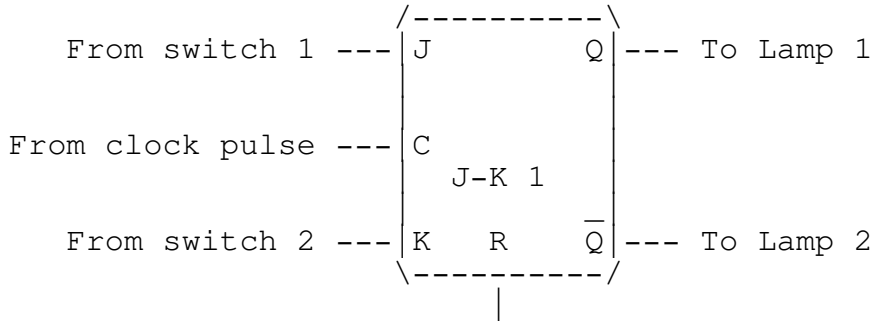


## Logic Simulator Example 2 : A J-K Flip Flop

In our second example circuit we are going to wire-up a J-K flip flop to two switches and a clock pulse, with the outputs shown on two lamps:



As before, after deciding which J-K flip flop to use and which lamps and switches to connect it to, we can proceed to enter the circuit into the simulator.

Again, to enter the logic board simulator type

LOGIC

When the main screen appears, we can press the E key to begin making the connections.

The use of the editing screen is as before, and the connections we need to make are:

```
J-K flip flop number 1, J-input to Switch number 1
J-K flip flop number 1, K-input to Switch number 2
J-K flip flop number 1, C-input to Clock
Lamp number 1 to J-K flip flop number 1, q-output
Lamp number 2 to J-K flip flop number 1, qbar-output
```

Then press the ESC key to end the wiring-up stage and return to the main screen.

As we are not going to connect the reset input of the flip flop, the above five connections are all that are required.

To show the device in box one, press the V key (for Views). Then press C to invoke the change option.

Choose box 1, device J-K flip flop, number 1

Press the ESC key to stop putting further diagrams on the screen.

Press keys '1' and '2' to set switches 1 and 2 to 'high' (so that they glow on the screen) and then press the C key. The C key makes the clock output line go from 'low' to 'high' and back to 'low'.



If the circuit is correctly connected, the both lamps 1 and 2 should change state (from 'high' to 'low' or visa versa). If this works, try to verify that the J-K flip flop follows the following actions by setting the switches and pressing the C key.

Switch 1 (J)	Switch 2 (K)	Lamp 1 (Q)	Lamp 2 (Qbar)
Low	Low	No change from before	
Low	High	High	Low
High	Low	Low	High
High	High	Change over (toggle)	

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:

JK.LOG

and press the RETURN key.

As with example 1, if you want to, you can view the connections by pressing the D key and then press I to show them sorted out by input device type.

From the main screen you can test the completeness of the connections by pressing the T (for Test) key. This examines each device to which you have made a connection. The device is then checked to ensure that all the other inputs have been connected to something, and that the output is used by another device. A list of unused connections is then shown.

Try pressing T now.

You should get a message that the reset input of J-K flip flop has not been connected to anything. In this case we did not want to connect it, but the testing facility is useful in fault finding.

You should note, however, that testing in this manner will not pick up every forgotten connection as :

- it only checks that AT LEAST ONE connection is made to an output, there perhaps should have been five.
- connection of an input to the wrong output would appear OK.

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



