MANUAL, INSTALLATION AND CONFIGURATION, TMAC™ ADVANCED TRACKER CONTROLLER

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TMAC™ Advanced Tracker Controller

INSTALLATION AND CONFIGURATION MANUAL

[redacted]

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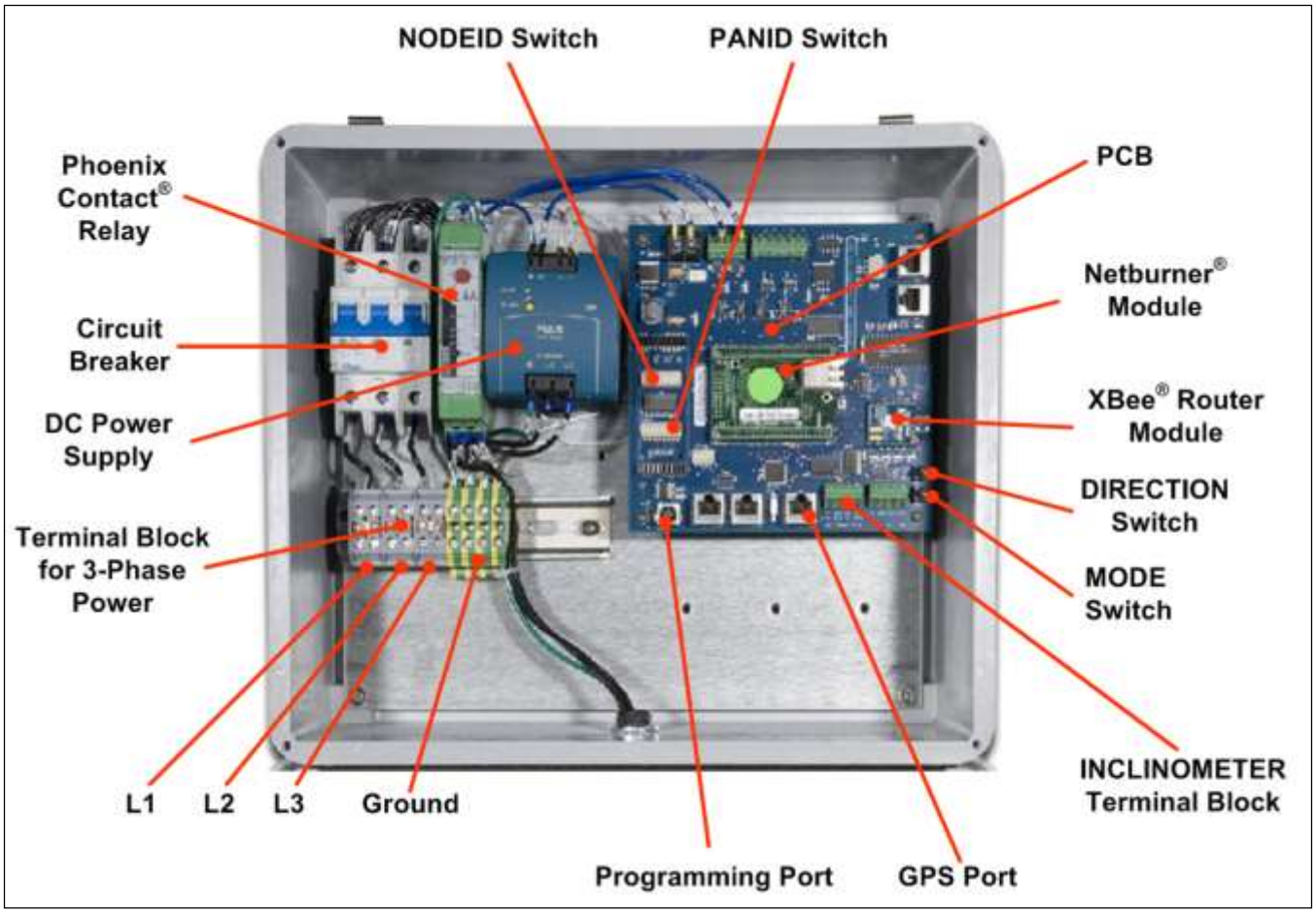
1.0 Introduction

1.1 Overview

The xxxxxxxx® Tracker features an embedded computer that controls the movement of the drive unit, which in turn rotates the torque tubes and optimally positions the PV modules. The xxxxxxxx Tracker Monitoring and Control™ (TMAC) Advanced Tracker Controller is programmed to optimize the angle of incidence between the sun and the modules.

The TMAC controller has remote control capability that allows for stowing in adverse weather condition, equipment monitoring, and system optimization. Remote access procedures that enable monitoring and control of correctly installed and configured TMAC units are described in Appendix B.

Here is an inside view of the TMAC controller:



TMAC Tracker Controller

1.2 Safety Procedures

Important! All personnel must adhere to the following safety procedures when working on the TMAC controller. These wiring and configuration instructions are for use by qualified personnel only.

1.2.1 Radio Frequency Safety

- The TMAC controller product is FCC certified.
- The design of the TMAC controller complies with the updated standards for safety levels with respect to human exposure to Radio Frequency (RF) emissions adopted by the Federal Communications Commission (FCC) in August 1996.

1.2.2 Electrostatic Discharge

Warning! Static charge buildup and discharge can damage the TMAC controller.

To avoid static charge buildup or discharge into the equipment:

- Before touching or connecting a laptop to the TMAC controller, xxxxxxxx recommends discharging the laptop and yourself by simultaneously holding your laptop and grounding yourself to a metal service that is connected to earth ground.
- Use a grounding mat when working on the TMAC controller.
- Use a grounding strap when working on the TMAC logic board.

1.2.3 Shock Hazards

Warning! Lethal voltages are present in the TMAC controller box. xxxxxxxx recommends not carrying out work on or near an energized controller. If it's necessary to work on an electrically active controller, ensure that you use appropriate Personal Protection Equipment (PPE) at all times.

- The TMAC controller is designed to operate at 380 VAC–480 VAC 3-Phase power. Other voltages are not compatible.
- The TMAC controller is designed with finger guards to protect the user from electrical shock. However, xxxxxxxx requires that all personnel working on the equipment wear rubber insulating gloves.

2.0 Configuring the TMAC Tracker Controller

Important! Do not attempt to change any of the TMAC controller's specified parameters. Doing so could dramatically alter system functionality and its ability to gather energy. Contact the TMAC Monitoring team if you have questions about controller parameters.

You must wire the TMAC controller and set the parameters so that the tracking functionality will execute properly. Once configured, new controllers are administered in the xxxxxxxx TMAC Advanced Tracker Controller monitoring application to complete the commissioning procedure (refer to Appendix B).

Note. Refer to the project drawings to route the reference cell wire for the DAS system.

2.1 Wiring the Controller

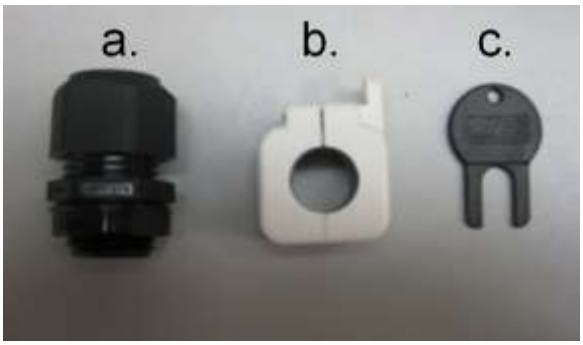
Before performing the steps in this section, refer to the project drawings to identify the following:

- the controller designated as the "Coordinator" TMAC for the network
- the controller to be installed with a GPS unit
- the last controller in the power entry daisy chain, if any

These units have unique hole-drilling and wiring requirements.

Important! If you are wiring controllers in an Oasis 1.5 MW block system, refer to the project drawings to determine which blocks may require installation of a bifurcating power cable on the centrally located TMAC. Identify the centrally located TMAC and perform the additional procedure described in Section 2.1.1 to install the bifurcating power cable.

Shipped separately, the TMAC Coordinator Upgrade Kit (xxxxxxxx part # 111437) contains components required for Coordinator conversion of the specified TMAC unit and to facilitate GPS installation into another TMAC:

XBee® Coordinator radio chip (enclosed in antistatic bag)	
• **GPS unit** (with cable and modular jack) • **Cable gland** for the GPS cable • **GPS Magnetic Mount Kit** (with three attachment screws for the main unit)	
a. **Cable gland** for the Ethernet cable b. **Snap-on Ferrite** c. **Ferrite Safety Key** (used to open the closed ferrite)	

Important! To minimize the risk of damage to internal wiring and other components in the controller box, drill all necessary holes before attaching wire leads. To reduce fiber dust during drilling, xxxxxxxx recommends that you use a hole saw.

The TMAC controller comes preassembled with the motor conduit and wiring already attached.

To connect the wiring to the TMAC controller:

1. In the bottom surface of the controller box, drill a hole 7/8″ (22 mm) in diameter for the xxxxxxxx supplied inclinometer cable (Fig. 1). The hole's edge must be a minimum of 2.0″ (5.08 cm) to the right of the motor cable entry (Fig. 2).

Fig. 1

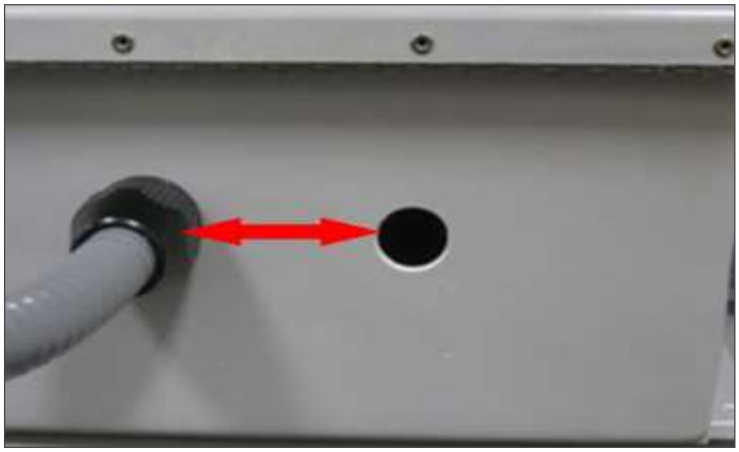


Fig. 2

2. Drill a hole of appropriate size for the input power entry cable or conduit (as specified in the project drawings) approximately 4″ (10 cm) to the left of the motor cable entry (Fig. 3).
3. If the project drawings require interconnecting (daisy-chaining) multiple controllers drill a second hole in the bottom surface of the controller box for the power cable (or conduit) exiting the enclosure (Fig. 4). Center this hole between the power entry hole and the motor cable entry hole.

   Important! Do not drill this second hole on the last controller in the power daisy chain.

   Note. The maximum number of controllers that can be safely daisy-chained together is five and is also a function of the fuse block capacity. Refer to the electrical wiring diagram.
4. If the controller you are installing is not the designated Coordinator TMAC or GPS unit, proceed to Step 6.

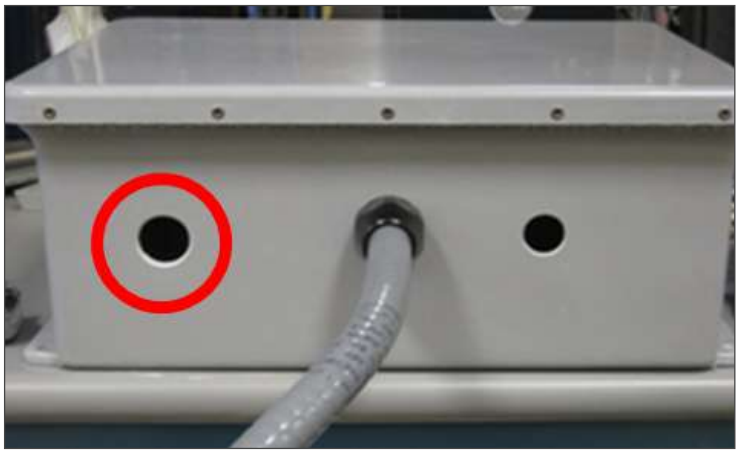


Fig. 3

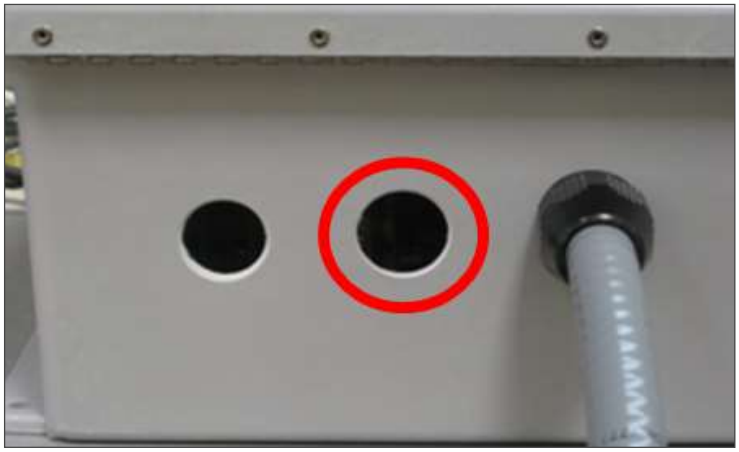


Fig. 4

5. If the controller is the Coordinator TMAC or the designated GPS unit, drill another hole to the right of the inclinometer hole (Fig. 5) according to the following requirements:

   - If the controller is designated as the GPS unit:

     Drill a hole 7/8″ (22 mm) in diameter for the GPS cord grip (Fig. 6) contained in the TMAC Coordinator Upgrade Kit.

