

ASSIGNMENT 2a: Identify Mystery 74HCxxx chips
due Wed Sept 25 at start of class.

Synopsis. You are given two chips from the 74HCxxx series. Without destroying them in the process, identify them.

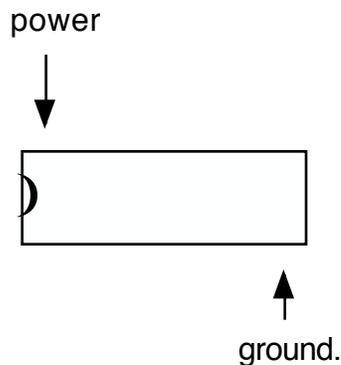
Process. The method is more important than the result. In other words, you must document your thought process and experimental method—the way that you go about finding the solutions. You must turn in a detailed description of the steps you take with each chip that led you to your conclusion.

About one full page of single-spaced, printed output is expected (per chip).

Just turning in the answer, e.g., “The 14-pin chip is the 74HC00” is not acceptable. (Note: this isn’t the correct answer, so you’ve just had one possibility eliminated.)

Method. It is important to avoid burning out the chip during testing. This means you must not wire chip outputs to power or ground. So you must first determine which pins are input and which are output.

First of all, make sure you wire the chip to power and ground properly. Holding the chip like this:



The +5v power pin is on the upper left, and the ground pin is on the lower right.

To determine if a given pin is an input pin, wire the pin to +5v **using a 1k resistor**. Then, measure the signal at the pin using your logic probe. If it’s an input, it should be high. Now, connect the pin to ground with the resistor. Measure it again. If it’s now low, then it is an input. **If the pin ever disagrees with the value you’re asserting with the resistor, then it is an output.**

Go around all of the pins and determine which are input and which are output. Once you know a pin is an input, you may wire it high or low with a wire (the resistor isn’t needed). **But be sure to not wire outputs to +5 or ground with a wire!** If the output is trying to generate a signal other the one you’ve wired, the chip will get hot and may burn up.

Connect the outputs to your LED indicators. Now vary the inputs, and figure out what the chip is doing. You may want so systematically record all possible inputs and what outputs are generated, or explore and try to figure it out differently.

Hints. The two chips (one 14-pin, one 16-pin) are both members of the 74HCxx or 74HCxxx series. Both are pure combinational logic—outputs are directly a function of inputs, with no internal state (no flip-flops or latches).