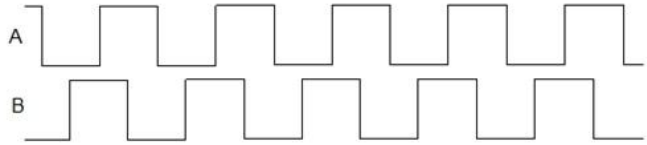
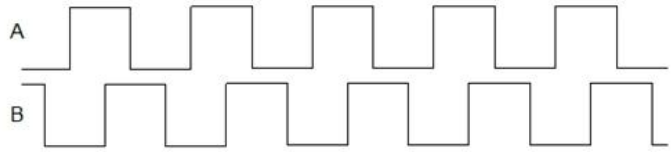
Rotary Encoder Interface

Incremental rotary encoders are used in most modern radios for tuning and volume control. Same with the new car radios, the dial keeps spinning without any stops as found in older equipment.

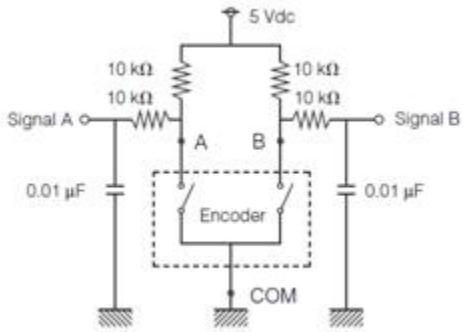
The rotary control will have two outputs, typically called 'A' and 'B'. Outputs A and B are not in phase when the dial is turned. For clock-wise direction turn, one channel will be ahead of the other.



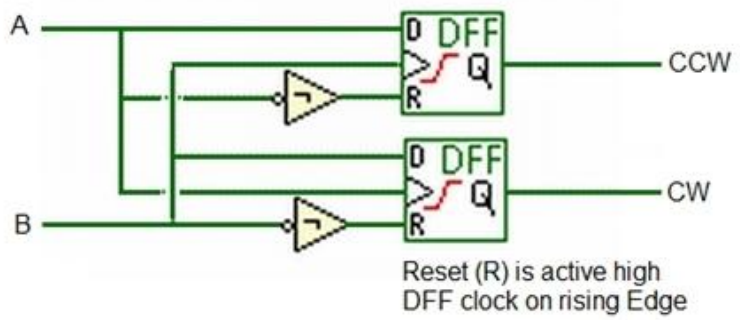
And the opposite is true when turned in the counter clock-wise direction



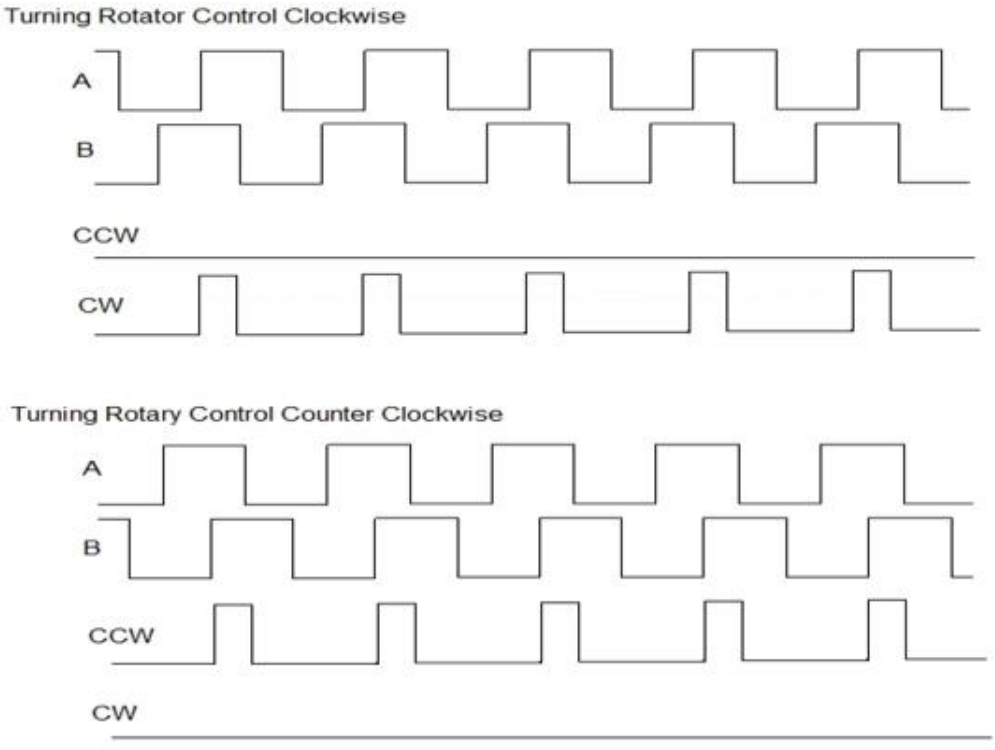
If the incremental rotary controller has mechanical contacts, then switch bounce filtering will have to be used. Below is recommended by Panasonic for their mechanical encoders.



To interface with microcontrollers, signals A and B can be fed right into the microcontroller discrete inputs, preferably ones with interrupt mapping. Also, these signals can be directly fed into FPGA (Field Programmable Gate Array) and CPLD (Complex Programmable Logic Device). Simple D registers with reset input (active high for this illustration) can be used to determine which direction the control is being rotated.



The circuit above will yield the following waveforms (input waveforms included)



Using a fixed clock timebase, rate of rotation can be estimated.

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