   - If the controller is the Coordinator TMAC:

     a. Refer to the electrical wiring diagram to determine if an outdoor rated Cat 5 Ethernet cable or a specified conduit fitting is to be installed for Internet connectivity.

     b. If Cat 5 Ethernet cable is to be used, drill a hole 7/8″ (22 mm) in diameter for the cable gland (included in the kit); if conduit fitting is to be used, drill a hole of appropriate size for the conduit that serves as the raceway for the Ethernet cable (Fig. 7).

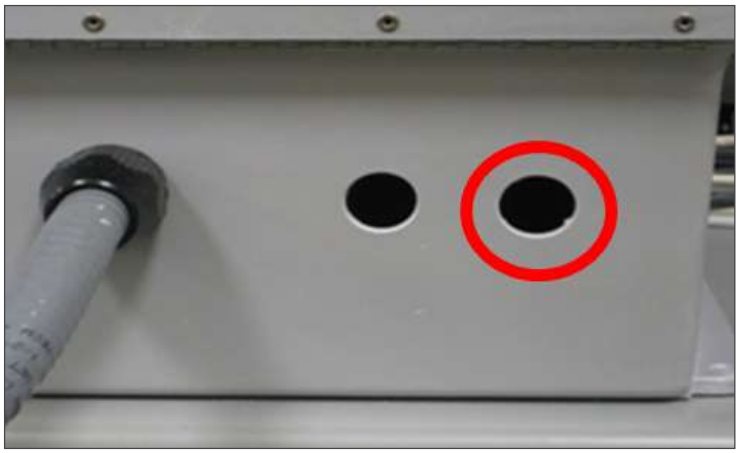


Fig. 5

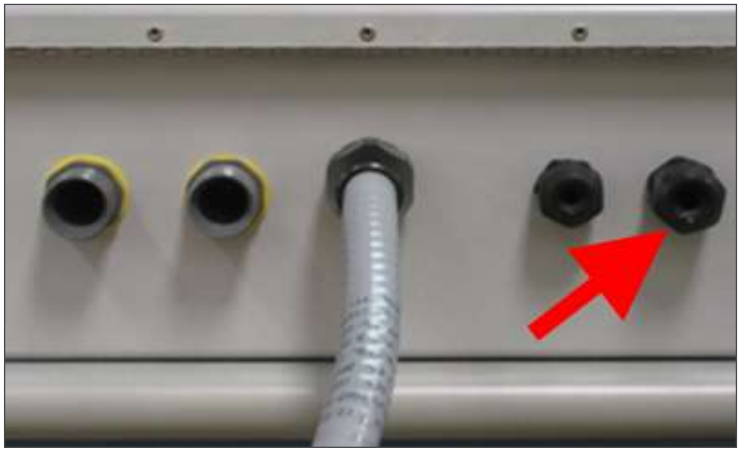


Fig. 6

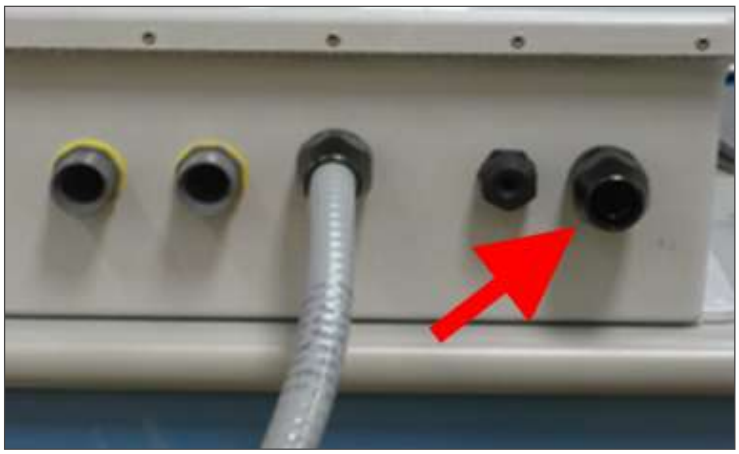


Fig. 7

6. Install the cable or conduit fitting for the power entry wiring provided at the site.

   Bring the 3-phase power entry leads out of the fitting and then land the **L1, L2,** and **L3** leads, and **GND** wire on the correct terminal blocks (Fig. 8). A black label under the terminal blocks identifies the terminal locations.

   Important! Ensure that you land the wires on the correct terminals.

   If the controller is part of the power daisy chain—except the last controller—install the second cable or conduit fitting (power exit) and carefully connect the output wiring of the power entry wires to the correct adjacent terminals (Fig. 9 and Fig. 10).

   Note. The installed ferrules on the power wires are optional (Fig. 8, Fig. 9, and Fig. 10).

7. Apply 14 in-lbs (1.6 N-m) torque to all of the recently attached terminals while securely holding them against the terminal blocks. Firmly pull on the wires to make sure that all are securely attached.

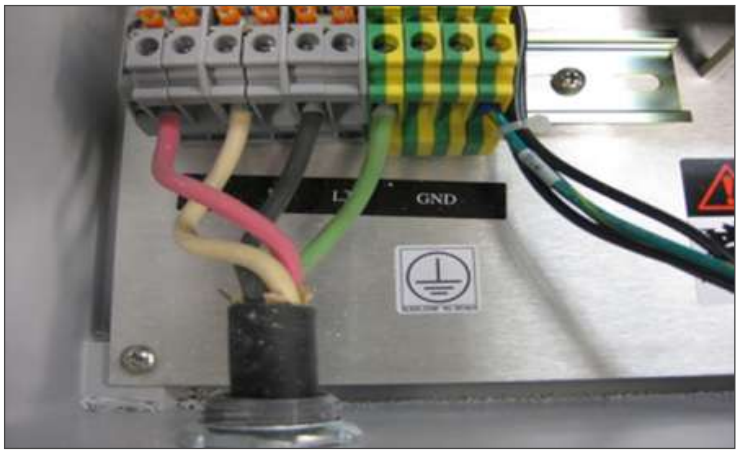


Fig. 8

Fig. 9

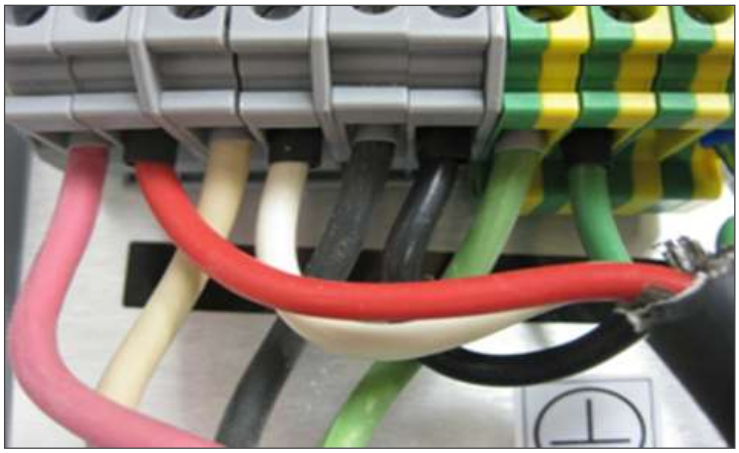


Fig. 10

8. To install the inclinometer cable:
   a. Install the cord grip (contained in the inclinometer hardware bag; Fig. 11) into the previously drilled inclinometer hole.
   b. Hand-tighten the locking nut until it is flush against the inside wall of the enclosure and then tighten 1/6 turn with a wrench.
   c. Feed the inclinometer cable through the cord grip until a maximum of 1″ (2.5 cm) of black cord protrudes into the enclosure (Fig. 12).
   d. Hand-tighten the cord grip dome and then tighten 1/6 turn with a wrench.
   e. Route the lead set of colored wires between the PCB standoff and the enclosure wall. Wrap the lead set counterclockwise around the standoff and under the PCB. From underneath the PCB, route the leads to the topside.
   f. Terminate the lead wires per color code labels (**RED, BLU, YEL,** and **GRN)** on the **INCLINOMETER** terminal block. (Fig. 13).

      Important! Incorrect wiring may damage the inclinometer. Ensure that you land the wires on the correct terminals.

   g. Apply 4–5 in-lbs (0.4–0.6 N-m) torque to all four terminals.

Important! If excess inclinometer cable is brought into the enclosure, ensure that you loop and secure the cable to the lower standoff (in the right wall of the enclosure) to preserve the separation of circuits per UL.

Fig. 11

Fig. 12

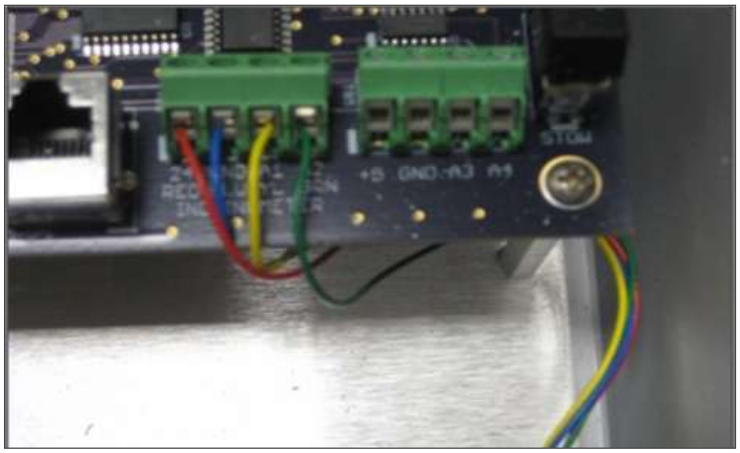


Fig. 13

Only perform Step 9 on the controller designated as the GPS unit.

9. To install the GPS cable:
   a. Install the cord grip into the hole for the GPS cable (to the right of the inclinometer hole).
   b. Hand-tighten the locking nut until it is flush against the inside wall of the enclosure and then tighten 1/6 turn with a wrench.
   c. Feed 12″ (30.48 cm) of the GPS cable through the mounted cord grip.
   d. Tighten the cord grip dome until it is flush with the fitting and in contact with the gland base.
   e. In the box, route the cable between the lower right PCB standoff and the enclosure wall. Route the cable counterclockwise around the lower standoff and under the PCB. From underneath the PCB, route the cable to the topside (Fig. 14).
   f. Insert the RJ45 plug into the modular jack labeled **RJ3-GPS** (Fig. 15).

Fig. 14

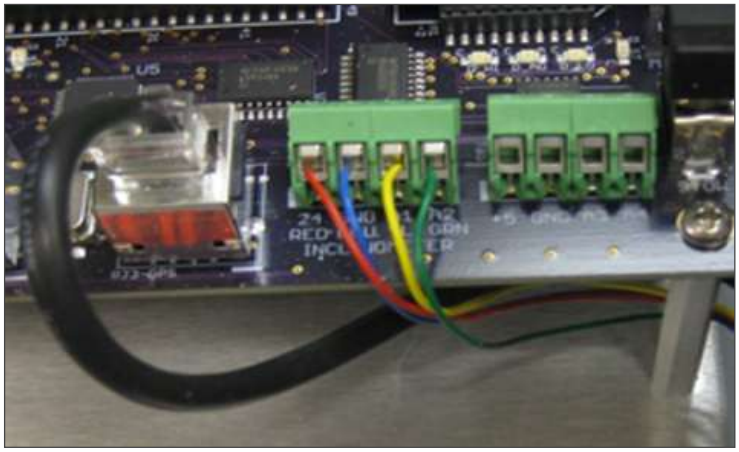


Fig. 15

Only perform Steps 10–11 on the controller designated as the Coordinator TMAC.

10. To install the Ethernet cable:
   a. Install the cord grip (if being used) into the hole to the right of the inclinometer hole. Hand-tighten the locking nut until it is flush against the inside wall of the enclosure and tighten 1/6 turn with a tool.

