A simple Absolute-Value Circuit and a counter will transform an inexpensive V-to-F module into a magnitude-plus-sign Analog-to-Digital converter with better than 11-bit linearity and resolution approaching 14-bits. In the absolute-value circuit, op-amp A2 acts essentially as an ideal diode to faithfully reproduce positive inputs and also provides the signal for the sign bit. Op-amp A1 inverts only negative inputs. The output from the Voltage-to-Frequency Converter is TTL-compatible frequency-coded information which can be converted to binary or BCD parallel outputs by a counter and time base.

\[ R \quad R \]
\[ -10 \text{ V} \leq V_{in} \leq +10 \text{ V} \]

ALL DIODES = 1N484 OR 1N914 OR EQUIV.
A1 AND A2 = PHILBRICK 1319 OR EQUIV.
R \( = 10 \text{ k} \Omega, \) WIREWOUND, 0.01%

*18-bits with Model 4706 and 4709