

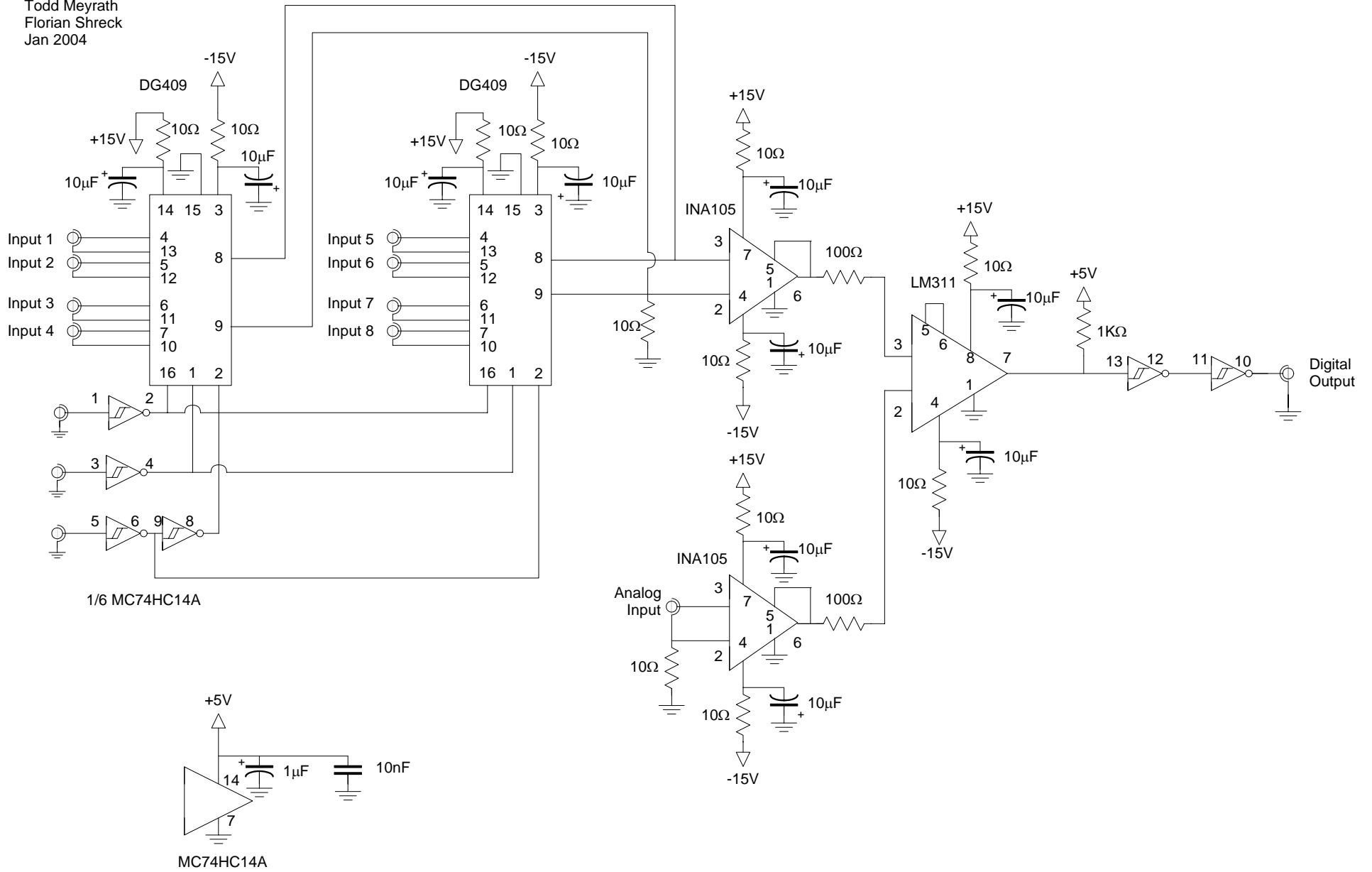
## Cheap 8 channel analog input board

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This board is a very simple and cheap way to build analog inputs. To be able to provide analog inputs without a real analog to digital converter a trick is used. You need to have already a control system that provides an analog output and a digital input. This can be for example our control system (see <http://george.ph.utexas.edu/control/>) together with a digital input for example one line of the parallel port or an unused bit of the NI6533 card. The analog signal which has to be measured is compared with an analog reference signal provided by the computer. The comparator gives out +5 V (= logical 1) if the input signal is higher than the computer signal and 0 V (=logical 0) the other way round. Now the computer modifies the reference signal and reads in the result from the comparator again. Here is an example: the voltage to be measured is 2.55 Volts. The measurement range is -10 V to 10 V. First the computer tries 0 V. Thus the comparator delivers a 1. The computer knows the signal is higher and tries 5 V. Now the comparator delivers 0. The computer tries 2.5 V and gets a 1. It tries 3.75 V, gets a 0 and so forth. Thus if its analog output is 16 bits wide it can determine the input voltage with that precision after 16 queries. To make the board more flexible, it uses a multiplexer with three digital inputs choosing one of 8 inputs as the actual input signal which is sent to the comparator. We use this board mainly to have an easy, automated way to verify the working of our 8 channel analog output boards. Its main advantage is the trivial construction and its main drawback the relatively slow operation. It still manages to operate in the 10 kHz range, which is completely sufficient for many applications. To have enough space for all the BNC connectors, the circuit is divided in a main board and a secondary connector board. Those boards have to be connected with cables as indicated.

# Analog Inputs Circuit

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Bottom

