

EE 308
Homework 11
Due April 8, 2002

For this homework you will be determining times for various things to happen in expanded mode. To do this, you will need to refer to the timing specifications for the HC12, which can be found on pages 478-479 of your Motorola M68HC12B Family Manual. (Use the 8 MHz timing column.) You will also need the timing of the RAM chip, which can be found on pages 5-7 of the IDT 71016 data sheet, which can be downloaded from the location you got this homework assignment. Note that we are using the 12 ns version of the chip. (Use the Read Cycle No. 2 and Write Cycle No. 2 figures.) Also, we are using a 12 ns Altera chip, so assume all delays through the Altera chip are 12 ns.

1. Find the length of time E is high.
2. Find the length of time E is low.
3. Find the read/write delay time - the length of time from E going low to R/W going low on a write cycle.
4. Find the address delay time - the length of time from E going low to a new address on AD15-0.
5. Find the address latch time in the Altera chip - The length of time from E going high until a new address appears on A15-0.
6. Find the length of time OEn, WEn, and CEn will be low.
7. Find the length of time from E going high to CEn going low.
8. Find the length of time from E going low to CEn going high.
9. Find the address hold time - the time from E going high to AD15-0 changing from address mode to data mode.
10. Find the HC12 data hold time - the time from E going low to AD15-0 changing from data to address mode during a write cycle.
11. Find the RAM access time - the time from CEn going low the the RAM chip puts data on the data bus on a read cycle.
12. Find the RAM data hold time - the time from CEn going high to the RAM chip releasing the data bus.