Optional Tracker Additions

The basic tracker's sensor can be modified to add several different features. I will outline how to add:

Thermostatic control for low heat drying or sanitizing
Timed baking
Double speed manual tilt adjustment
Use of the tracker as a 12 volt power source
Use of tracker as dual axis tracker for a photovoltaic panel

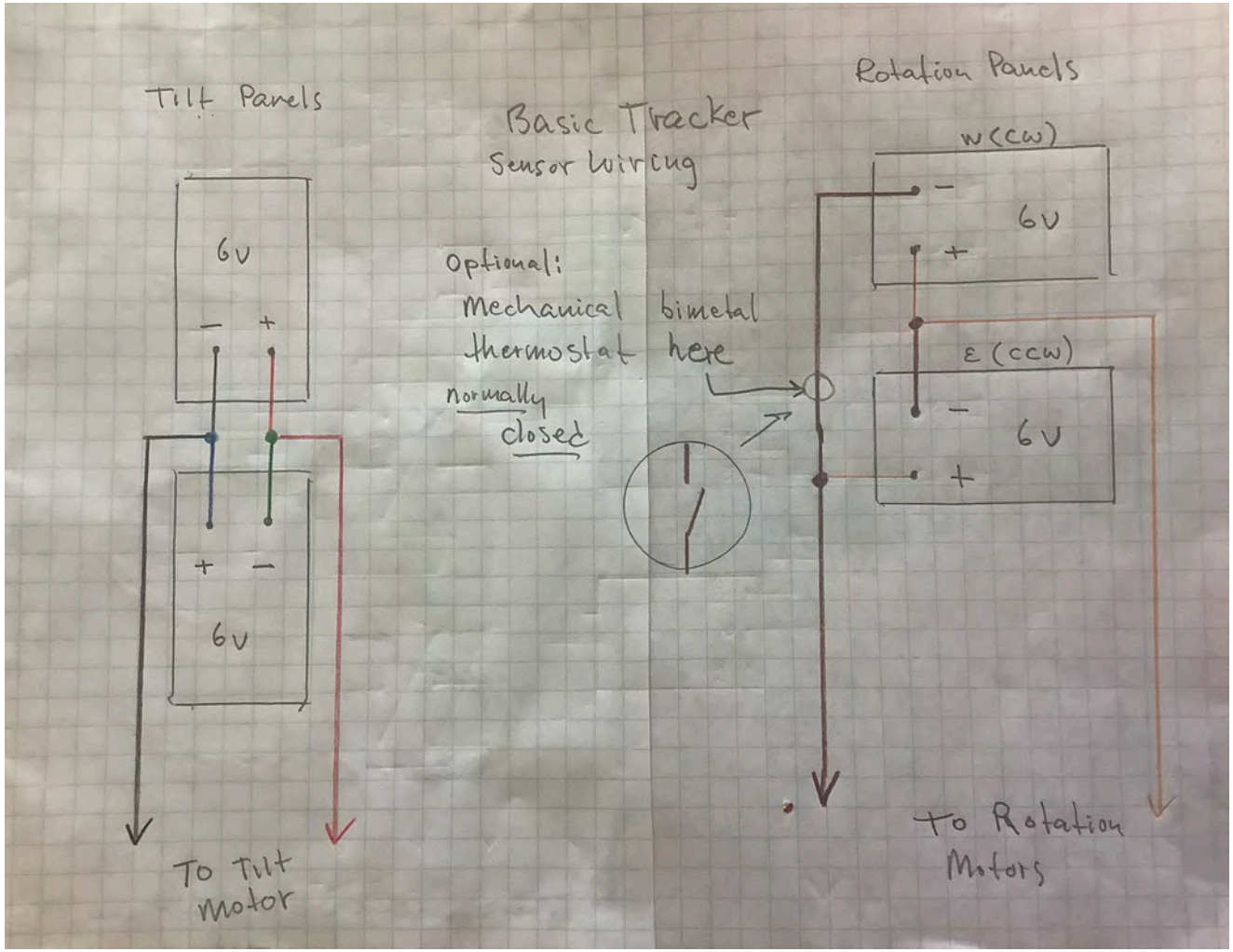
All you need is three toggle switches, a thermostat and/or a timer.

