4.500 INCHES (114 mm)

AZ MOTOR

AZIMUTH DRIVE MOTOR

M2B M2A

AZIMUTH LIMIT INDICATORS

ELEVATION LIMIT INDICATORS

ELEV MOTOR

ELEVATION DRIVE MOTOR

M1A M1B

AZIMUTH LIMIT SWITCHES

E RTN W LIMIT RTN

DN RTN UP RTN

DN LIMIT UP

ELEVATION LIMIT SWITCHES

DRIVE DIRECTION INDICATORS

W E DN UP

STM2

theanalogguy.com

ISO RTN

WIND

PRK

PUMP

WIND RETURN

WIND SENSOR IN

EXT PARK COMMAND

PUMP SIGNAL OUT

DC INPUT

+ —

TRACK THRESHOLD

RT5

REMOTE SENSOR RD BLK WHT SHLD

REMOTE LIGHT SENSOR

DC IN

DC IN

STATUS INDICATORS

PWR ALARM PRK PAUSE TRACK

W DN
POSITION TRIM
RT3 RT4

DLY

DELAY ON/OFF SELECT

RESET

RESET

4.800 INCHES (122 mm)

SOLAR TRACKER CONTROL

PARK

MANUAL AUTO

WEST

OFF

EAST

MANUAL

ZENITH

OFF

NADIR

OPERATING MODE SELECT

AZIMUTH MANUAL CONTROL

ELEVATION MANUAL CONTROL

The STM2-20A is a light seeking tracker control designed for DC motor systems. It has a manual control capability and wind alarm input.

Input voltage range: 10-56VDC
Output current: 20 Amps continuous per axis

On initial application of power or reset button push and release, the status leds will light for one second to indicate proper led function—all normal functions halted during led test.

STATUS INDICATORS

PWR: DC power is on.

ALARM: Wind alarm control asserted—move array to elevation up limit. With delay on, this led remains lit during the 30 minute wind alarm recovery delay. Power on reset clears wind alarm.

ALARM (FLASHING): Output overload—protection circuit shuts off outputs and waits an hour before trying again. Overload can be cleared by cycling mode switch manual-auto or a power on reset.

PRK: Low light park asserted—move array to east and down limits.

PAUSE: Dim light due to absence of clear sun, stop movement until light recovers or darkness falls.

PAUSE (FLASHING): With delay on, a one minute delay is forced after a move is completed. During this delay, the pause led flashes.

TRACK: Light level high enough to track.

Abnormal conditions—typically, motor failure or mechanical system jam (from ice build up) or heavy wind load:
Tracker will attempt to move the array for 1 second. If motor overcurrent condition is sensed, tracker will terminate output drive and flash the ALARM LED (at a half second rate) for 1 hour before attempting another move.

Notes on initial installation, power up and adjustments.

The remote sensor needs to be attached to the array frame such that the mounting surface of the sensor is parallel with the plane of the array—where on the array is not critical as long as the sensor receives unobstructed sun during the hours when the array is expected to track.

When power is applied, if the ambient light level is above the track threshold and if the mode rocker switch is in AUTO, it will then commence tracking immediately unless S1-1 is in the DLY position, in which case there may be a one minute delay.

Position trimpots RT31 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 until movement stops and vice versa). RT4 is for the elevation (e.g. if the control commands an up move with obscured sun, rotate RT4 clockwise until movement stops 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.

RT5 is to adjust the light level at which the tracker control changes from track to pause. Adjust clockwise for greater sensitivity (tracks at lower light levels).

S1-1 on the PCB controls the delay function. The idea here is that, during the initial installation, this is in the OFF (SETUP) position. In this state, everything happens "instantaneously"—a useful condition when tweaking the track trimpots and setting the *Light Sensitivity*. When **S1-1 switch is in the ON** (DLY) position (**for normal, unattended operation**), the following delays are added to the system operation:

   When an autotrack move is completed, a one minute delay must be counted down before the next move on that axis is enabled. This is to reject transient events such as something flying over the sensor and, in cases where the sensor is shaded by moving vegetation during part of the tracking day, to hold off and/or reduce movement during back and forth shading events which aren't representative of true sun position. If this delay is active for either axis, the PAUSE led will flash twice per second.

   A ten minute delay is added to the PARK movement. This is for conditions of changing cloud cover (where the sun occasionally pokes through) to keep the tracker from sending the array back and forth between PARK and TRACK positions. Light conditions must remain below PARK threshold for ten minutes before the controller will allow movement. (There is only a 10 second delay when changing from PARK to TRACK.) When park delay active, PARK led flashes twice per second.

   A 30 minute delay is added to the recovery from wind alarm park.

