

BEFORE WIRING, SEE SAFETY NOTE ON PAGE 3, READ ENTIRE MANUAL!

The ST2-AC is a solar tracker control that performs the function of light seeking solar tracking for drive systems using reversible single-phase AC motors.

This product comprises *only* the control circuit board, auxiliary transformer and remote light sensor with attached cable (10 ft standard).

Safety note: The circuit board is divided into two areas—the *safety extra low voltage side* which contains the low level electronics and where the voltages present no hazard to humans, and the *high voltage side* which has circuitry carrying line voltage and *presents a potentially lethal hazard*. When the board has AC power applied, no contact with the high voltage side of the board should be made with metal tools or any part of the body. When placed into service, the board must be suitably enclosed to prevent chance contact of hazardous portions of the board by unsuspecting and/or untrained people. The enclosure must carry a warning of hazardous voltages inside.

OVERVIEW OF ADJUSTMENTS, INDICATORS AND OPERATION

Drive priority: Only one drive is enabled at a time. For instance, if the azimuth control is active, the elevation control is locked out until the azimuth move is complete. This is of particular note when the control moves to PARK position—in order for the elevation to be enabled, the east limit switch must close. Azimuth movement has priority over elevation movement in all modes.

Position trimpots RT3 and RT4 settings are to halt movement of the array under conditions of obscured sun where pause is not invoked. RT3 is for the azimuth (e.g. if the control commands west move with obscured sun, rotate RT3 counterclockwise and vice versa). RT4 is for the elevation (e.g. if the control commands an up move with obscured sun, rotate RT4 clockwise and vice versa). Note that the trimpots have a maximum rotation range of approximately 270 degrees. Use a light touch and small screwdriver if adjustment is necessary.

Light sensitivity trimpot RT5 sets the light level at which the tracker changes from pause to track mode. Increasing the sensitivity (CW) means that the tracker will start tracking at a lower light level. Decreasing the sensitivity (CCW) means that the tracker will start tracking at a higher light level. If partial obscuring of the solar disk by cloudy conditions causes the array to wander randomly, decrease the sensitivity. If the tracker isn't following the sun when you think it should be, increase the sensitivity. The elevation track function has its own (high) fixed threshold, so the elevation will stop tracking when the sun is obscured.

LED indicators of light level control:

PARK (red)—light level representative of dusk, time to go to park position (East & Down).

PAUSE (yellow)—clearly it's daylight but not enough light to track yet.

TRACK (green)—enough light to track azimuth axis.

ANEMOMETER terminals and led: When the anemometer rotates, the anemometer input led pulses. When the wind speed exceeds 30 mph, the ALARM led lights and the tracker sends the array to **UP LIMIT** position where (if DIP switch 3 is ON) it will remain for one hour after the last wind alarm trigger. During this one hour delay, the ALARM led (near the center of the board) will remain lit. Other automatic functions will not work while wind alarm park is in play. When DIP switch 3 is OFF, there is no delay for recovery from wind alarm park. While wind alarm active, the azimuth tracking is disabled. If not used, the anemometer input may be left open and it will have no effect on operation. Designed for use with #40R anemometer SKU APRS6504 available from www.offgridoptions.com

The ALARM INPUT terminals allow the use of a "contact closure" type of wind sensor, such as the WINDCLIK. When the ALARM INPUT terminals are shorted, a wind alarm condition is initiated.

LIMIT SWITCH terminals and leds: The sense of these switches is: open during normal operation, close at limit. Whenever a limit switch closes, the tracking in that direction is stopped.

MANUAL CONTROL ROCKER SWITCHES (near the center of the board): These switches allow for the manual control of the azimuth and elevation motors through the control circuit. A useful tool to insure the correct motor drive direction and useful at other times when manual positioning of the array is desired. When the AUTO/MAN switch is in the MAN position, the MANUAL led is lit and all automatic function is inhibited. The UP/DN switch operates the elevation motor and the E/W switch operates the azimuth motor.

When an UP drive is commanded, the ELEVATION DRIVE led is lit; when a DOWN DRIVE is commanded, the ELEVATION DRIVE and ELEV-REV leds are lit.

When a WEST DRIVE is commanded, the AZIMUTH DRIVE led is lit; when an EAST DRIVE is commanded, the AZIMUTH DRIVE and AZ-REV leds are lit.

In manual mode, azimuth move has priority over elevation, so if the azimuth rocker switch is in the east or west position, the elevation switch will have no effect.

When in MANUAL mode, the following are disabled: automatic tracking, parking and wind alarm park.

When dip switch S1-SECTION 3 is ON, the following delays are added to the control:

- 1) A 1 minute delay is added to tracking corrections such that a sensed sun position change must remain consistent for 1 minute to enable movement—this is to reject transient events such as birds flying past the sensor or, in the case of shading of sensor by nearby vegetation, reduce excessive movement of the system. During this delay, the PAUSE led flashes at a twice per second rate.
- 2) A 1 hour delay is added to the start of the PARK movement when dusk falls—this is to preclude seesawing of the array if partly cloudy conditions near sunset produce highly variable light conditions. While the PARK delay is active, the PARK led flashes at once per second. S1-SECTION 3 can be in the off position for initial set up and adjustment (so that things happen without delay—useful for verifying correct operation), but ***must be in the ON position for unattended operation.***
- 3) A one hour delay is added to recovery from wind alarm park.