      If conduit is being used, install the fitting similarly but tighten 1/2 turn with a tool.
   b. Feed the Ethernet cable through the xxxxxxxx provided cable gland (or conduit—in which case the gland is not needed) and route the cable between the front standoff and the enclosure wall (Fig. 16).
   c. Coil any excess cable and restrain with a zip tie to maintain isolation from the power circuits in the enclosure.

Fig. 16

d. Continue to route the cable underneath the PCB and to the left side of the upper right standoff (not between the upper standoff and enclosure wall), and then bring the cable to the topside of the PCB (Fig. 17).

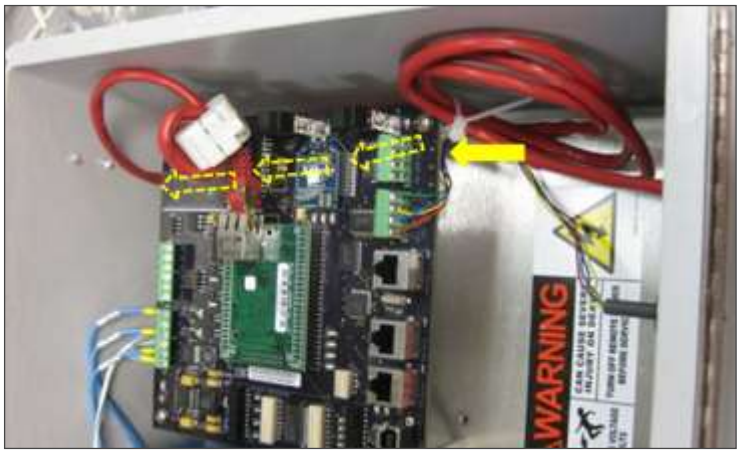


Fig. 17

e. Wrap the cable three times around the snap-on ferrite (Fig. 18, Fig. 19, and Fig. 20) so that when finished less than one inch of cable protrudes between the ferrite and the plug end (Fig. 21).

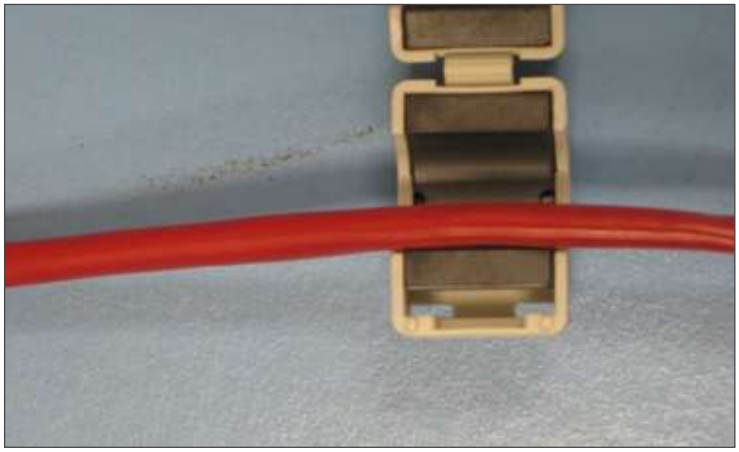


Fig. 18

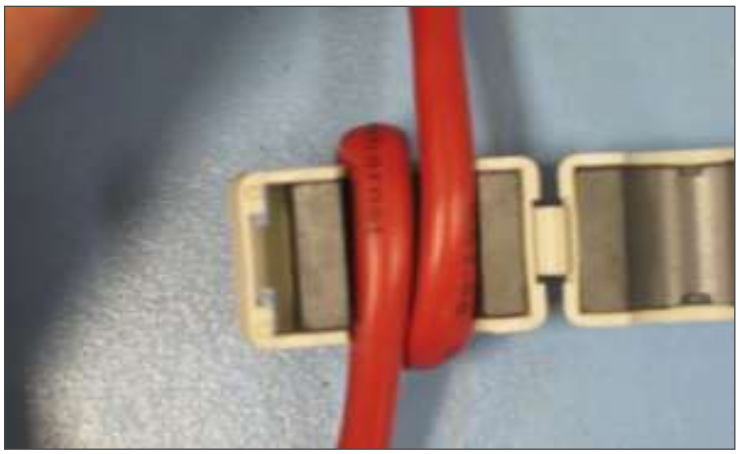


Fig. 19

f. Insert the cable end into the modular jack on the NetBurner® module (Fig. 22).

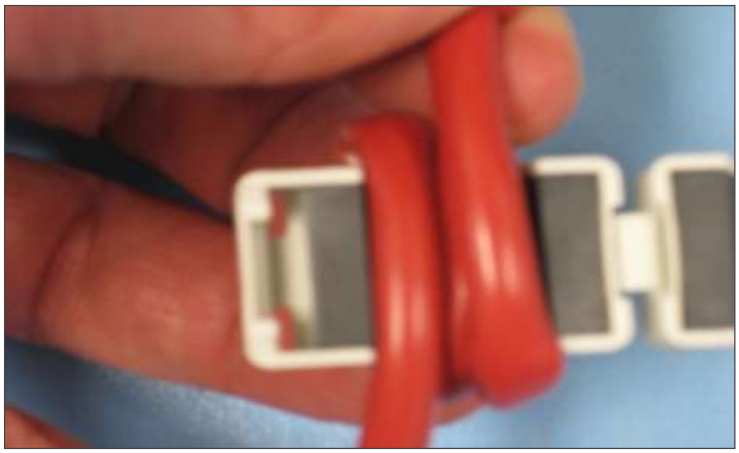


Fig. 20

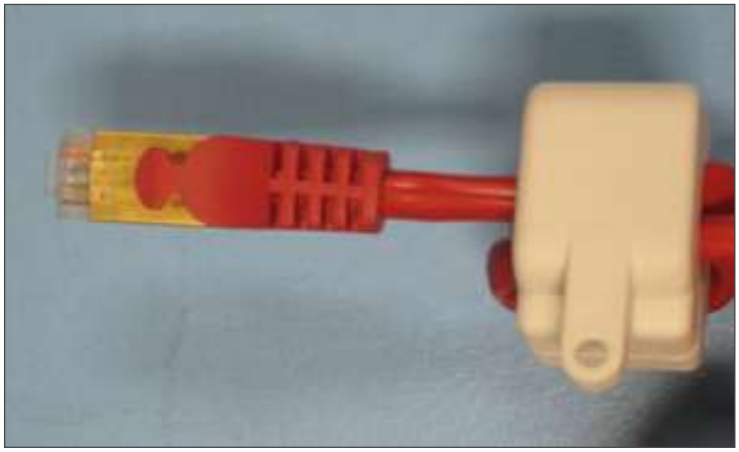


Fig. 21

Fig. 22

11. To install the Coordinator radio chip:

    a. Remove the factory-installed XBee® router module (Fig. 23).

       Place an index finger against the router module's edge between the DIRECTION and MODE switches and other index finger against the opposite edge near the NetBurner® module. With a slight back and forth rocking action, slowly lift the pins out of the socket a small amount each time (Fig. 24).

       Important! Ensure that you handle the router module carefully to avoid damaging the antenna attached to the PCB.

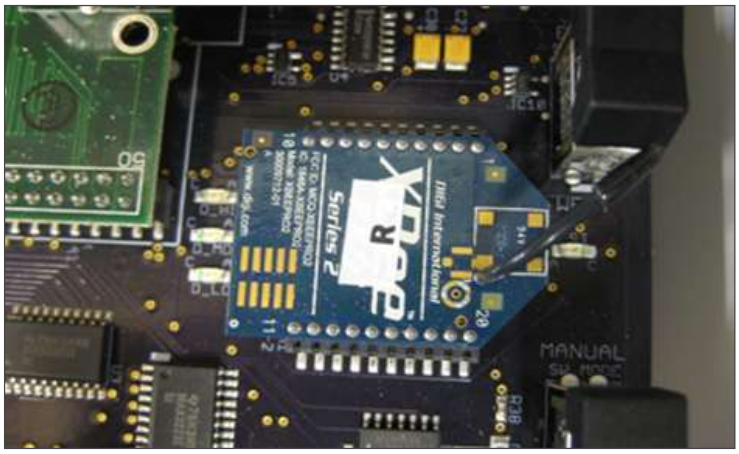


Fig. 23

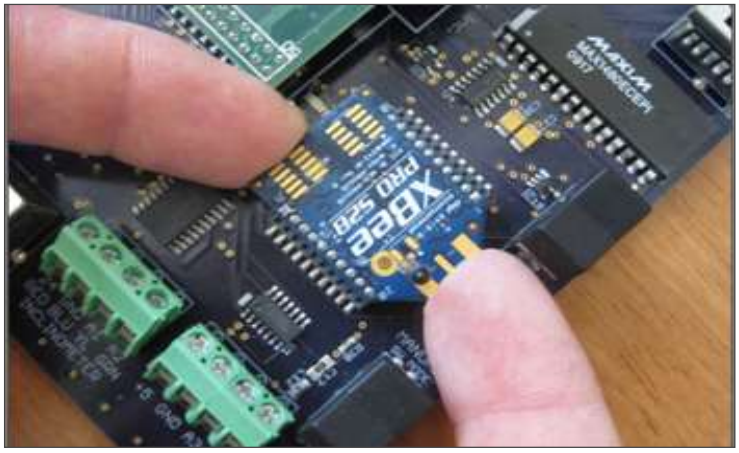


Fig. 24

b. Check that the antenna is perpendicular to the PCB. Carefully straighten the antenna if needed.

c. Remove the XBee® Coordinator radio chip from the antistatic bag and position it over the socket.

d. Make sure that all of the module pins are aligned with the pin receptacles of the socket (Fig. 25), and *not* shifted over by one pin (Fig. 26).

e. With a slight back and forth rocking action, firmly press on both socket rows simultaneously.

f. Verify that all module pins are directly over the pin rows of the socket strips (Fig. 25). The module's physical shape should directly coincide with the outline on the PCB silkscreen overlay.

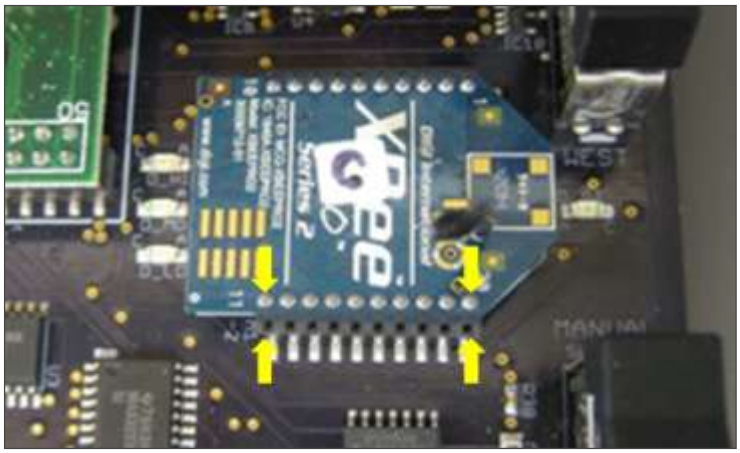


Fig. 25

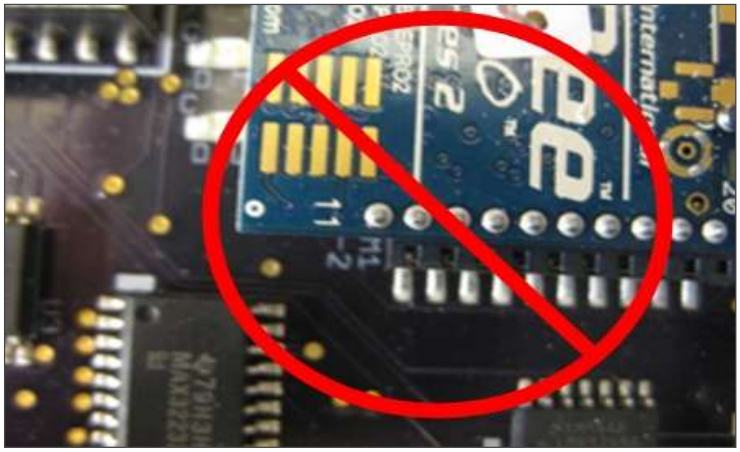


Fig. 26

2.1.1 Installing Bifurcating Power Cable

Installation of a bifurcating power cable on the centrally located TMAC may be required for certain blocks in an Oasis system.

Refer to the project drawings to identify the centrally located TMAC controller to which power for the network will be delivered.

To install the bifurcating power cable:

1. Open the controller box and examine normal power wiring.

   Three sets of dual terminal blocks provide termination points for the three phases of the power entry and exit wires (Fig. 27).

