is from:

      2-input AND gate number 1, input 1
      to the output from switch number 1.

We will see how this can be entered.

To begin making connections press the E key.

The 'editing' screen appears with a choice of device from which
to connect. The 2-input AND gate is the second choice down so
press the downward arrow key to move the highlighted choice to
it and then select this by pressing the RETURN key.

Another column should appear, these being the number of the
device. We want to choose device number 1 which is already
highlighted, so just press RETURN.

The third column of choices is to select which actual input to
use. We want the first input 'input-1' and so just press RETURN.

We now need to specify where to make the connection to. The device type is a 'switch', so move the highlight bar down by pressing the arrow keys until the 'switch' entry is highlighted and select this by pressing RETURN.

The device number of the 'switch' is 1, so just press RETURN.

The computer accepts the connection and clears the editing screen ready for the next connection.

Make the following connections:

        2-input AND number 1, input-2 to switch number 2.
        Lamp number 1 to 2-input AND number 1.

Then press the ESC key to get back to the main screen from the editing screen.

The connections have been made to wire up the AND gate. To see the gate working, we must use the switches numbered 1 and 2, and observe lamp number 1.

The square simulating lamp 1 at the top right of the screen should not be glowing, showing the lamp to be in a 'low' state.

Pressing the '1' key will toggle the output from switch 1. Try this and you should see the indicator for switch 1 glow. Pressing key 1 again turns the switch output back to 'low'.

Only when you have pressed keys 1 and 2 to set switches 1 and 2 to be a 'high' should indicator for lamp 1 glow. In fact, you should be able to verify the truth table for the AND gate:

Switch 1	Switch 2	Lamp 1
Low	Low	Low
Low	High	Low
High	Low	Low
High	High	High

To see the device on the screen we can show a diagram in one of the 8 boxes on the main screen. Showing devices can be useful in tracing any errors that have occurred, but is not required to allow the circuit to function.

To install a diagram into one of the boxes , we can press the V key (for Views) from the main screen. In the Views screen we have to choose between blanking (erasing) a view, or changing a view.

To add a view of a device into a box, we need the change option,
so press C. You are asked which box to change. The boxes appear
on the main screen in the order:

         1   2   3   4

         5   6   7   8

So to fill box number 1 with a diagram of 2-input AND device
number 1, follow these instructions.

Use the arrow keys to highlight choice '1'.
Press the RETURN key.
Use the arrow keys to highlight choice '2-input AND'
Press the RETURN key.
Use the arrow keys to highlight choice '1'
Press the RETURN key.

Press the ESC key to stop placing furhter diagrams on the screen.

You will see a picture of 2-input AND gate number 1 in box 2 on
the main screen.

Now as you change the switches, the lamp and switch indicators
should change as before, but the inputs and outputs of the AND
gate shown in box number 1 should also change.

To copy the circuit connection details and diagrams to a computer
file, press S (for save). You should then type in a filename in
this case:
          AND.LOG

and press the RETURN key. The filename should always have the
form XXXXXXXX.LOG, where the XXXXXXXX can be any letters you
choose, up to 8 of them.

Any logic board filenames that have already been used are listed.

The current connections and diagram views of the logic board are
recorded, and can be reinstated later by using the L (Load)
option and typing in the appropriate file name ('AND.LOG' in this
case).

To see what connections have been made, press the D (for display)
key and then press I to show the connections sorted out by input
device.

When you have viewed these, press any key to get back to the main
screen. You could have sent the connection list to the printer
instead by pressing P, but please make sure that the printer is
switched on and available first.

To get out of the simulation, press the Q (for Quit) key.

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