

Tutorial 3 – ALU and CU Design

1. Review FF, Multiplexer and Adder design and functionality

2. Design an ALU with 3-bit commands and operations:

0: NOP

1: $\text{Accu} = -\text{Accu}$

2: $\text{Accu} = \text{Accu} + \text{data}$

3: $\text{Accu} = \text{Accu} - \text{data}$

4: $\text{Accu} = \text{Accu} * \text{data}$

5: $\text{Accu} = \text{data}$

6: don't care

7: don't care

3. Build a CU which advances the program counter by 2 in every step.

4. Build a CU which allows:

- Increment PC by 1
- Jump to address from the Address register
- Store PC contents for a subroutine call
- Return to (stored address + 1) for return from subroutine

5. Review Functionality of CPU4.

- Write a machine program to multiply two numbers by repeated addition.
- The two operands are in memory cells 0xFD and 0xFE
- Store the result in memory cell 0xFF