   The **L1, L2,** and **L3** wire leads on the top terminal blocks are connected to the controller circuit breaker (Fig. 28).

2. Locate and identify open terminals on the terminal blocks.

   On the top terminal blocks is a set of open terminals that can accommodate the three phases of the bifurcating power entry cable (Fig. 29). The new cable's **GND** (green) wire can be terminated on the remaining open terminal on the bottom right terminal block (Fig. 29).

Fig. 27

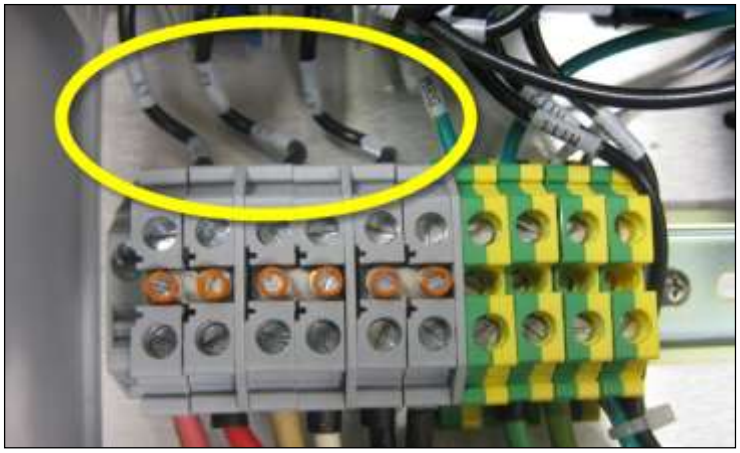


Fig. 28

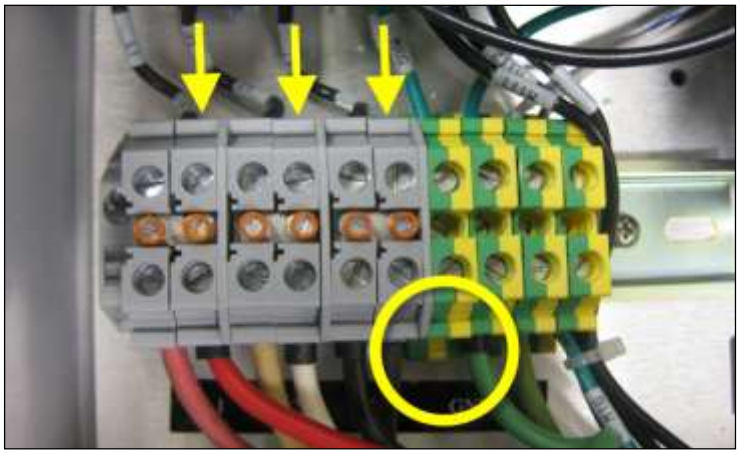


Fig. 29

3. Drill a hole of appropriate size for the NEMA 4 cable gland. Locate this hole approximately 2″ (5.08 cm) from the base (the edge where the controller box mounts) and 2 1/2″ (6.35 cm) from the bottom edge (Fig. 30).

   Important! When drilling, ensure that you are very careful to not damage any of the installed wiring inside the enclosure. To reduce fiber dust during drilling, xxxxxxxx recommends that you use a hole saw.

4. Insert the cable gland into the hole and tighten.

Fig. 30

5. Install the bifurcating power entry cable (Fig. 31).

   Hand-tighten the fitting nut until it is flush against the inside wall of the enclosure, and then tighten the gland.

Fig. 31

6. Land the phase wires (**L1, L2,** and **L3** leads) and ground wire on the previously identified open terminals (Fig. 32, Fig. 33, and Fig. 34).

Fig. 32

7. Tug on the wires gently to ensure that they are properly seated.
8. Check all installed cables before closing the enclosure (Fig. 35).

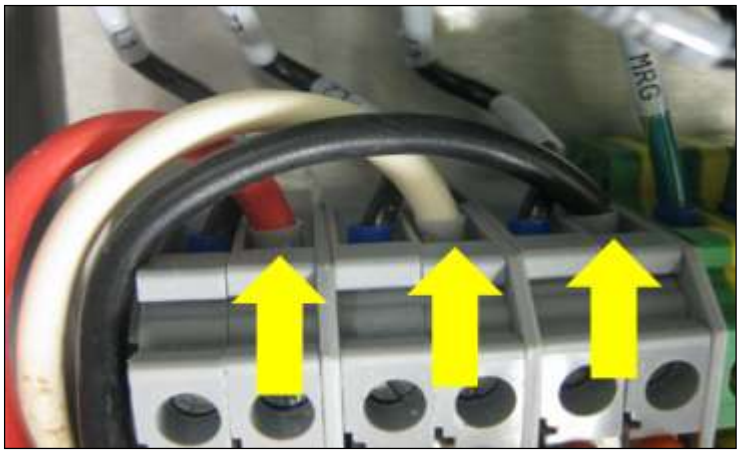


Fig. 33

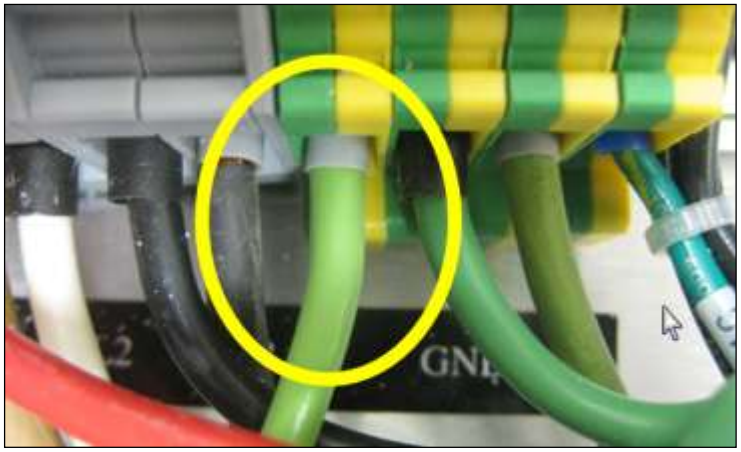


Fig. 34

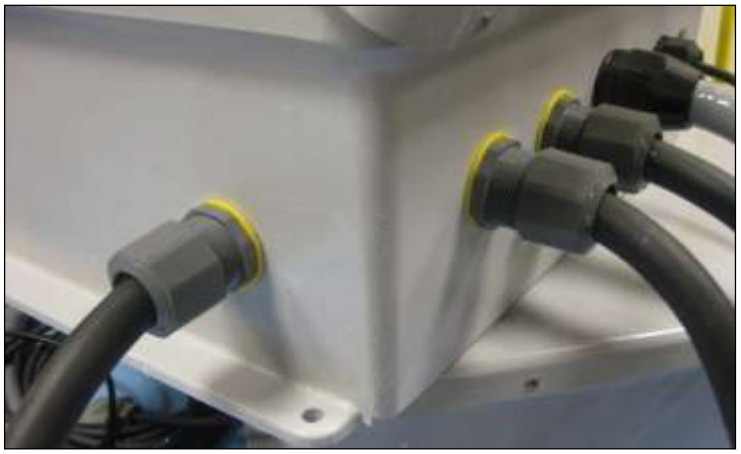


Fig. 35

2.2 Wiring the Motor

To wire the drive motor to the controller:

1. Remove the cover plate of the junction box (J-box) on the drive motor (Fig. 36).
2. Feed the four motor cables from the controller box through the lower extension fitting of the J-box. Screw the liquid-tight conduit to the extension fitting of the motor J-box (Fig. 37).
3. Verify the jumper configuration of the motor. If it is not already so configured, you must configure the jumpers according to the power supply.
4. Land the black T1, T2, and T3 wires of the motor cable to the terminal studs in the J-box by removing the top brass nut from the T1, T2, and T3 terminals (and the corresponding wire to the terminals), and then hand-thread the nuts until they seat completely. Use a socket wrench to finish tightening the nuts.

   Warning! Do not strip the studs. Thread nuts by hand before using a wrench. *Do not* tighten with a drill. Make sure to check that the backing nuts are not loose.
5. Land the ground (green) wire to the J-box housing using the raised ground location and Phillips screw inside the J-box.
6. Replace the drive motor J-box cover.

Fig. 36

Fig. 37

2.3 Mounting the Inclinometer

The inclinometer enables the controller to determine the exact position of the modules relative to the sun.

Secured by special cushion straps (Fig. 38), the inclinometer cable runs from the controller to the north pier, up the pedestal, and then north along the underside of the torque tube. You install the inclinometer and bracket last to help ensure that you remove all slack from the cable.

Important! You must install the inclinometer on the *north* side of the drive strut.

To mount the inclinometer:

1. Open each cushion strap by backing the tip of the screw out of the mounting hole and pulling the strap open.
2. Use the cushion straps to secure the inclinometer cable at the proper locations (Fig. 39). While securing the cable, hang the bracket across the top of the torque tube to prevent stressing the splice or the cable connection in the inclinometer housing.

Fig. 38

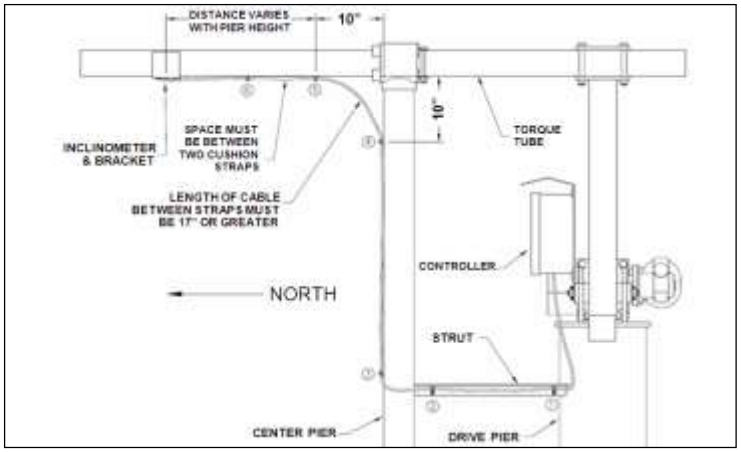


Fig. 39

3. To prevent the cable from twisting, stabilize the cushion strap while drilling it onto the torque tube (Fig. 40).
4. Ensure that there is a minimum of 17″ (43 cm) of cable length between the fourth and fifth cushion straps (nearest the junction of the torque tube and pedestal).

   Important! Do not over-torque the screws. Maximum torque is 200 in-lbs (22 N-m). All screws use a 3/8″ (10 mm) socket.
5. Retrieve the two #8 self-tapping screws from the inclinometer hardware bag.
6. Locate the inclinometer on the underside of the torque tube. Orient the cable end to the south.
   - For torque tubes with 3 mm thick walls:

     Feed the self-tapping screw through one of the inclinometer ear and then screw it into the torque tube.
   - For torque tubes with 5 mm and greater thick walls:

     Using a #28 9/64″ (3.6 mm) drill bit, drill a hole where one ear of the inclinometer will be placed. Align the inclinometer ear over that hole and then tack the inclinometer to the torque tube using one self-drilling screw (xxxxxxxx part # 114600). Tighten the screw snugly, still allowing inclinometer to rotate.

.

Fig. 40

7. Use a square to align the inclinometer with the torque tube in the north–south direction only (Fig. 41). Do not square up in the vertical direction (Fig. 42).
    - For torque tubes with 3 mm thick walls:

      Feed the second self-tapping screw through the other inclinometer ear and then screw it into the torque tube.
    - For torque tubes with 5 mm and greater thick walls:

      Using the #28 9/64″ (3.6 mm) drill bit, drill a hole where the other ear of the inclinometer is currently positioned. Keeping the alignment of the inclinometer ear over that hole, install the second self-drilling screw (114600) into the torque tube. Hand-tighten the screw. Snug both screws and check alignment.
8. Start over at Step 1 if the inclinometer is more than 1/16″ (1.5 mm) off of square.
9. Tighten screws to 45 ±10 lb-in (5 ±1 N-m) once proper alignment is achieved.

