EE / CprE / SE 491 – sdmay26-12
ABC with Modern Components
Report 7

11/05/2025 – 11/11/2025
Client: Alexander Stoytchev
Faculty Advisor: Alexander Stoytchev

Team Members:

Gavin Bunker — *Technical Manual Lead*
Ryan McFadden — *Client Liaison, Recorder*
Samuel Schroeder — *Team Leader*
Vance Arnold — *Team Facilitator, Purchasing*
Bryan York — *PCB Lead*
Kyle Koch — *VHDL Lead*

Summary

During this reporting period, we continued work on all of the different modules from the previous reporting period. This included creating schematics and updated designs for the decimal output module, creating a prototype and schematic of the binary conversion drum, and continuing work on the VHDL clock. We also made progress on the full VHDL simulation of our recreation by simulating the different input cards. Finally, we began work on designing the control mechanisms for the ABC and on assembling the PCBs for the add/subtract module.

Past Week Accomplishments

- Bryan
  - Found components that could be used for Seven Segment Selector and Seven Segment Displays (SSS & SSD)
  - Created Schematics for both SSS & SSD in KiCAD to show how to route selected components together.
  - Breadboarded prototype for the SSD with working up and down counters
- Samuel
  - Continued designing the decimal output module.
    - Updated the design to include the SSS, which selectively enables individual SSDs
    - Explored potential designs that are simpler to implement or require fewer components, but are still historically accurate.
  - Used Berry's manual for the ABC and the available diagrams from the ISU archive to reverse engineer the functionality of the different control boxes for which we do not have the design figures.
  - Started updating the system design diagram to include all control signals, so that we can start creating the control table for our replica.
- Kyle
  - Spent the time to learn how to solder from Gavin, and then, using that information, soldered one of the add/sub modules. Only had the parts for the resistors and capacitors, though, so will do the other components when they come in
  - Spent some time this week with Vance researching and developing a plan for

implementing punch cards in VHDL to test the entire unit going forward.

- Vance
  - Researched and reviewed different methods of using binary/decimal punchcard inputs to VHDL simulation.
  - Looked into tri-state buffer design for VHDL simulation.
  - Researched SPDT switches for testing physical circuit modules, with plans to order.
  - Compiled next part order for ETG.
- Ryan
  - Generated the binary file we will need for our decimal to binary conversion drum and programmed an EEPROM chip with the binary file
  - Created a breadboard test bench for the binary conversion drum and successfully tested it (EEPROM stores the correct values we desire for each address)
  - Created a full schematic for the binary conversion drum
  - Created a first draft of the PCB layout for the binary conversion drum and discussed with Bryan the best path forward for an effective and aesthetically pleasing PCB design
- Gavin
  - Soldered passive components onto an Add/Sub module PCB
  - Continued generation and troubleshooting of the clock modules VHDL files
  - Assembled Add/Sub module onto a breadboard for testing and proof of functionality

Pending Issues

- We are waiting for chip sockets to arrive so that we can finish assembling the add/subtract PCBs

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Gavin Bunker	Soldering board, work on Clock VHDL and troubleshooting	8	51
Ryan McFadden	Binary conversion drum work (EEPROM programming, creating test bench and testing, completed schematic, created first draft of PCB design)	10	47
Samuel Schroeder	Decimal output and control/timing module design.	6	58
Vance Arnold	Research into card input and tri-state buffer designs for VHDL. Continued parts management and ordering.	4	45
Bryan York	Did initial designing and prototyping of the Seven seven-segment display and Selector.	12	65
Kyle Koch	Solder and VHDL design and work for punch cards	5	40

Plans for the Coming Week

- Review components for SSS & SSD and begin revising the layout of PCB modules
- Select a final design for the decimal output module
- Create a second draft of the binary conversion drum PCB
- Create an inventory of control signals, operations, and the control signals needed by each operation

- Finish assembling the add/subtract PCBs (once we get the parts)
- Continue working on the VHDL simulation of the clock and other components