Sensor induced pause: When the light intensity on the remote sensor drops below that required to generate a detectable error signal, the tracker may pause without the PAUSE led being illuminated--if the TRACK led is on, assume sensor induced pause during obscured sun conditions.

Separate return terminals are supplied for all limit switches. In installations where wiring permits it, all of the limit switch returns may be tied together and taken to a single limit switch return terminal. The limit switch returns connect electrically to (-) DC input and must not be used to conduct high current, as this will damage the PCB and cause failure.
The limit switches can be magnetically actuated reed switches or mechanically actuated type. They are "normally open" and close when drive system nears limit of non-destructive travel. If your actuators have built-in limit switches, the limit switch inputs to the control can be "not connected" and the tracker control will function properly.

To limit total power dissipation, only one axis is driven at a time. The azimuth axis locks out elevation until its move is complete. If limit switch activation stops azimuth, the elevation axis will also be halted. When PARK is being executed, Elevation and Azimuth drives are time shared at 20/40 seconds each.
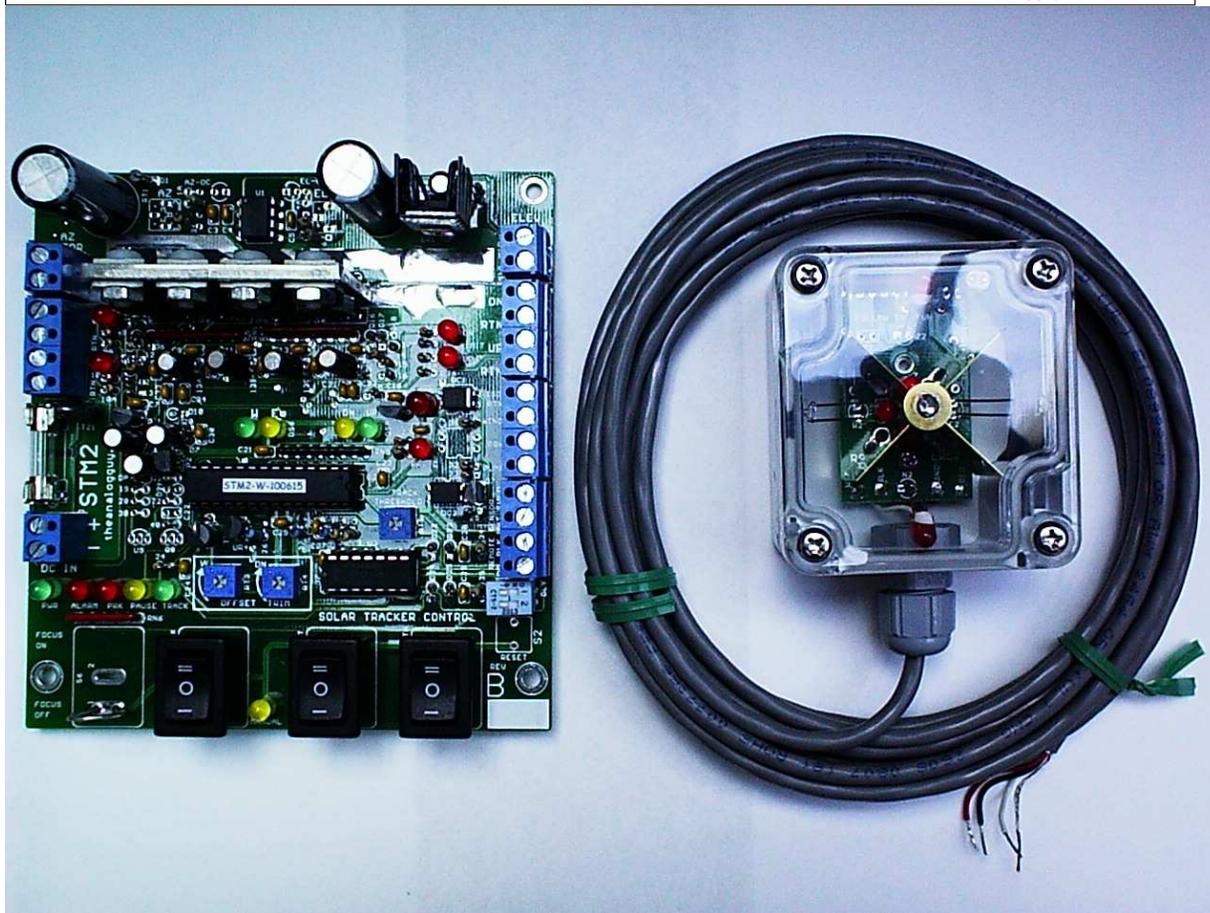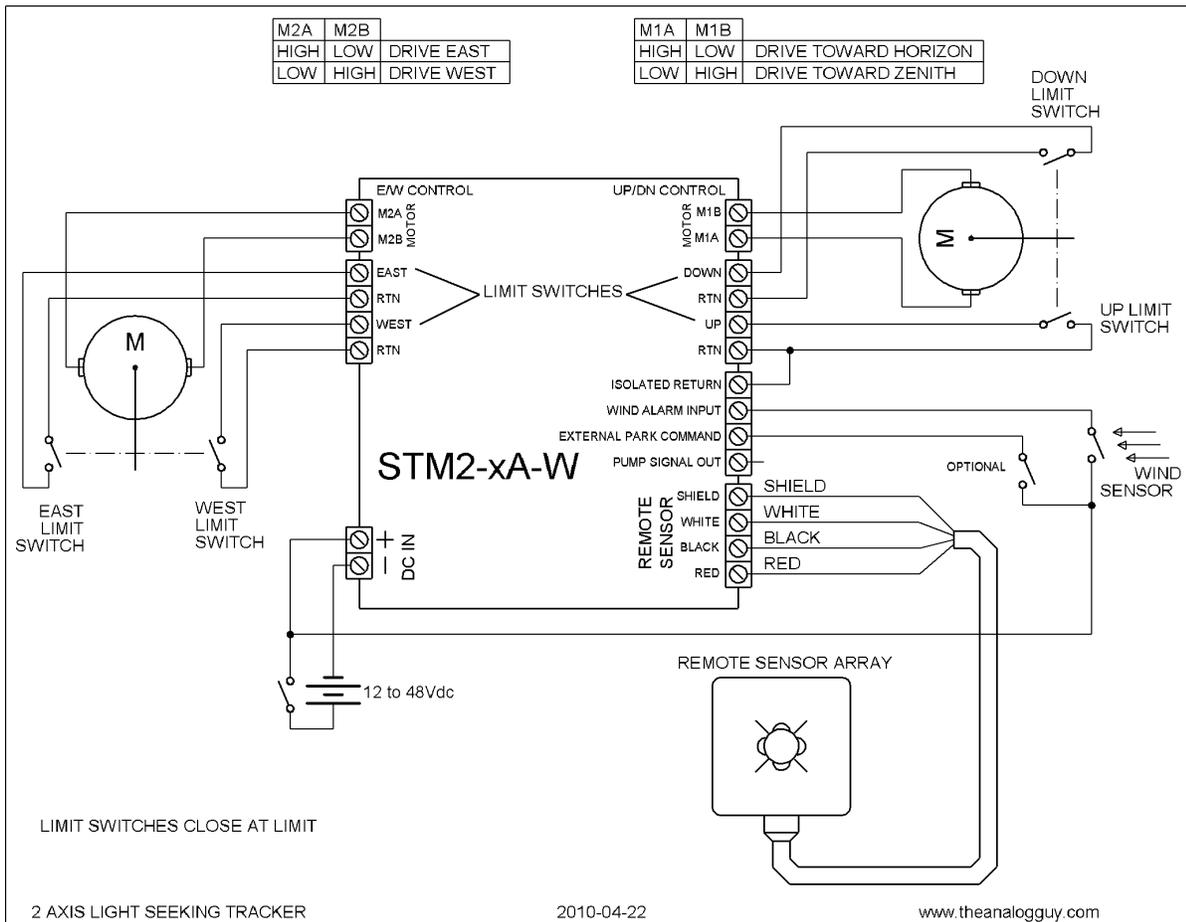
The tracker control PCB needs to be housed indoors or in a weatherproof enclosure.

