W04 Feb 05 (D3) Music box: ASMD chart design

Jose Ferreira

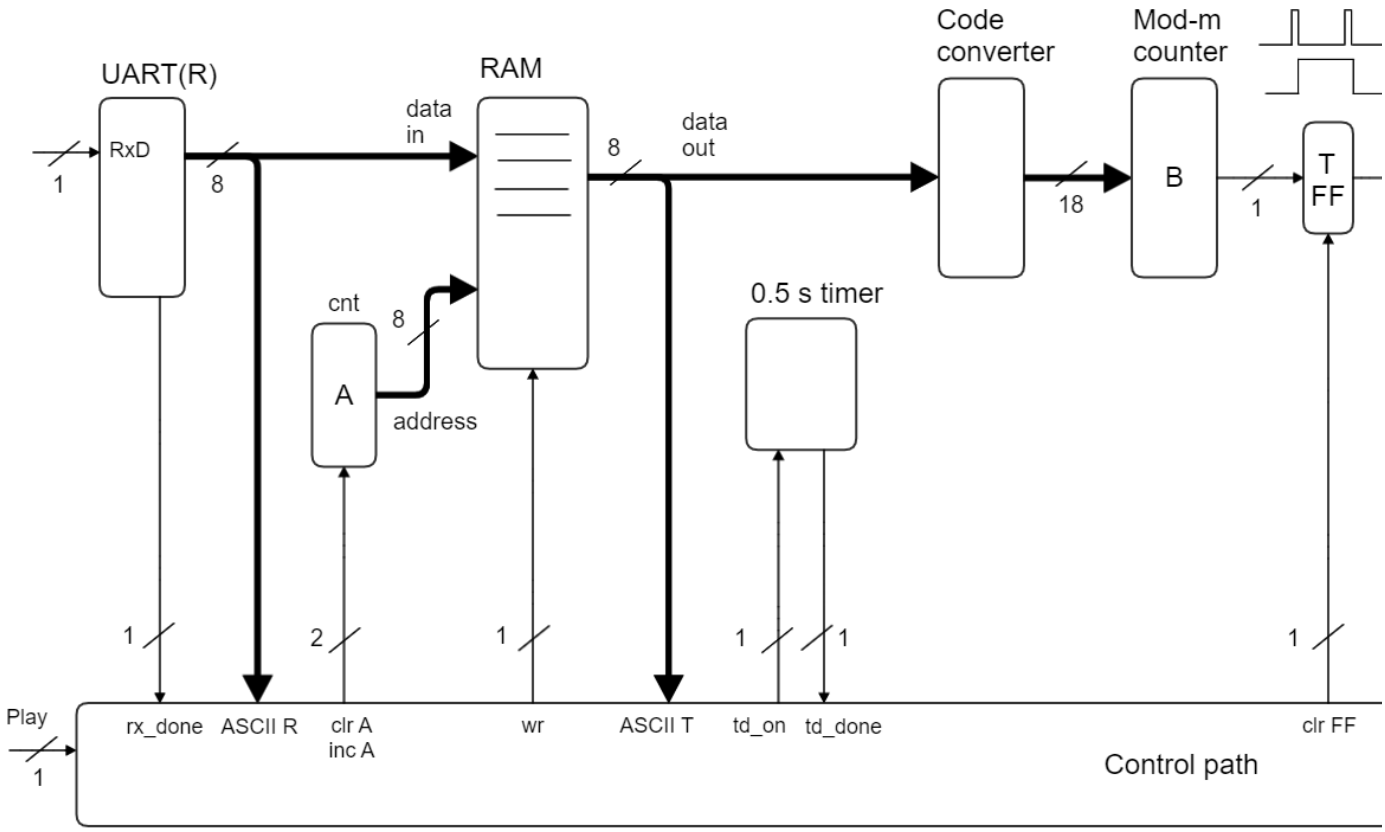
All Sections

These questions are presented under the following assumptions:

- They may be selected to be part of the final exam
- Responses must be posted by the students (not me)
- I will call your attention to any mistakes or wrong content posted in response

Consider a sequence of ASCII codes representing musical notes to be stored in a RAM with the objective of driving a loudspeaker with a square wave of appropriate frequency for octaves 4 and 5. The UART, the RAM block, and the programmable waveform generator, are all part of the datapath of the FSMD represented below. The behaviour of the circuit may be described as follows:

- A tune is initially downloaded via RS-232C and stored into the RAM (you may use ASCII codes of your choice to mark the beginning and the end of the tune)
- After a tune has been downloaded, the output will remain at logic ‘0’ (muted) until a rising edge is detected in the “Play” input
- Once the ”Play” input is activated, the square wave output starts with a frequency defined by the content of the first memory position
- After 0.5 sec. the frequency of the square wave changes to the value defined by the second memory position
- The process repeats itself up to the last code (the ASCII code chosen to mark the end of the tune), and the output will revert to logic ‘0’ afterwards



1. Present an ASMD chart that represents the behaviour of this FSMD while receiving ASCII codes via RS-232C.
2. Present the remaining part of the ASMD chart, representing the behaviour of the FSMD while playing a tune stored in RAM.