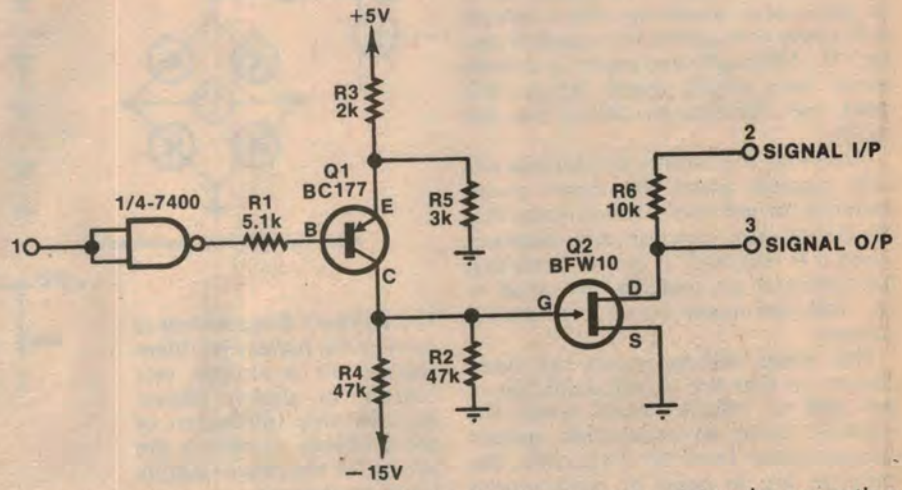
A TTL compatible audio switch

It is necessary at times to switch an audio signal without introducing any clicking noise. This could be done by using a switch or a relay but when the switching is to be done at high speeds, then electronic switching becomes the more desirable way to go. The circuit shown can switch audio very effectively at fast speeds without any clicks and it is also TTL compatible.

A BFW10 FET device is used as a switch due to the very high off resistance and very low on resistance offered by the source-drain channel. This particular FET has a high pinch-off voltage. Therefore, to turn it off reliably, the gate must be at least 7V negative with respect to the source. To turn it on the gate must be slightly above +1V. This is done by the voltage level shifting transistor Q1, which is directly driven by the output of any TTL gate, such as the 7400.

When the TTL gate output is low transistor Q1 is in full conduction and due to the high resistance of R4, the net voltage at the gate of the FET is positive, which turns the FET solidly on. Resistor R6 and the FET channel resistance which is very low, form a voltage divider and this attenuates the signal of point 2 so that there is no output at point 3. On the other hand when the TTL output is high, the emitter-base junction of transistor Q1 is reverse biased and transistor Q1 is off. This gives approximately 7.5V of negative bias to the gate of the FET and turns it off. The signal now passes to point 3 virtually unattenuated.



Measurements showed that when the FET was on, the attenuation was about 45dB. High operating speeds are also possible as there is no capacitance in the circuit to delay the operation. Care should be taken to connect point 3 to a high impedance circuit, such as an op-amp voltage follower, otherwise unwanted insertion loss will be experienced. If higher than 45dB attenuation is required, then R6 should be changed to 100k.

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