Using a dual axis control with a single axis system will result in large and varying tracking error because a single axis system requires a different light sensor geometry.
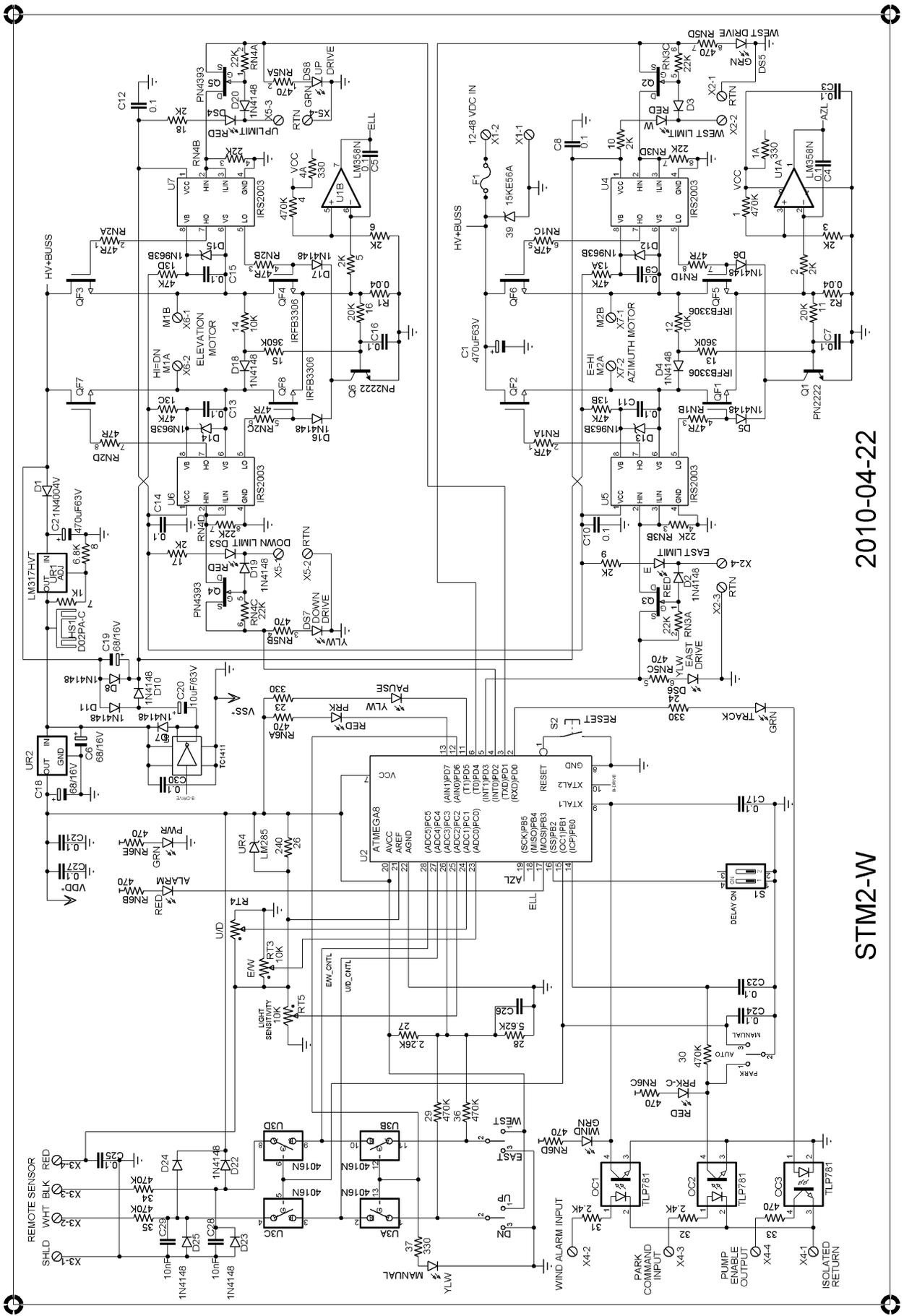
DO NOT use the light sensor cable strain relief nut to mount the light sensor, as this can compromise the mechanical and hermetic integrity of the unit and cause failure.