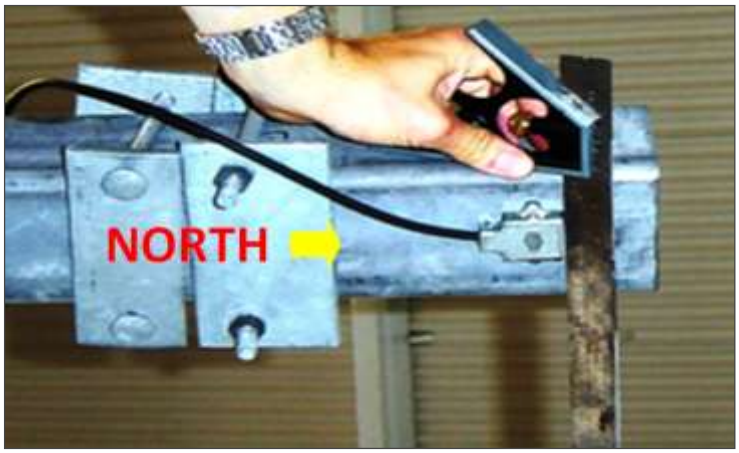


Fig. 41

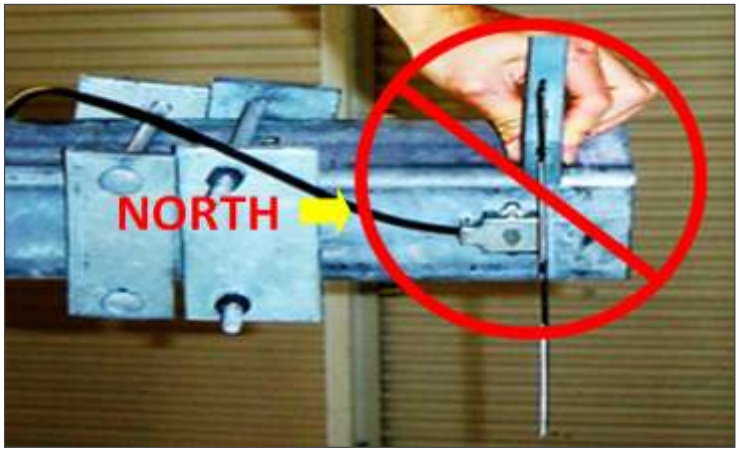


Fig. 42

2.4 Setting Parameters and Verifying Functionality

After you install the TMAC controller, you must assign the controller a node address, level the system, verify east and west tracking limits, and enter other operational parameters. You must assign a node address, perform the verifications, and enter the parameters for *each* TMAC controller on the site. Once entered, the data is stored in the non-volatile memory of the TMAC through an update command.

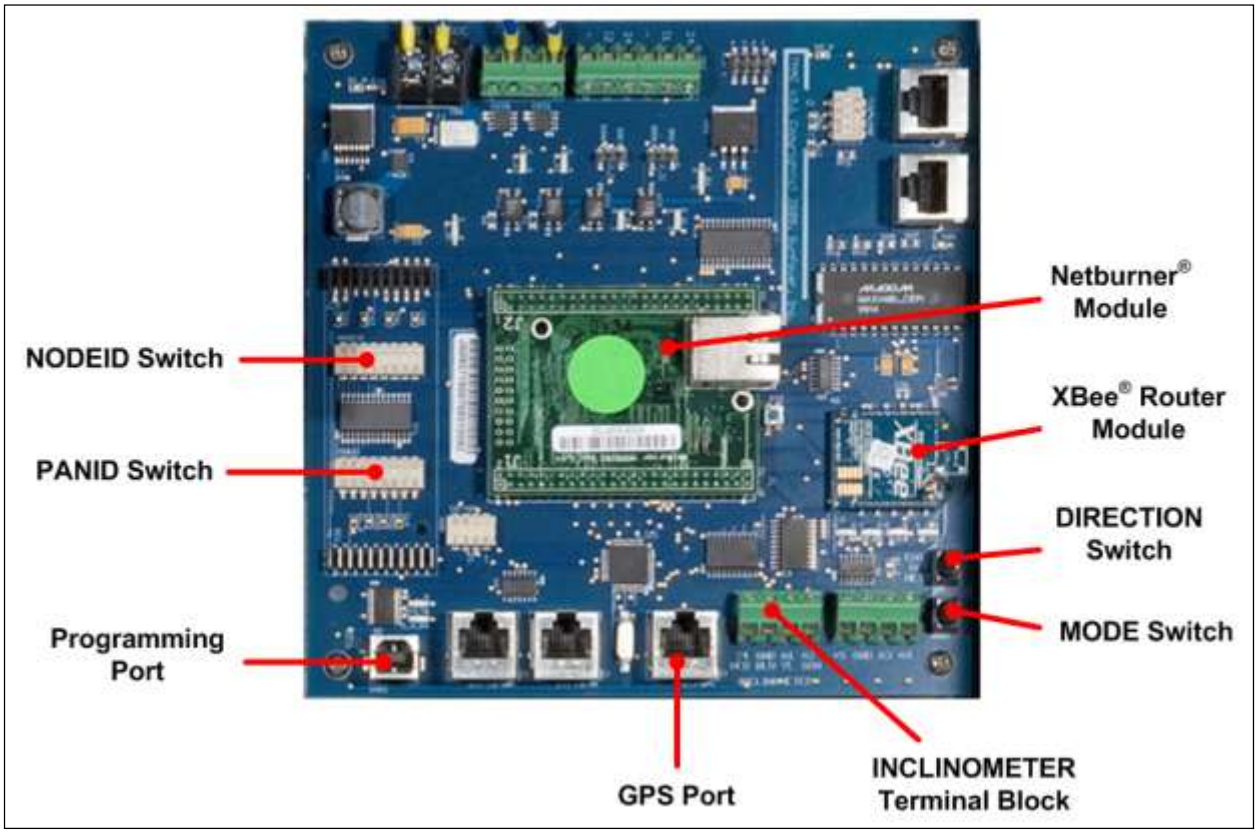
Important! The GPS device installed in designated TMAC controllers enables the controller to acquire the longitude, latitude, and time, and to wirelessly provide the information to the Coordinator TMAC. The Coordinator TMAC then transmits the data to all controllers in the network. Configure the Coordinator and TMAC GPS units first so these data can be available as other controllers are configured. A TMAC controller without time information will not run in **Auto** mode.

Note. TMAC controllers installed with GPS units are usually assigned node address *NODEID 1.*

You set system parameters by connecting a laptop to the TMAC controller. The laptop you connect must have the TMACterm application installed. The TMACterm application enables easy configuration of the TMAC and quick verification of system functionality.

Important! The laptop you use must be configured for TMAC programming. Refer to Section 2.5 for the configuration procedure.

Here is a closer view of the TMAC controller logic board:



TMAC Tracker controller PCB

The state of the TMAC controller can be manipulated with two 3-position rocker switches: the MODE Switch and the DIRECTION Switch.

The TMAC controller has three primary operating modes, activated with the MODE Switch:

- **AUTO Mode** (the middle or neutral position) runs the motor to drive the array that maximizes system power output (the controller computes the sun's position and moves the array accordingly)
- **MANUAL Mode** enables the position of the array to be manually adjusted using the DIRECTION Switch:
  - **EAST** (up) runs the motor to tilt the panels to the east
  - **OFF** (the middle or neutral position) turns the tracker motor off
  - **WEST** (down) runs the motor to tilt the panels to the west

  There is a time delay enforced if the DIRECTION Switch is too rapidly moved.
- **STOW Mode** runs the motor to the preconfigured 'flat' position

Important! Before setting parameters, refer to the project drawings to identify the designated Coordinator TMAC unit for the network you are configuring. The Coordinator TMAC unit, located at the closest inverter station, is hardwired with Ethernet cable to the site access point (refer to Section 2.1, Step 10). Verify that the unit has the XBee® Coordinator radio chip (marked with a "C", Fig. 43) instead of the factory-installed XBee router module (refer to Section 2.1, Step 11).

Fig. 43

2.4.1 Setting System Parameters

Power on the controller and verify that the LED marked **D_3V** near the power supply is lit.

To set the system parameters for each TMAC controller:

1. Power down the controller.
2. Refer to the project drawings for the following:
   - Network Address (PANID) – the address of this group of TMAC units
   - Node Address (NODEID) – the address of the TMAC being configured

   Important! *NODEID 0* is always reserved for the Coordinator TMAC unit.
3. Put the MODE Switch in the **MANUAL** position.

4. Referring to the Individual Tracker Information Table, perform the following steps on the TMAC address switches:

   a. Set the **PANID** Switch:

      All of the controllers in a network have the same PANID. Set *all* of the units in that group to that same PANID using the following table to convert from PANID decimal to binary switch position.

PANID Number (Decimal)	Binary Switch Position
1	00000001
2	00000010
3	00000011
4	00000100
5	00000101
6	00000110
7	00000111
8	00001000
9	00001001
10	00001010

      The rightmost digit in the **Binary Switch Position** value corresponds to the rightmost binary switch (labeled **8**). The "up" position (towards **ON)** of each switch represents a binary *1,* and the "down" position a binary *0* (Fig. 44).

      For example, the **PANID Switch** is set to *00000011* on a controller that belongs to a network with *PANID 3* (Fig. 44).

      Important! To convert PANID decimals 11 to 255 to binary switch position, refer to Appendix A.

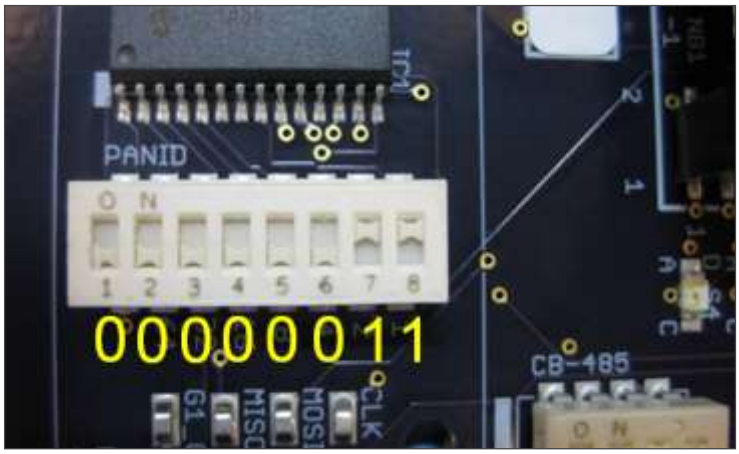


Fig. 44

b. Set the **NODEID** Switch:

- On the Coordinator TMAC unit, set the **NODEID** binary switches to *00000000* (all switches down).
- For all of the remaining TMAC units within this PANID, consult the project drawings for each controller's assigned NODEID. Refer to the following table to convert from NODEID decimal to binary switch position.

  The individual **Binary Switch Position** value correlates with the individual switch positions as you go from left (switch **1**) to right (switch **8**) (Fig. 45).

NODEID Number (Decimal)	Binary Switch Position
1	00000001
2	00000010
3	00000011
4	00000100
5	00000101
6	00000110
7	00000111
8	00001000
9	00001001
10	00001010

For example, the **NODEID** Switch is set to *00000101* on the controller that is assigned *NODEID 5* (Fig. 45).

Fig. 45

5. Use the USB-A to USB-B cable assembly to connect the laptop to the controller through the **Programming Port.**
6. Start the TMACterm application.
7. The TMACterm Select serial port screen opens (Fig. 46):
   - Select the serial port number being used by your computer for TMACterm and then click *OK*. Skip Steps 8–11 and proceed to Step 12.
   - To determine the serial port number being used by your computer for TMACterm, perform Steps 8–10.

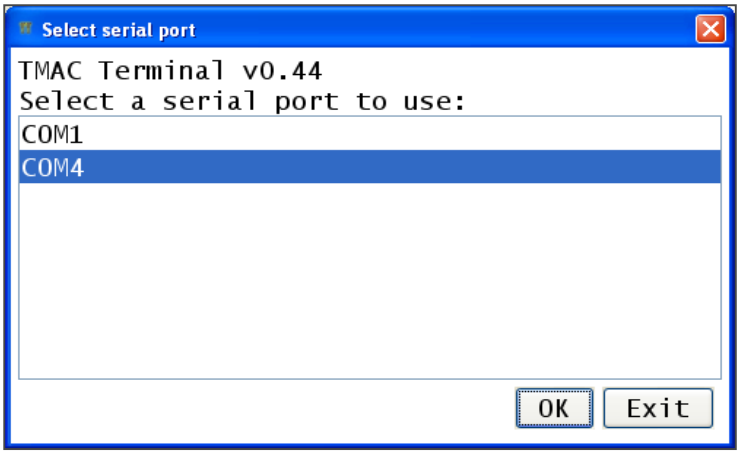


Fig. 46

Perform Steps 8–10 the first time you connect the computer to a TMAC controller.

Note. If in future the USB port is used to connect the computer to another device, it may be necessary to perform these steps again the next time you connect your computer to a TMAC controller.

8. Navigate to Start, Settings, Control Panel, System.
9. In the System Properties window, click the Hardware tab and then the Device Manager button (Fig. 47).
10. In the Device Manager window, scroll down the list until *Ports (COM & LPT)* is found. Expand that entry and look for *USB Serial Port (COM?)* (Fig. 48). The *?* (question mark) is the port number being used by your computer for TMACterm (in this case, *COM4*).