I recommend building and testing the basic tracker before adding these enhancements.

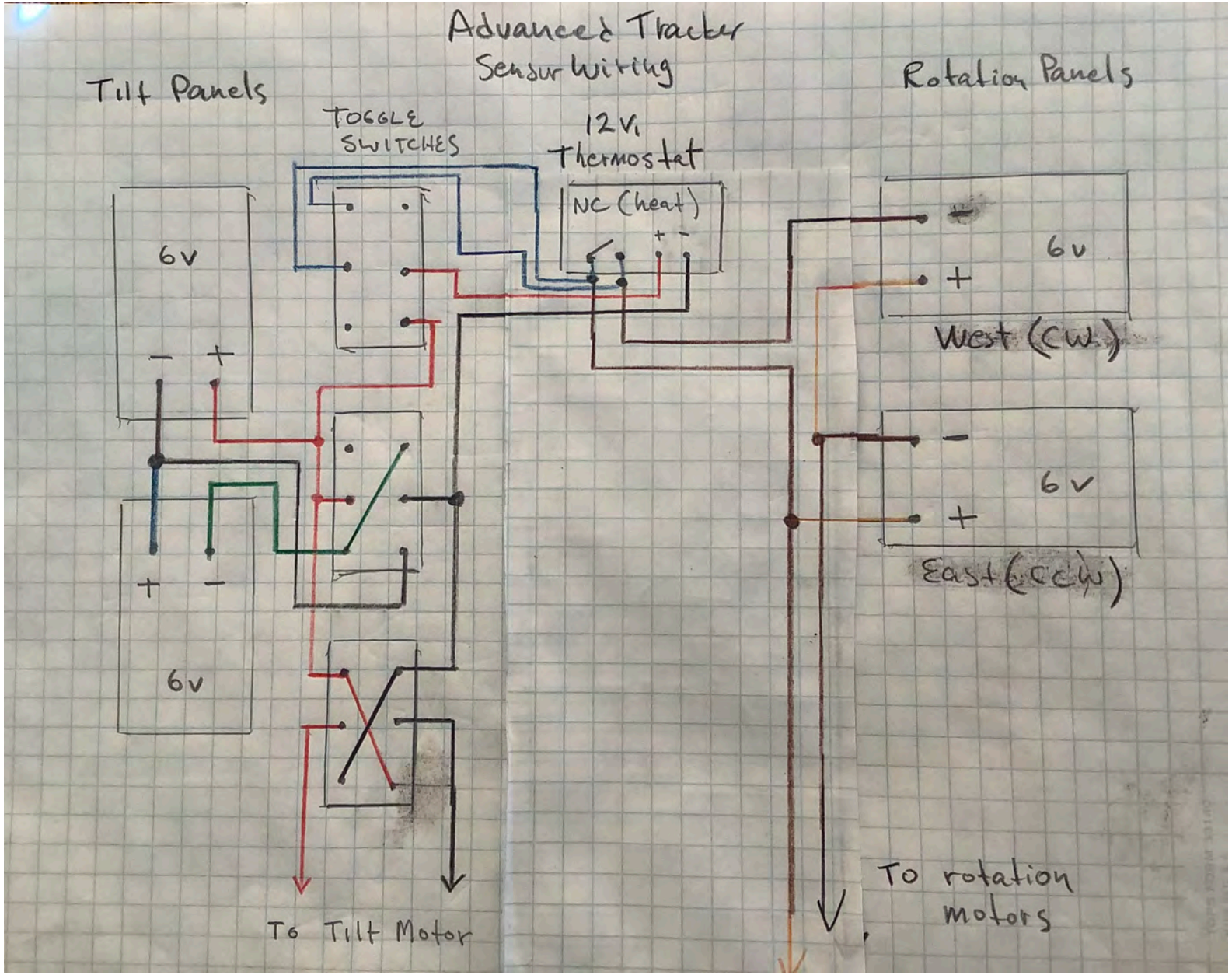
One additional use that requires no changes is to put a large PV panel in place of the oven for a dual axis tracking solar power source. This might be useful during power outages. The tracker is not weather proof.