The wind sensor input, external park command and pump signal output share a return which is optically isolated from the rest of the control circuit. This isolated return may be tied to a limit switch return for systems not requiring this isolation.

WIND ALARM PARK has priority over TRACK, PAUSE, and low light PARK.

M2A	M2B	
HIGH	LOW	DRIVE EAST
LOW	HIGH	DRIVE WEST

M1A	M1B	
HIGH	LOW	DRIVE TOWARD HORIZON
LOW	HIGH	DRIVE TOWARD ZENITH

DOWN LIMIT SWITCH

E/W CONTROL

UP/DN CONTROL

M2A
M2B
MOTOR

MOTOR M1B
M1A

EAST
RTN
WEST
RTN

LIMIT SWITCHES

DOWN
RTN
UP
RTN

UP LIMIT SWITCH

ISOLATED RETURN

WIND ALARM INPUT

EXTERNAL PARK COMMAND

PUMP SIGNAL OUT

OPTIONAL

WIND SENSOR

STM2-xA-W

M

EAST LIMIT SWITCH

WEST LIMIT SWITCH

REMOTE SENSOR

SHIELD — SHIELD
WHITE — WHITE
BLACK — BLACK
RED — RED

+ —
DC IN

12 to 48Vdc

REMOTE SENSOR ARRAY

LIMIT SWITCHES CLOSE AT LIMIT

2 AXIS LIGHT SEEKING TRACKER   2010-04-22   www.theanalogguy.com

STM2   SOLAR TRACKER CONTROL   STM2-W-100615   OFFSET   THIN

STM2-20A-W   DUAL AXIS TRACKER CONTROL WITH MANUAL SWITCHES AND WIND ALARM INPUT

2010-04-22

STM2-W