

Input voltage range: 12V minimum, 30V maximum.

Maximum motor run current: 10A.

Supplied cable length (7 x #22): 6 ft.

This version of the EST1 is modified for thermal concentrator applications.

When power first applied, there is a one second boot interval during which nothing happens and the status LED* shows green.

There are three normal operating modes:

1) **Tracking**—the sun is bright enough to track. *For the first minute after power is applied, there is a minimum one second delay in light response—this is to allow for ease of adjustment if the enclosure position is "trimmed" for accuracy. After a minute of power on, the control adds a 1.5 minute delay to every east move and there is a maximum west move delay of 10 seconds in full direct sunlight (this is the equivalent of a 0.04 degree tracking error).*

2) **Pause** (status LED* orange)—there's not enough sunlight hitting the light sensors to allow tracking so it waits in the last "good" position until the sunlight recovers or it gets dark enough to go into...

3) **Park mode** (status LED* red)—it's getting kind of dark now and the tracker control is thinking maybe the day is over and it's time to send the array back to the **flat park** switch position to wait for the next tracking day.

* The status led is visible from the north side of the enclosure.

Cable wire connections:

RED +DC input

BLACK -DC input

GREEN motor output

WHITE motor output

BROWN flat park signal return

BLUE flat park input

ORANGE over-temperature drive off focus input

Notes on extra switch inputs:

The **flat park** switch is normally open and closes when the collector is flat. The flat park switch is "found" by the control thusly: if the flat park switch opens while the control is driving west, it assumes it must move east to find the flat park switch; if the flat park switch opens while the control is driving east, it assumes it must move west to find the flat park switch. ***When control is in park mode, as soon as the flat park switch closes, the drive is stopped and won't start again until the control returns to track mode.***

The **overtemperature** switch is normally open and closes to drive the collector (5 seconds) east of focus when there is an overtemperature condition signalled by this switch closure. When the overtemperature switch opens, normal tracking is enabled.

General Notes:

Only the tracker control is supplied by the analog guy—customer must provide all other system components.

The drive motor or actuator must have built in limit switches.

It is assumed that the rotational axis of the concentrator is aligned with the rotational axis of the earth.