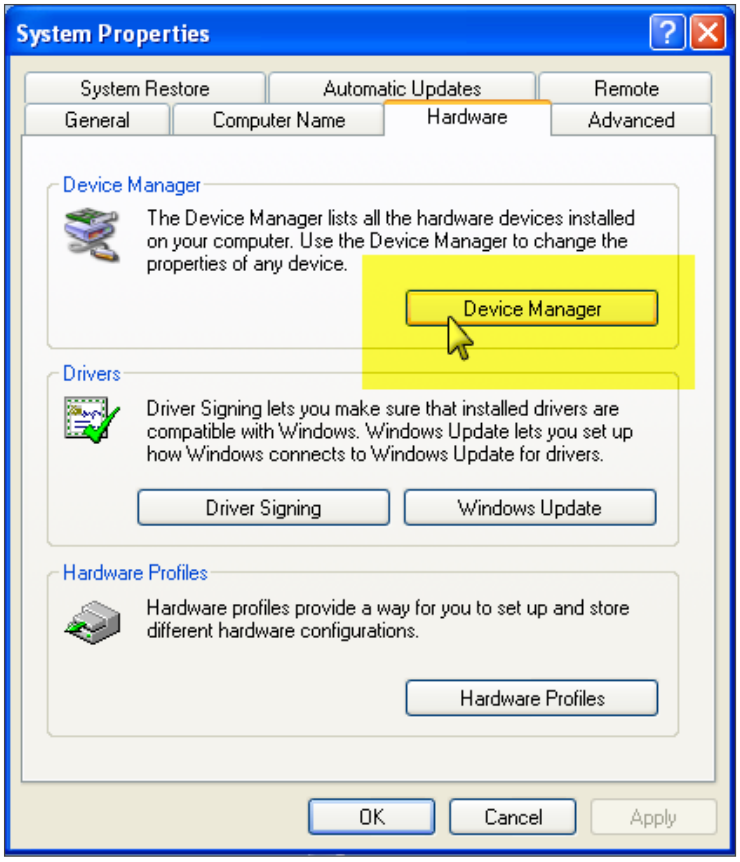


Fig. 47

11. Return to the TMACterm Select serial port screen and select the COM port identified. Click *OK*.
12. The TMACterm main screen appears with a dialog box that says *'Unable to establish communication with TMAC'*. Disregard the message and click the *OK* button. Note that the only activity present is the *Sent* counter at the bottom of the window (Fig. 49).

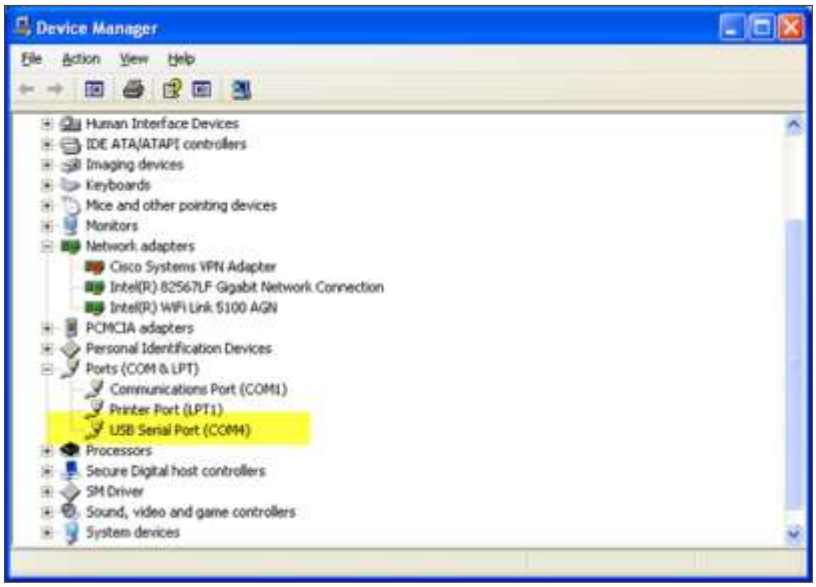


Fig. 48

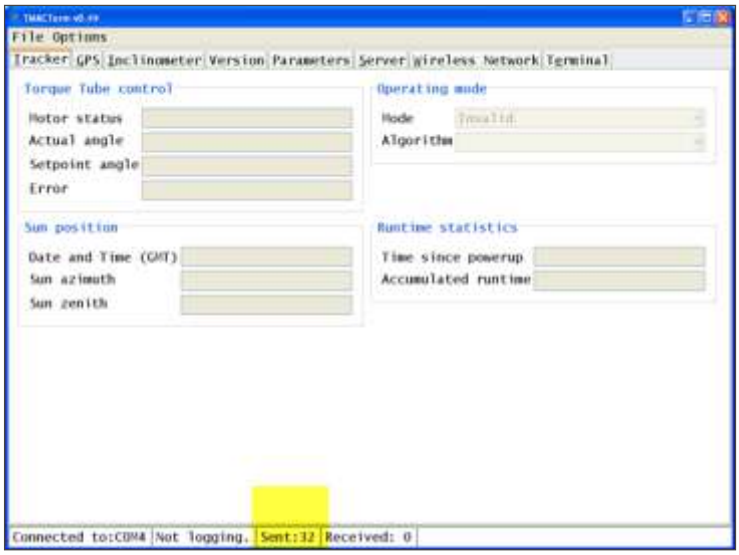


Fig. 49

13. Turn on the TMAC circuit breaker.

    In the TMACterm main screen, a message *'Can't parse firmware version'* may appear but it can be ignored.

    After the TMAC boots up it may not find time and date information yet. Note that the *Received* counter value indicates the number of messages that the TMACterm has received from the TMAC (Fig. 50).

    Fields under **Operating mode** indicate when the TMAC has fully booted in **Manual** mode (Jog) and the GPS has been read (Fig. 51). Other TMAC units will get their time information wirelessly from either the GPS unit or from the Coordinator TMAC which gets the time from an Internet clock. The **Motor status** error is normal when the TMAC is in **Manual** mode (Fig. 51).

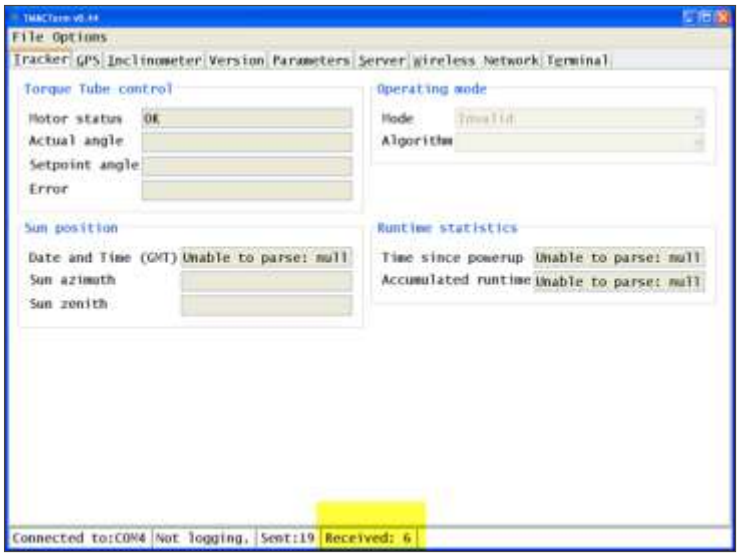


Fig. 50

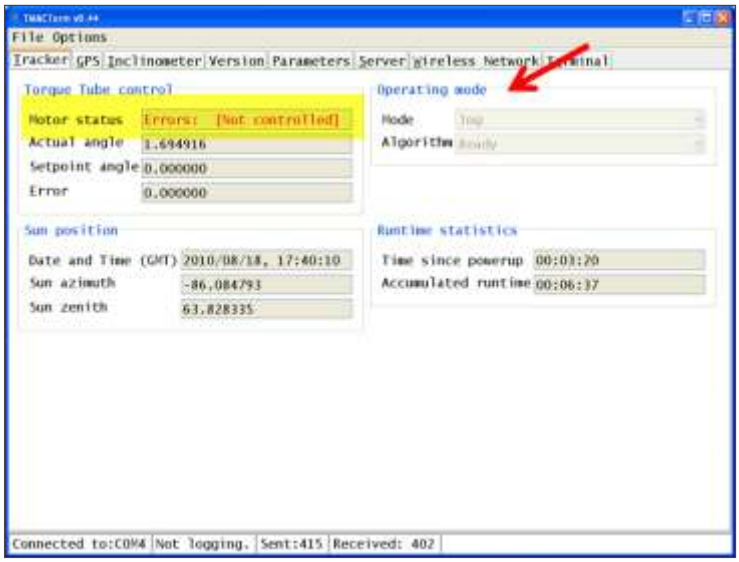


Fig. 51

14. Click the **Wireless Network** tab in the **File Options** bar.
15. In the Wireless Network screen, verify that the **PAN ID** and **Node ID** values under **Local wireless status** are the PANID and NODEID decimals, respectively, specified in the project drawings (Fig. 52).
16. Click the **Parameters** tab.
17. In the Parameters screen, enter (or select) and verify parameter values:
    a. Enter (or select) the parameter values indicated in the project drawings in the **Position settings** and **Site parameters** fields (Fig. 53).

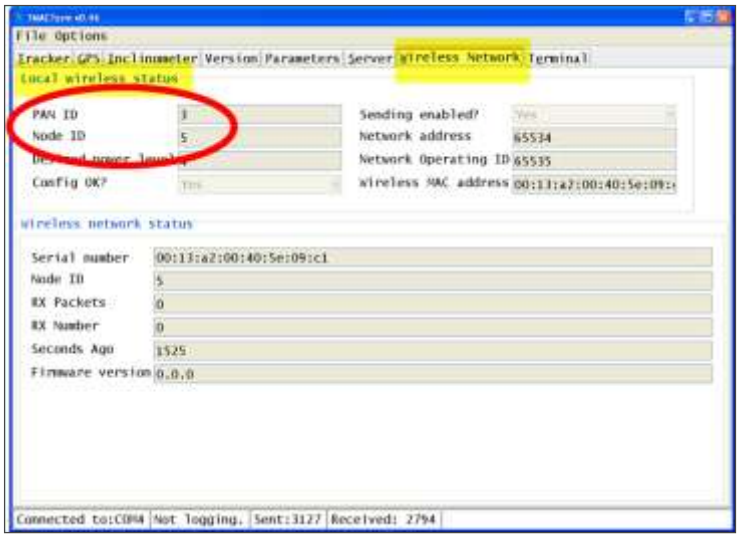


Fig. 52

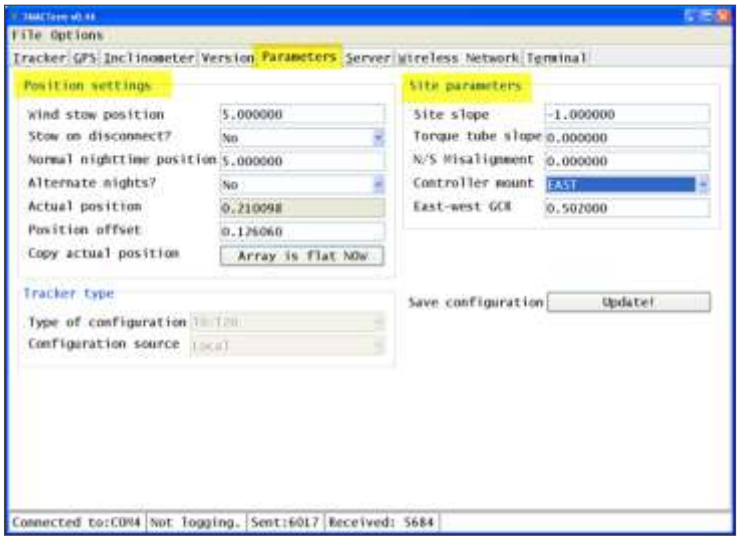


Fig. 53

To view the description or details of a field, position your cursor over the field title (Fig. 54).

b. Verify the **Site slope, Torque tube slope,** and **East–West GCR** values.

- Measure the site slope and torque tube slope using a digital inclinometer. Measure the E–W GCR using a tape measure.
- Compare the measurements with the values in the **Site slope, Torque tube slope,** and **East–West GCR** fields. If the difference between the measured value and the entered value is less than 1%, proceed to the next step. If the difference is 1% or greater, contact the TMAC Monitoring team.

c. When all the parameter values have been entered and verified, click the *Update!* button.

18. A confirmation dialog box appears. Click *OK* (Fig. 55).

19. To test the entered data:

a. Power down the controller with the TMAC circuit breaker.

b. Close TMACterm and then re-launch the application after several seconds.

c. Wait 10 seconds before powering the controller back up.

d. At the TMACterm main screen click the **Tracker** tab and then click the **Parameters** tab. Verify that the correct values are stored in the Parameters screen.

