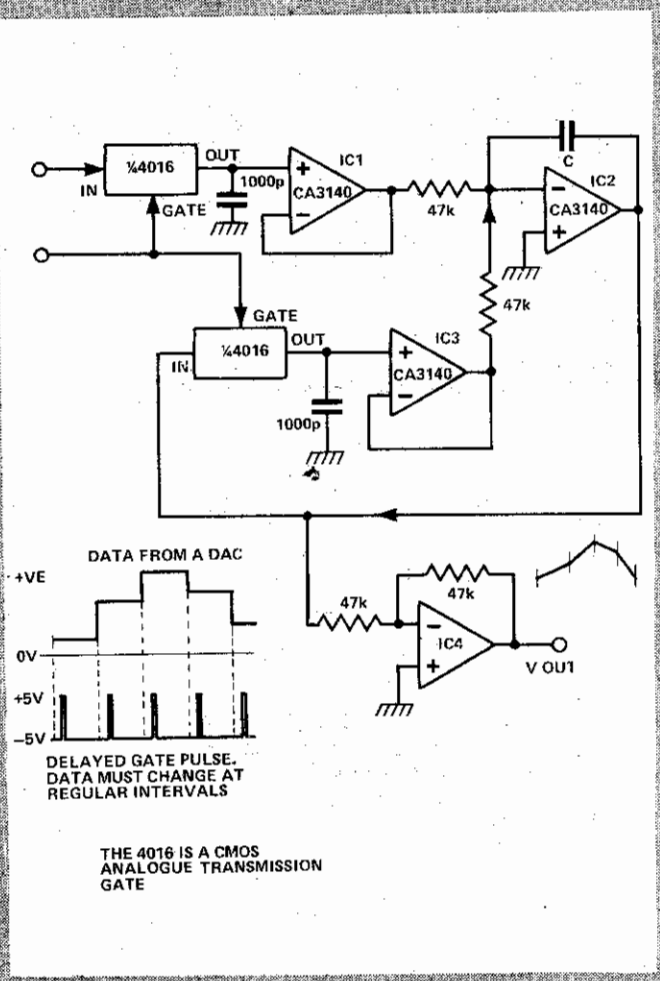

Cleaning Up Digitally Generated Signals With 2 Sample and Holds and an integrator

The output from a digital to analogue converter (DAC) is composed of a series of steps which have been selected by a series of binary numbers. The output of the DAC may represent the result of some computation done by a microprocessor or the contents of a digital memory. If the number of bits that control the DAC is low (less than 8), then the output will look like a series of descrete steps, plus lots of digital 'glitches'. Therefore, if this signal is to be displayed on an oscilloscope, the overall picture quality will be very poor. One way to clean up things would be to join up all the steps with straight lines and if done successfully a great improvement can be obtained. The only problem is that the distance between steps is continuously varying and so the slope of the straight lines will need to be variable as well. This process is known as linear point interpolation and can be achieved with two sample and holds and an integrator.

A delayed gate pulse is generated, so that once the DAC's output has settled the sample and hold switches momentarily open, sample the information and then close. The output of the first sample and hold (IC1) drives an integrator (IC2), the output of which drives the second sample and hold (IC3). The second unit provides negative feedback around the integrator, but it is delayed by one time interval. Thus a momentary positive going signal will pass through the first sample and hold and cause the integrator to ramp in a negative direction. When the next time interval arrives, the first sample and hold returns to OV, and the second obtains a negative voltage. This then makes the integrator ramp positively. The size of the integrator's capacitor C should be chosen to suit the clock speed of the DAC. An inverter, IC4 has been included to correct the invertion caused by the integrator.