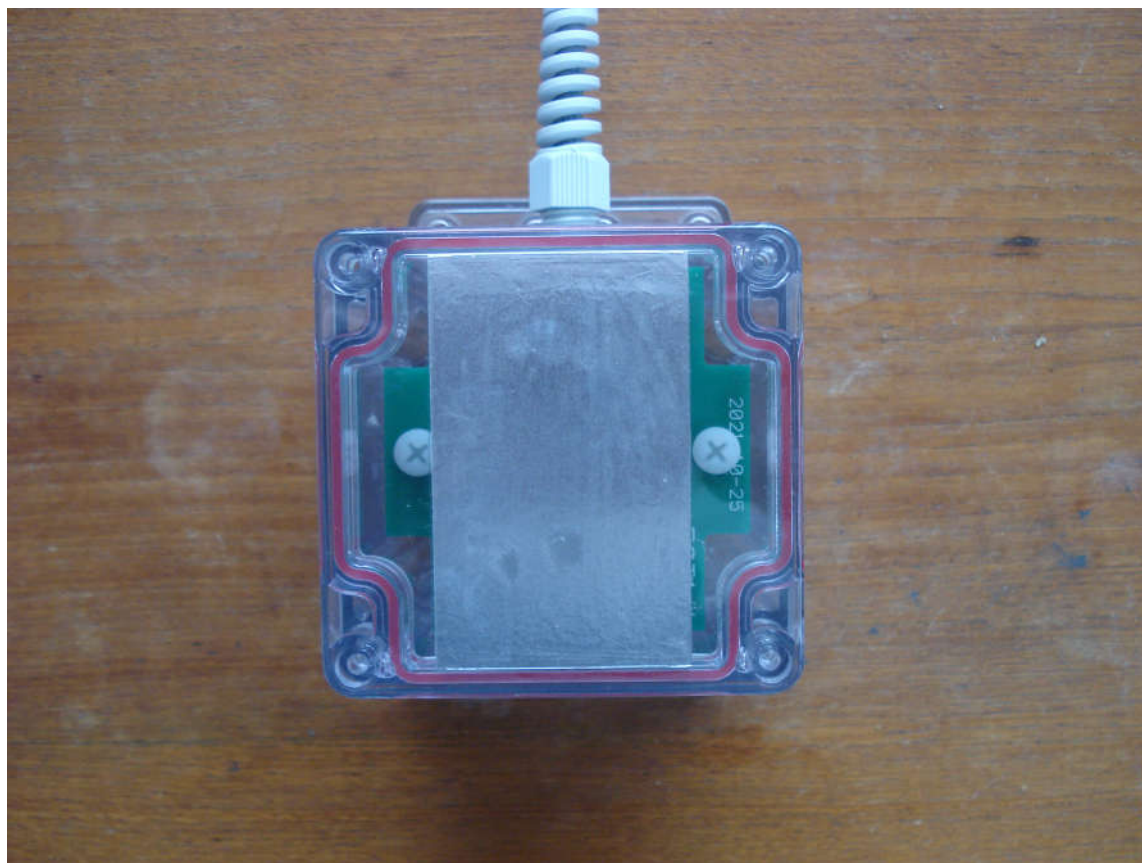
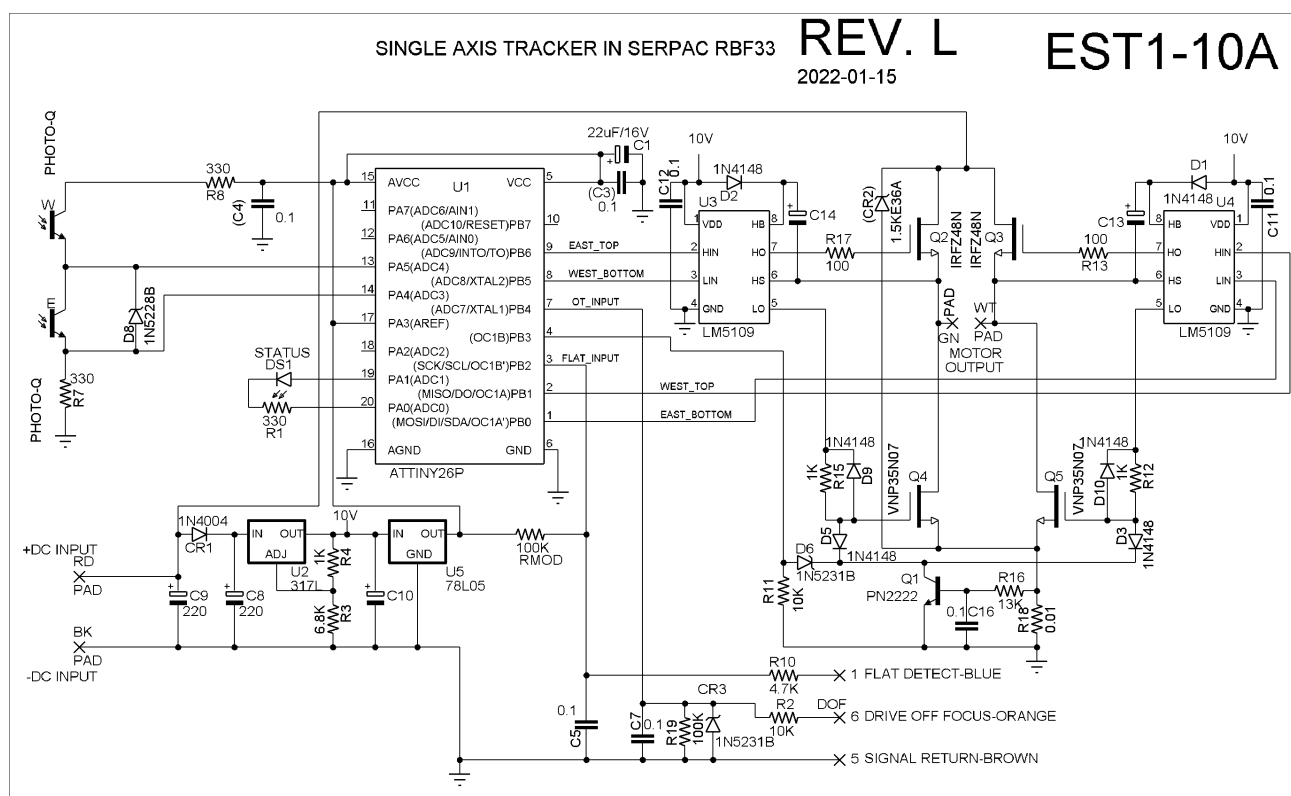
The tracker can work without flat park switch (it will park at east limit) or the overtemperature switch (no overtemperature protection available).

