

High Level

Variables

- activeADC = keeps track of which channel is currently active
- POT = value of potentiometer
- ADCin = value of guitar line in
- Counter = 0 = keeps track of number of ADC conversions since last potentiometer

Setup ADC

- Use AVCC as reference voltage -> Write 1 to ADMUX.REFS
- Left aligned for 8 bit resolution: write 1 to ADMUX.ADLAR
- Prescaler = 128 for 16 MHz clock
 - ADC operates from 50 KHz to 200 KHz to get maximum resolution
 - $16 \text{ MHz} / 128 = 125 \text{ KHz}$ ADC frequency
 - Write 0x111 to ADCSRA.ADPS
- Initialize ADMUX.MUX to channel 0 (pin ADC0)
 - This will change periodically to channel 1 in order to read the potentiometer.
- **IF FREE RUNNING MODE:**
 - Enable ADC conversion complete interrupt.
 - Set ADCSRA.ADIF to 1.
 - Enable auto trigger.
 - Write 1 to ADCSRA.ADFR
- Enable ADC.
 - Set power reduction ADC bit (PRR.PRADC) to 0
 - Write 1 to ADCSR.ADFR.
 - Note: Takes 25 ADC clock cycles to initialize first conversion. After that, further conversions take 13 ADC clock cycles (13.5 for auto triggered conversions).
- Enable global interrupts.
- Start a single conversion.
 - Set start conversion bit to 1 in ADCSRA.ADFR.

Change Channels Function

- If ADMUX.MUX = 0 (ADC0 currently active)
 - Set ADMUX.MUX to 1.
- If ADMUX.MUX = 1
 - Set ADMUX.MUX to 0.

Interrupt Service: ADC Complete

- **POTENTIOMETER LOGIC:** If counter = n (n to be found experimentally)
 - Read ADCH into POT. Leave ADCin unchanged.
 - Call change channels function again.
 - Reset counter = 0.
- Map upper and lower thresholds based on potentiometer value.
- Map input values to amplified equivalents.
- If (ADC value \geq upper threshold)

- Set output value = upper threshold
- If (ADC value <= lower threshold)
 - Set output value = lower threshold
- **POTENTIOMETER LOGIC:** If (++counter=n)
 - **Call change channels function** so next ADC interrupt will be for channel 1.
- Increment counter.
- Start manual conversion. (unless in free running mode)

<https://onlinedocs.microchip.com/pr/GUID-F670183D-C025-46C7-B7F5-9BAD389BF43F-en-US-3/index.html?GUID-36865EC3-4E82-41FA-B7DA-58E36435CDE9>