

2.6 Autotune Temperature Compensation

The pitch of the pipe organ changes due to variations in the pipe chamber air temperature. The digital ranks must track this change so that the entire hybrid organ remains in tune. The autotune circuitry senses the temperature in the pipe chamber and adjusts the digital pitch to match the pipes over a range of 52°F to 92 °F. The pipe organ is normally tuned at the center temperature of 72°F.

As the air temperature changes from 52°F to 92 °F the velocity of sound varies from 338m/s to 351m/s. When you do the arithmetic, this translates to a pitch change of ± 32 cents for a flue pipe. Reed pipes change much less and that means that a pipe organ does not stay perfectly in tune with itself as temperature changes. We correct all the digital ranks to track the pitch of the flue pipes.

The circuit that temperature tunes the digital ranks is shown in figure 2.6-1 and the actual circuit board in figure 2.6-2. The temperature sensor is an LM34 which is located in the Swell chamber. This device outputs a voltage of 10mV/°F. The circuit board contains a DC coupled amplifier which amplifies this to an output range from 0.3V to 4V. This voltage is fed to an analog input on the Pedal keyboard encoder, and organ software processes the resulting MIDI signal to adjust pitch.

The circuit provides two calibration voltages corresponding to 52°F and 92 °F. A slide switch is used to feed the full scale range represented by these calibration signals to the auto-detect function in the Hauptwerk software.