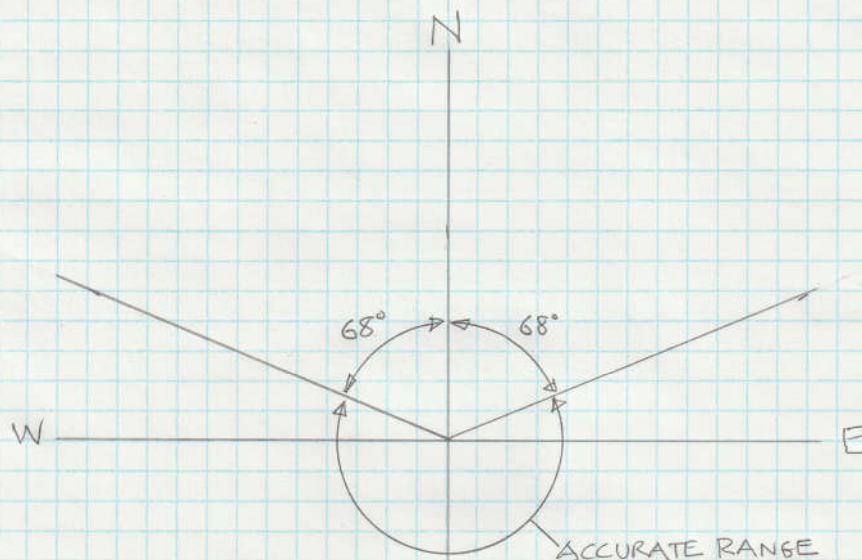
Extracting maximum performance from the tracker control requires a bit of "finesse" in tweaking all of the mechanical elements of the system.

There are 3 potential sources of error to look out for:

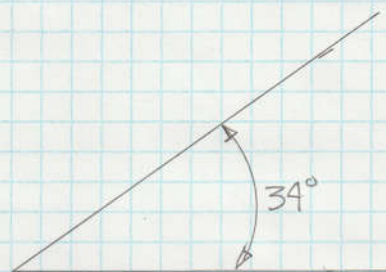
- 1) Tilt error—the plane of the light sensor not parallel to the focal plane of the concentrator.
- 2) Skew error—the "shadow strip" is not parallel to the axis of rotation of the concentrator. This will show up as different errors at different times of day.
- 3) Drive system overshoot error—the motor/drive system overshoots the "power off motor" point due to slack and/or inertial moments of the components involved.

Note: during the 1 minute short delay interval at start up, if there is significant overshoot, the system will oscillate across the control point.





SOLAR AZIMUTH ACCURACY RANGE



MINIMUM SOLAR ELEVATION
REQUIRED AT MIDDAY
TO MAINTAIN ACCURACY

ACCURACY RANGE CONSTRAINTS