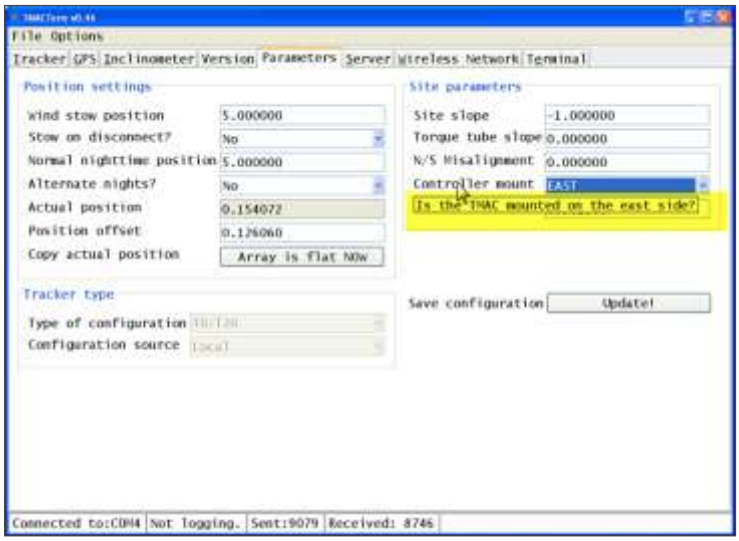


Fig. 54

Fig. 55

20. Before closing the controller box, verify that all LEDs (**D_S1, D_S2, D_S3,** and **D_S4)** on the TMAC PCB are not lit. All LEDS should be off; otherwise, the TMAC will not operate correctly.

    When lit, the **D_S1** LED indicates that the controller is in **Stow** mode; if flashing at 1Hz, the TMAC is in **Manual.**

    If the **D_S2** LED is flashing, it indicates that the motor is not under control. Several problems can cause this condition:

    - the motor failed to track
    - there is no valid time in the TMAC
    - there is no valid feedback
    - the temperature in the TMAC enclosure is too high, that is, greater than 70° C

    The **D_S3** and **D_S4** LEDs are reserved for future use. However if both LEDs are lit, either there is no software loaded on the Netburner© module or the TMAC PCB failed.

    Refer to the *TMAC Troubleshooting Guide* (xxxxxxxx document 001-64068) for more information.

21. Call or send an email to the TMAC Monitoring team to complete the commissioning procedure and enable remote control and monitoring for the site. Provide the site name and location, and network configuration data indicated in the project drawings.

    Note. You are not required to perform this last step onsite unless instructed otherwise by the TMAC Monitoring team.

2.4.2 Verifying Motor and Controller Wiring

1. With the controller box powered down and the door open, turn the MODE Switch to **MANUAL.** Power up the controller by turning the circuit breaker on.
2. Turn the DIRECTION Switch to **EAST.** The modules should begin rotating to the east.

   If instead the modules rotate west, verify that the correct mount (EAST or WEST) for the installation is selected in the TMAC Parameters screen (refer to Section 2.4.1, Step 19). If *WEST* is selected in the **Controller mount** field and the modules still rotate west, inspect the controller's power terminal blocks and the motor's wiring for reversed polarity. Contact xxxxxxxx if the wiring for the controller or motor appears incorrect or not according to the electrical wiring diagrams.
3. Turn the DIRECTION Switch back to OFF (the middle position, neither **EAST** nor **WEST**).

2.4.3 Verifying Array Flatness

验证阵列水平

A Tracker array is considered "flat" when its modules are at a tilt angle of 0°.

当模块在角度 0 度角时我们认为阵列时水平的

1. Turn the MODE Switch to **MANUAL.**

   将 MODE 开关拨到 MANUAL。
2. Turn the DIRECTION Switch to the **EAST** or **WEST** positions as necessary to move the modules to a visually horizontal (flat) position.

   将 DIRECTION 开关调制 EAST 或 WEST 位置，必要时将模块转至目测水平位置。
3. Use an auxiliary digital inclinometer to measure one of the modules at the center of the first row (or place your level E−W, across a fairly even, stable module near the drive strut on the first row), and then use the DIRECTION Switch again to manually move the array, until the auxiliary inclinometer (or level) reads exactly level (or 0° +/− 0.1°).

   使用数字水平仪第一行中间测量一个模块的角度，然后再次使用 DIRECTION 开关转动阵列，找到水平仪读数为水平（或 0 度±0.1 度）
4. In the TMACterm screen, click the **Parameters** tab. Click the *Array is flat NOW* button.

   在 TMACterm 界面，点击 Parameter 页面。点击" Array is flat Not" 按钮。
5. Click the *Update!* button and then click *OK* in the confirmation dialog box.

   点击 "update" 按钮，然后在确认窗口点击 OK。

2.4.4 Verifying East and West Limits

验证东西角度极限

Warning! During the following procedure, ensure that you closely observe the movement of the modules so that you can use the switches to manually stop the motion if the modules do not stop at 45° or if there is risk of damage.

注意！在一下的步骤中，确保你可以近距离观察到模块的转动，如果模块在转动到 45 度没有停，你可以使用手动开关停止，否则有损坏的危险。

1. Turn the MODE Switch to **MANUAL.**

   将 MODE 开关拨至 MANUAL。

2. Turn the DIRECTION Switch to **EAST.**

   将 DIRECTION 开关拨至 EAST。

3. Verify that the modules begin rotating to the east.

   确保模块开始向东转动。

4. The modules will eventually stop rotating (this will take approximately 22 minutes if the modules were flat when you started jogging east). Use a digital inclinometer to verify that the module directly above the controller inclinometer is at 45° ± 2°. If the angle of the module directly above the controller inclinometer is not 45° ± 2°, you must replace the controller inclinometer. Contact xxxxxxxx.

   模块最终将停止转动（如果模块从水平到东极限将耗费 22 分钟）。使用数字水平仪在控制器斜角仪上方验证角度在 45 度±2 度。如果角度不是 45 度±2 度，需要更换控制器斜角仪。联系 xxxxxxxx。

5. Turn the DIRECTION Switch to **WEST.**

   将 DIERCTION 开关拨至 WEST。

6. Verify that the modules begin rotating to the west.

   确保模块开始向西转动。

7. In approximately 45 minutes the modules will stop. Use a digital inclinometer to verify that the module directly above the inclinometer is at 45° ± 2°. If the angle of the module directly above the controller inclinometer is not 45° ± 2°, you must replace the controller inclinometer. Contact xxxxxxxx.

   模块最终将停止转动（如果模块从水平到西极限将耗费 22 分钟）。使用数字水平仪在控制器斜角仪上方验证角度在 45 度±2 度。如果角度不是 45 度±2 度，需要更换控制器斜角仪。联系 xxxxxxxx。

8. Return the DIRECTION Switch to OFF (middle position, neither **EAST** nor **WEST**).

   将 DIRECTION 开关拨至 OFF(中间位置，非东非西)。

9. Turn the MODE Switch to **AUTO.** The controller will automatically begin driving the modules to the optimal position for collecting solar energy. If it's early morning or late afternoon, do not be alarmed if the tracker starts

moving to the nighttime (stow) position. Observe the AUTO mode behavior for ten minutes to ensure that the controller parameters are stable.

将 MODE 开关拨至 AUTO。控制器将会自动跟踪到一个最佳位置来收集太阳能。如果是在清晨或傍晚，请勿担心跟踪器会开始转东奥夜间（stow）位置。观察 AUTO 模式动作大概十分钟确保控器参数稳定。

The Tracker is now operational.

现在跟踪器正常运行。

2.5 Configuring a Computer for TMAC Programming

Computers used for TMAC programming must be preconfigured. If the laptop you are using is not preconfigured, perform the steps in this section.

2.5.1 Overview

Specific software application and hardware enable a computer to communicate with the TMAC controller:

Software Requirement	Hardware Requirements
TMACterm application	• Laptop with USB connection capabilities • USB male A plug to male B mini plug cable

TMACterm is a xxxxxxxx-provided custom application for computer-to-TMAC communication. A USB/RS232 conversion radio chip is used on the TMAC PCB to communicate to a computer through the **Programming port.**

If you have TMACterm installed on your computer but the application fails to run, uninstall the application using the FTClean - Driver Removal Utility and then re-launch the tmacterm Setup Wizard to install/update/repair the application. To download and extract the **FTClean - Driver Removal Utility** zip file, navigate to the FTDI Utilities web page http://www.ftdichip.com/Support/Utilities.htm. The FTClean - Driver Removal Utility must be run with Internet connection.

2.5.2 Installing the TMACterm Application

The TMACterm application is available online through an internal URL. The installer installs both the TMACterm software and the required FTDI driver.

1. Enter http://devtmac02/setup.msi in your web browser.
2. Click *Run* in the File Download - Security Warning dialog box (Fig. 56).