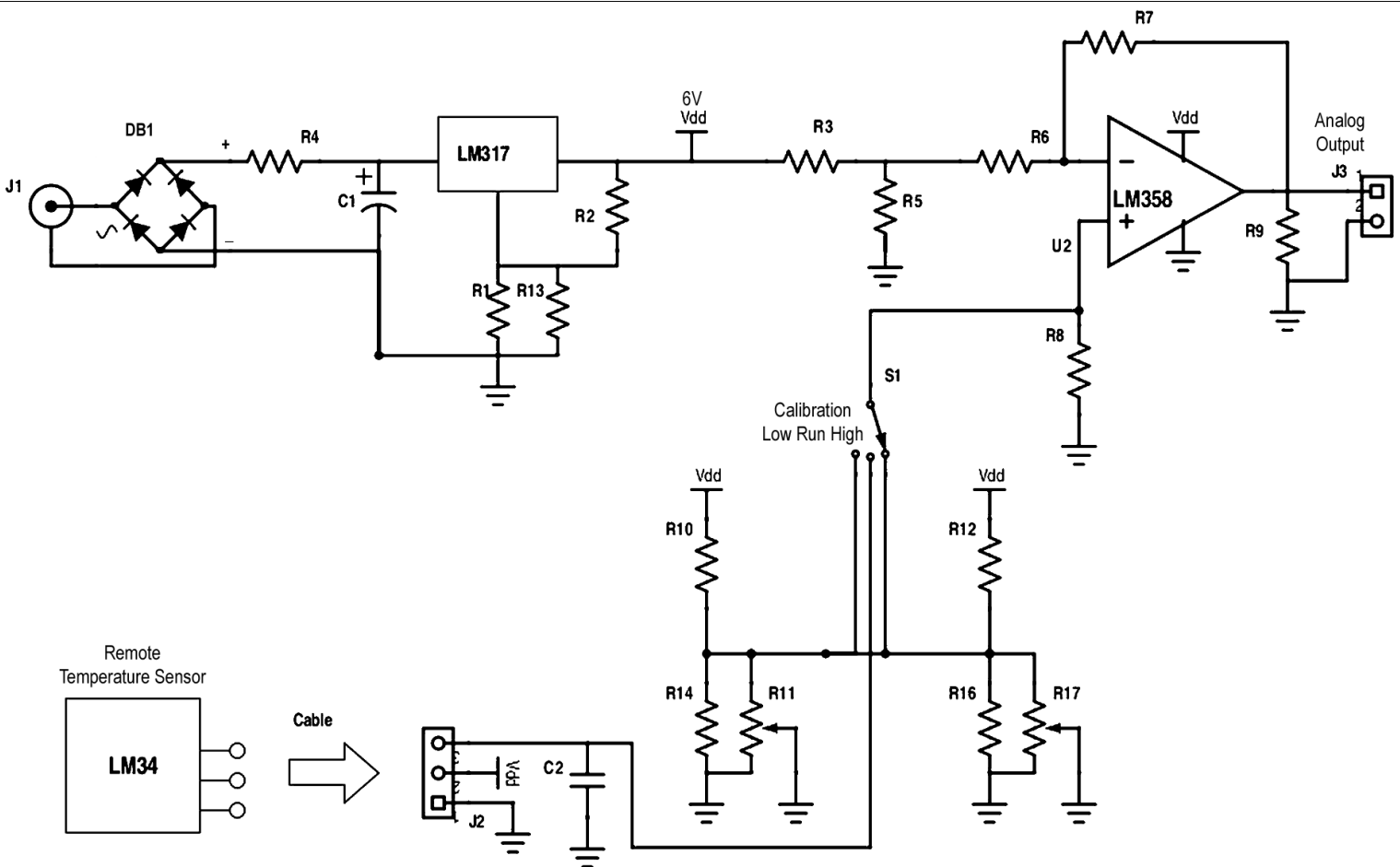


Figure 2.6-1 Autotune circuit

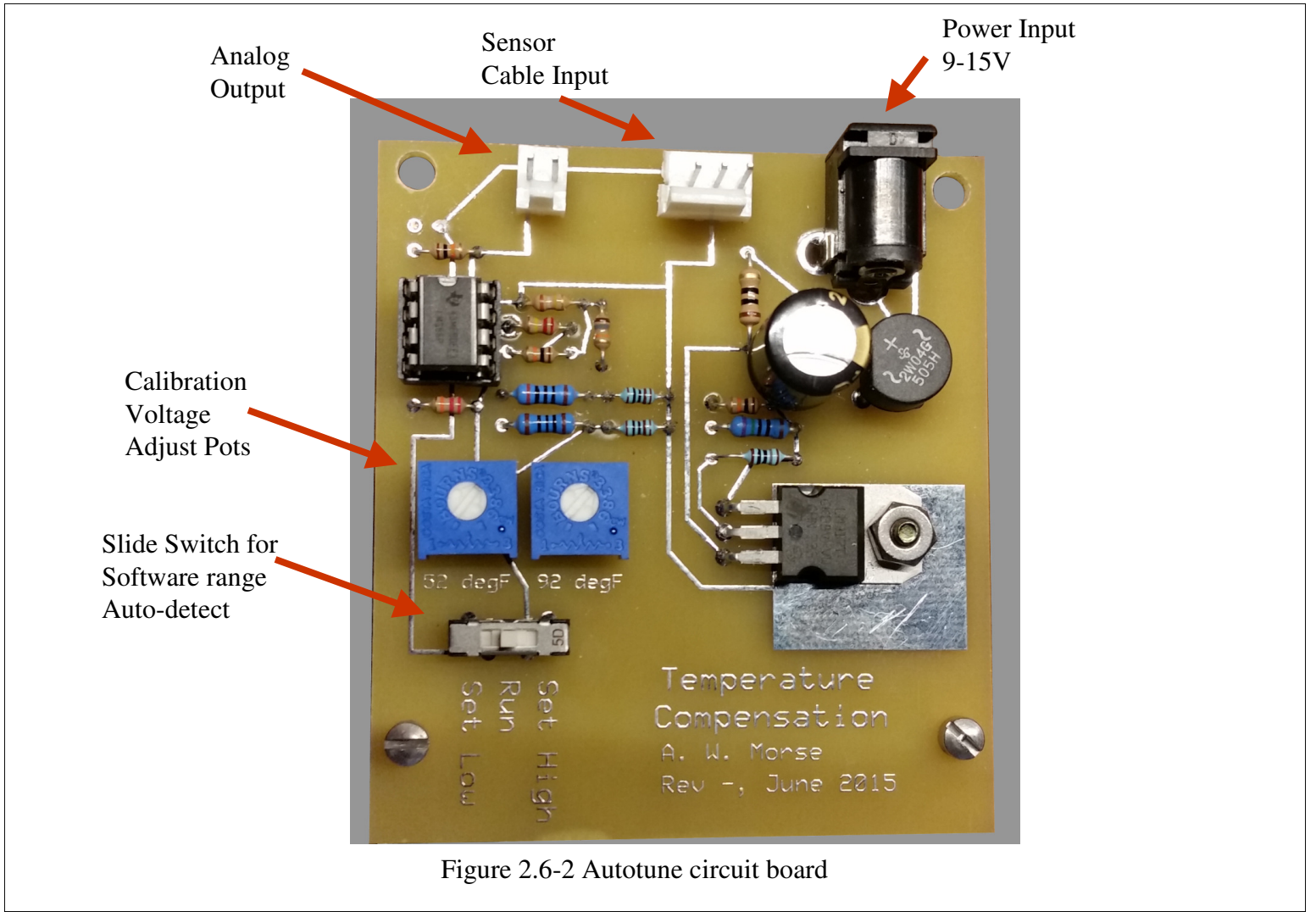


Figure 2.6-2 Autotune circuit board