When dip switch S1-Section 4 is ON *in addition to S1-Section 3*, an additional light level dependent delay is added to the system. At full sun strength, there is only the S1-3 one minute delay. As the light level decreases (when clouds obscure the sun), the delay time between movements increases to a maximum of 20 minutes. This is to reduce the random wandering that occurs on "puffy cumulous" days.

On a "normal" power on, the ALARM, PARK, PAUSE, and TRACK leds all come on for 1 second, then revert to the "correct" status indication.

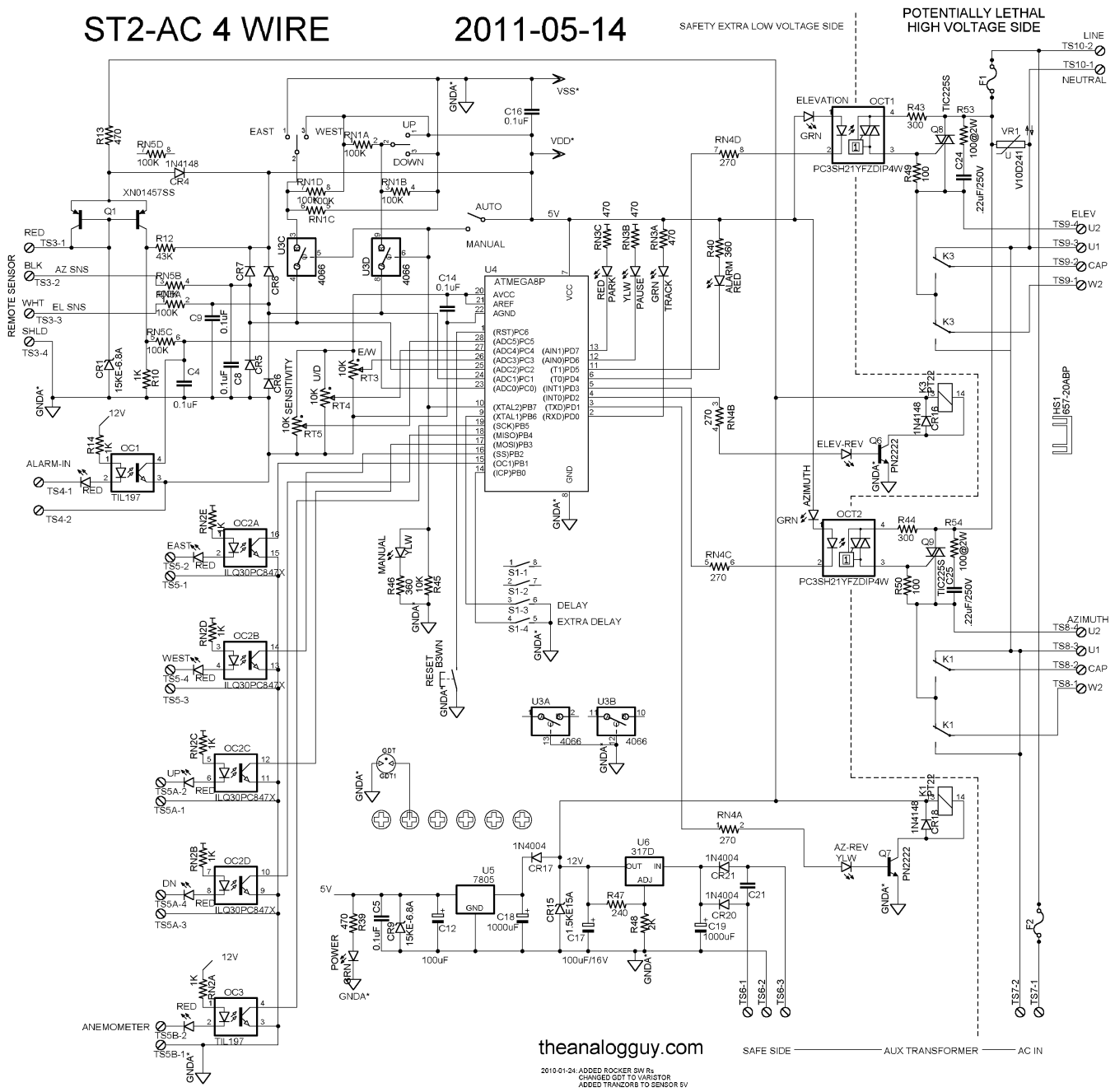
DELAYS ADDED TO SYSTEM: All control modes have an added 1 or 2 second delay between the time a move is "commanded" and the AC output is energized. This is to insure that all motor motion has stopped before another move is initiated.

The reset button simulates a "power on" reset, clearing all alarm flags, setting counters to zero.

Input voltage: 120VAC +/- 10%
 Input current: 5.1 Arms Maximum
 Output current: 5 Arms Maximum

Approved fuse types for F1: Littlefuse 0233005.MXP
 Approved fuse types for F2: Bussman BK/S500-1-R, Littlefuse 0239001.HXP

ST2-AC 4 WIRE 2011-05-14



theanalogguy.com

2010-01-24: ADDED ROCKER SW R8
 CHANGED GDT TO VARIATOR
 ADDED TRANSFORMER TO SENSOR SV