The easiest modification is to interrupt the CW rotation panel with a mechanical bimetal thermostat that you place in the oven. Depending on the thermostat used you might also

need to add a toggle switch to override the thermostat for normal tracking. The thermostat should be for heating also referred to as normally closed. It will open when the desired temperature is achieved. The diagram below shows the basic wiring diagram and where the thermostat can be added. Run two wires from the thermostat into the tracker's sensor. Make the wires long enough to reach from the sensor into the oven. You may need to calibrate the thermostat. I envision finding the sweet spot that produces the desired temperature e.g. 70 C and just leaving it at that setting. This has not yet been tried.



All of the other options are a package deal. To get them, you add three DPDT toggle switches and carefully follow the wiring diagram below to connect them.


Advanced Tracker
Sensor Wiring
Tilt Panels
TOGGLE SWITCHES
12V, Thermostat
NC (heat)
Rotation Panels
6v
6v
6v
6v
West (CW)
East (CCW)
To Tilt Motor
To rotation motors

I used tiny toggles with solder connections but the larger ones with screw connections are easier to wire. The thermostat is 12 volts and only goes up to 110C. Others should work fine but the one I use is inexpensive, reliable and is adequate for this function. (If you want higher than 110 C you probably don't need a thermostat). The thermostat is connected to the two wires coming out of the top toggle switch for 12 volt power. The thermostat switch connections are the same as for the bimetal. There should also be two wires going from the thermostat switch contacts to the left top two terminals on the top

toggle switch to override the thermostat when it is not in use. The thermostat comes set to C for cooling. Change that to H for heating.

The switches from left to right correspond to the wiring diagram top to bottom.

For normal dual axis tracking all three switches are in the up (sun) position. (When the first switch is in sun position it is overriding the thermostat).

For temperature controlled heating the first switch is down to turn on the thermostat, the second switch is down which changes the tilt panels to be wired in series and produces 12

volts. The red dots indicate where each switch is set for that. The right switch is in the middle to turn off tilt tracking.

The right switch is manual up/down for the tilt. When the middle switch is down for 12 volts it allows you to close the tilt for storage or to lift it at the beginning of the cooking session. The tilt movement is slow so it can help to run it at the higher voltage speed. It will automatically stop when the tilt limit switches are engaged.

There is an optional outlet on the bottom of the sensor. When the middle switch is down it provides 12 volts from the tilt panels to power other devices. It's not shown on the wiring diagram but the outlet connects to the middle two contacts on the middle toggle switch. Note that when in tilt tracking mode this outlet receives the voltage of the tilt sensor which is anywhere from negative to positive 6 volts. Care should be taken not to send negative volts to a device that may not have reverse polarity protection. When in 12 volt mode, polarity at the outlet is correct regardless of the position of the up down switch.

The sensor can be removed from its mast and inserted into a hole drilled in the tilt deck to be more compact during power producing mode. Note that the tracker is single axis in this mode. Rotation only. I added a hinge on the back panel so I could place the two panels next to each other during this mode for better sun exposure and to access the thermostat for temp control. I had to lengthen the thermostat sensor wire so it could reach the oven. Polarity does not matter on the temp sensor wire and lengthening it does not impact accuracy.

For timed baking you can get a programmable 12 volt timer that has the same 4 contacts as the thermostat: power +/- and switch contacts. You can program on and off times. The wiring would be the same as for the thermostat with its own on/off/override switch. The 12 volt power should come from an external source because we need the tilt panels for tracking. To use this you would point the oven NE. The oven would not start tracking until the timer switches on and connects the CW rotation panel. When the timer switches off, the tracker would rotate CCW and cool down.

Other random thoughts:

In the basic tracker instructions I forgot to mention you need to slightly drill out or tap one side of the 6mm coupling to accept the 1/4 20 threaded rod.

I misstated the diameter of the dowel coming out or the sensor for the mic clip. It's 1" not 3/4".

When closing the basic tracker without the optional enhancement switches, make sure you devise a way to prevent the sensor from slipping out of the mic clip when you point it straight down. Mine slipped out and broke. I have drilled a hole and added a pin to prevent that.

Normal tracking has been well tested and is working exceptionally well. It is important to have a flat smooth surface for best results.

Temperature control has been tested with excellent results so far but more testing is needed. If the oven does not cool well enough, especially on hot days, rotating the sensor off center can also help keep the oven cooler. Timed baking has not yet been tried but the concept is logical.