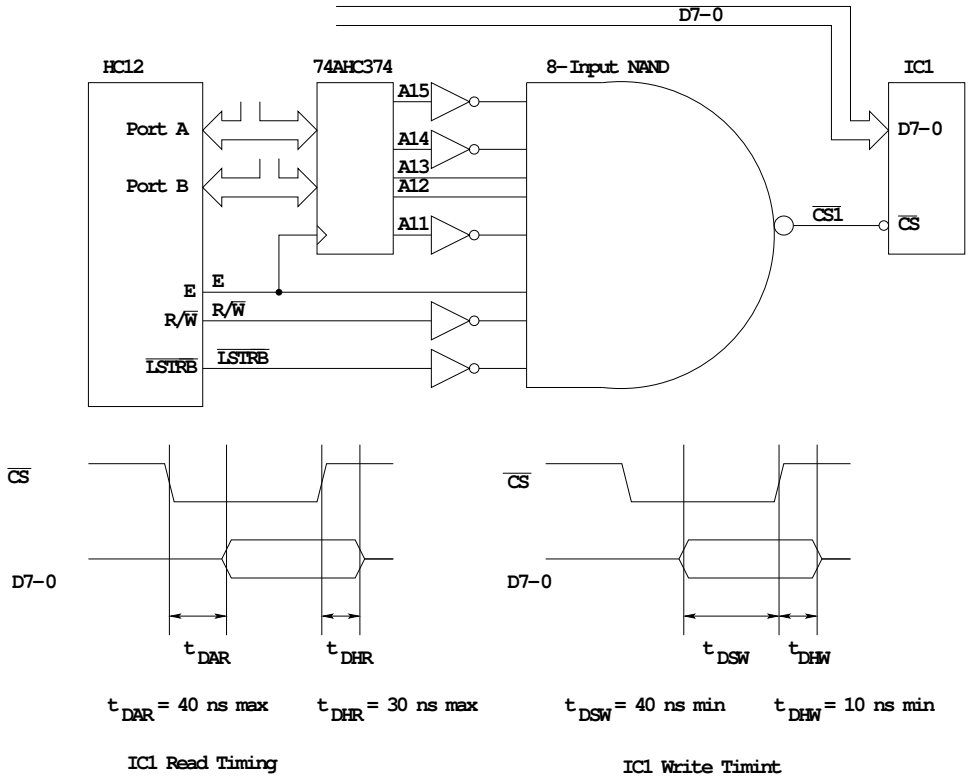
EE 308

Homework 12

Due April 18, 2005

1. The figure below shows a peripheral chip connected to an HC12 using some standard CMOS logic chips. For this problem assume that the propagation delay through each CMOS logic chip is 10 ns.



(a) Will IC1 be an input device or an output device? Explain

(b) Should the data lines of IC1 be connected to Port A or Port B on the HC12? Explain.

(c) For what range of addresses will IC1 be selected?

(d) Sketch the signals on the E, R/$\overline{W}$, $\overline{\text{LSTRB}}$, $\overline{\text{CS1}}$ and D7 − 0 lines for the following actions:

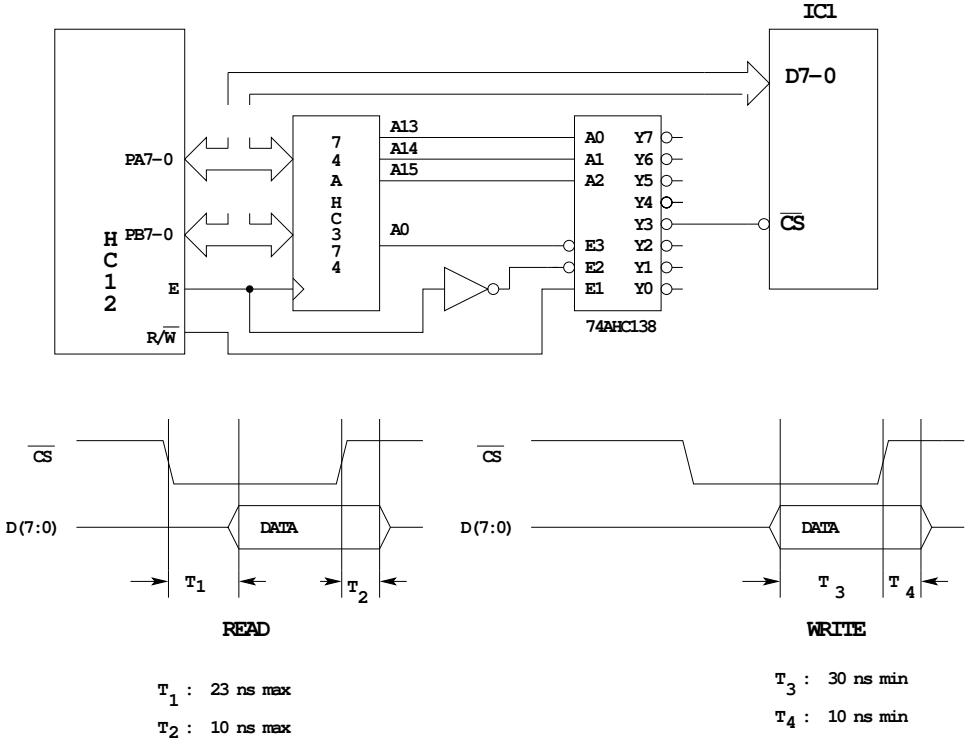
- If IC1 is an input device, the HC12 reads from IC1, and IC1 returns an 0x55.
- If IC1 is an output device, the HC12 writes an 0xAA to IC1.

Note: Only do one of these, based on your answer to Part (a) above.

(e) Will the circuit shown work reliably with an HC12 running with an 8 MHz E-clock, and no E-clock stretches? Explain.

(f) Will the circuit shown work reliably with an HC12 running with an 8 MHz E-clock, and one E-clock stretch? Explain.

2. An engineer drew a quick sketch of an IC interfaced to the HC12. She accidently spilled some coffee on the sketch, and some details were lost. On the same piece of paper she drew the timing diagram for an input IC and and output IC. but forgot to label which diagram corresponds to IC1 interfaced to the HC12. The figure below shows her sketch:



(a) Is IC1 an input or an output port? Explain.

(b) Should the data lines of IC1 be connected to the Port A or the Port B pins? Explain.

(c) For what range of addresses will IC1 be selected? Explain.

(d) If IC1 is an input port, write some C code to read a byte of data from IC1 and save it in a variable called `data`. If IC1 is an output port, write some C code to write a 0x55 to IC1.

(e) Is the timing of IC1 compatible with an HC12 with an 8 MHz E-clock, and no E-clock stretches? Explain. (Assume the propogation delays through each glue logic chip is 10 ns.)

(f) Is the timing of IC1 compatible with an HC12 with an 8 MHz E-clock, and one E-clock stretch? Explain.