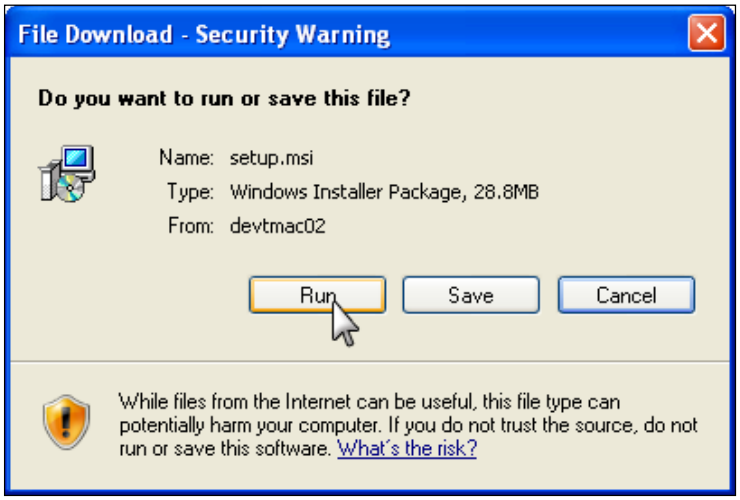


Fig. 56

3. The tmacterm Setup Wizard launches. Click *Next* (Fig. 57).

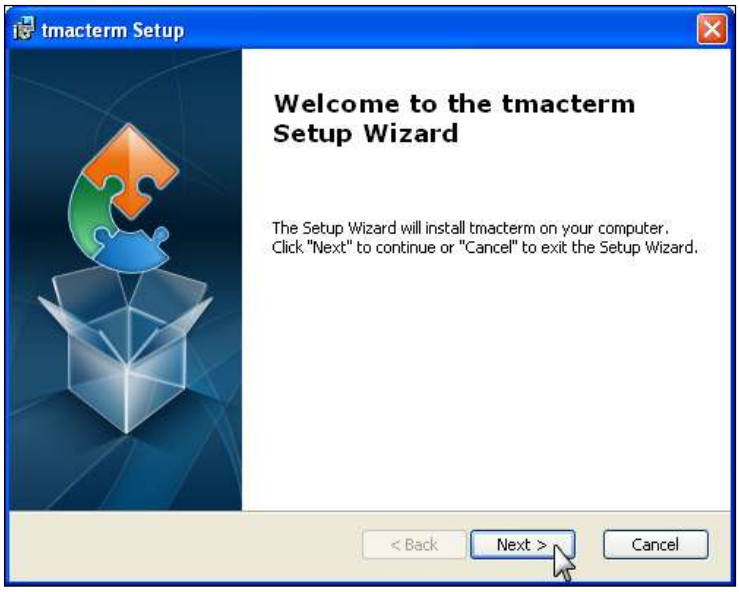


Fig. 57

4. Select the folder where you want TMACterm installed and click *Next* (Fig. 58).

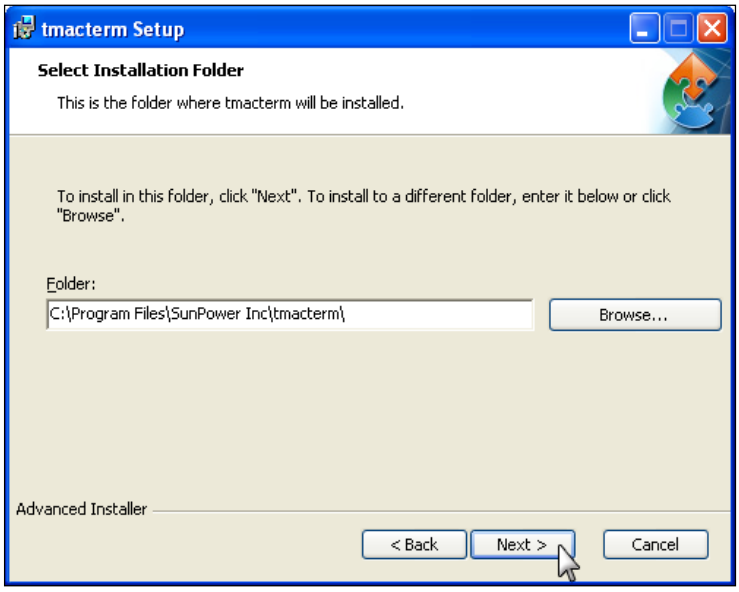


Fig. 58

5. Click *Install* to begin the TMACterm installation (Fig. 59).

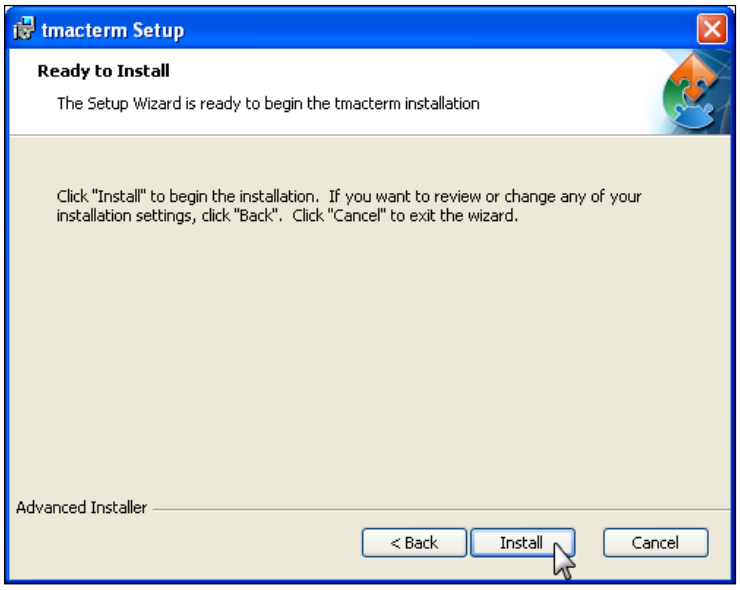


Fig. 59

6. The Device Driver Installation Wizard launches (Fig. 60). Click *Next.*

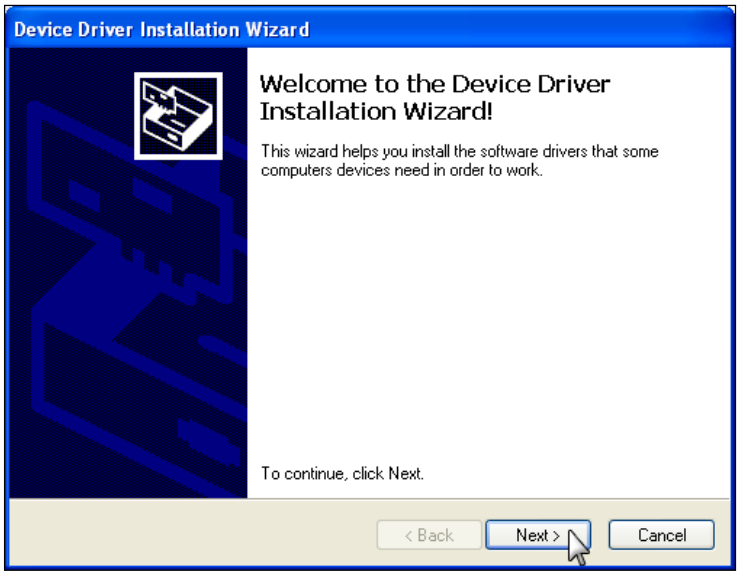


Fig. 60

7. Click *Finish* to complete the Device Driver Installation (Fig. 61).

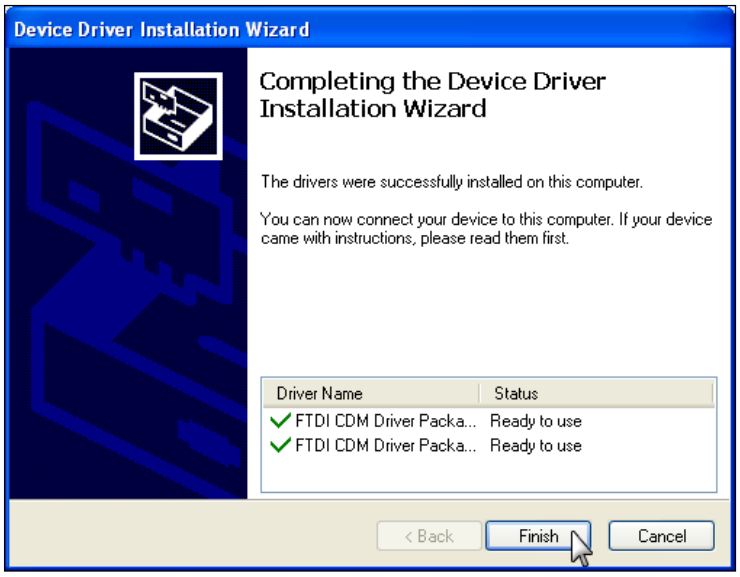


Fig. 61

8. Click *Finish* to exit the tmacterm Setup Wizard (Fig. 62).
9. Check that the TMACterm software icon appears on your desktop.

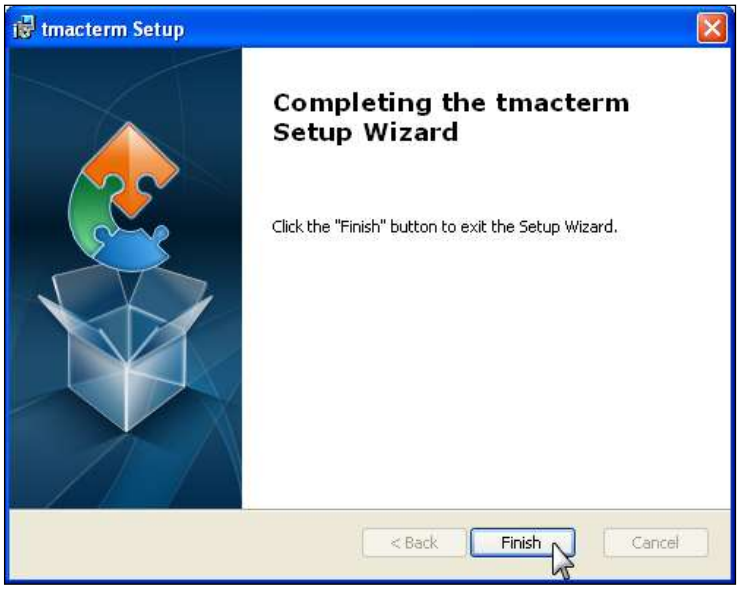


Fig. 62

Appendix A: PANID Decimal to Binary Switch Position Conversion Tables

Refer to the tables in this appendix to determine the binary switch positions for controllers in networks with PANID Numbers 11 to 255.

PANID Number (Decimal)	Binary Switch Position
11	00001011
12	00001100
13	00001101
14	00001110
15	00001111
16	00010000
17	00010001
18	00010010
19	00010011
20	00010100
21	00010101
22	00010110
23	00010111
24	00011000
25	00011001

PANID Number (Decimal)	Binary Switch Position
26	00011010
27	00011011
28	00011100
29	00011101
30	00011110
31	00011111
32	00100000
33	00100001
34	00100010
35	00100011
36	00100100
37	00100101
38	00100110
39	00100111
40	00101000

PANID Number (Decimal)	Binary Switch Position
41	00101001
42	00101010
43	00101011
44	00101100
45	00101101
46	00101110
47	00101111
48	00110000
49	00110001
50	00110010
51	00110011
52	00110100
53	00110101
54	00110110
55	00110111

PANID Number (Decimal)	Binary Switch Position
56	00111000
57	00111001
58	00111010
59	00111011
60	00111100
61	00111101
62	00111110
63	00111111
64	01000000
65	01000001
66	01000010
67	01000011
68	01000100
69	01000101
70	01000110
71	01000111
72	01001000
73	01001001
74	01001010
75	01001011

PANID Number (Decimal)	Binary Switch Position
76	01001100
77	01001101
78	01001110
79	01001111
80	01010000
81	01010001
82	01010010
83	01010011
84	01010100
85	01010101
86	01010110
87	01010111
88	01011000
89	01011001
90	01011010
91	01011011
92	01011100
93	01011101
94	01011110
95	01011111

PANID Number (Decimal)	Binary Switch Position
96	01100000
97	01100001
98	01100010
99	01100011
100	01100100
101	01100101
102	01100110
103	01100111
104	01101000
105	01101001
106	01101010
107	01101011
108	01101100
109	01101101
110	01101110
111	01101111
112	01110000
113	01110001
114	01110010
115	01110011

PANID Number (Decimal)	Binary Switch Position
116	01110100
117	01110101
118	01110110
119	01110111
120	01111000
121	01111001
122	01111010
123	01111011
124	01111100
125	01111101
126	01111110
127	01111111
128	10000000
129	10000001
130	10000010
131	10000011
132	10000100
133	10000101
134	10000110
135	10000111

PANID Number (Decimal)	Binary Switch Position
136	10001000
137	10001001
138	10001010
139	10001011
140	10001100
141	10001101
142	10001110
143	10001111
144	10010000
145	10010001
146	10010010
147	10010011
148	10010100
149	10010101
150	10010110
151	10010111
152	10011000
153	10011001
154	10011010
155	10011011

PANID Number (Decimal)	Binary Switch Position
156	10011100
157	10011101
158	10011110
159	10011111
160	10100000
161	10100001
162	10100010
163	10100011
164	10100100
165	10100101
166	10100110
167	10100111
168	10101000
169	10101001
170	10101010
171	10101011
172	10101100
173	10101101
174	10101110
175	10101111

PANID Number (Decimal)	Binary Switch Position
176	10110000
177	10110001
178	10110010
179	10110011
180	10110100
181	10110101
182	10110110
183	10110111
184	10111000
185	10111001
186	10111010
187	10111011
188	10111100
189	10111101
190	10111110
191	10111111
192	11000000
193	11000001
194	11000010
195	11000011

PANID Number (Decimal)	Binary Switch Position
196	11000100
197	11000101
198	11000110
199	11000111
200	11001000
201	11001001
202	11001010
203	11001011
204	11001100
205	11001101
206	11001110
207	11001111
208	11010000
209	11010001
210	11010010
211	11010011
212	11010100
213	11010101
214	11010110
215	11010111

PANID Number (Decimal)	Binary Switch Position
216	11011000
217	11011001
218	11011010
219	11011011
220	11011100
221	11011101
222	11011110
223	11011111
224	11100000
225	11100001
226	11100010
227	11100011
228	11100100
229	11100101
230	11100110
231	11100111
232	11101000
233	11101001
234	11101010
235	11101011

PANID Number (Decimal)	Binary Switch Position
236	11101100
237	11101101
238	11101110
239	11101111
240	11110000
241	11110001
242	11110010
243	11110011
244	11110100
245	11110101
246	11110110
247	11110111
248	11111000
249	11111001
250	11111010
251	11111011
252	11111100
253	11111101
254	11111110
255	11111111

Appendix B: Remote Access Procedures

B.1 Overview of Control Interface and Capabilities

Remote access to the TMAC controller enables better control of the entire network. By accessing the xxxxxxxx TMAC Advanced Tracker Controller monitoring application, you can perform the following tasks:

- Stowing the array
- Checking array status
- Accessing weather data
- Accessing temperature readings for each TMAC controller
- Carrying out advanced control functions with outside data
- Performing advanced maintenance functions
- Generating email reports

Note. Most of these functions are add-ons and chargeable to our customers.

B.2 User Types

The TMAC Monitoring Team assigns user roles to specific employees and third party representatives in order to execute TMAC control functions, and perform equipment monitoring and system optimization.

The following user types can access the TMAC server:

User	Description
Administrator	A xxxxxxxx employee assigned unrestricted access to the TMAC server and authorized to execute the following functions for all monitored sites: • Commissioning a TMAC controller (full remote configuration) • Setting specific controller parameters (minimal remote configuration) • Full remote operation • Minimal remote operation • Changing controller firmware • Locating a TMAC • Creating and managing customer, site, network, and TMAC information • Accessing detailed views of all objects using admin tabs • Creating and managing user accounts
Supervisor	A xxxxxxxx employee assigned permission to execute the following functions for a specific site or sites, or all monitored sites: • Commissioning a TMAC controller • Setting specific controller parameters

	• Full remote operation • Minimal remote operation • Locating a TMAC • Editing customer, site, network, and TMAC information • Accessing detailed views of all objects using admin tabs • Creating and managing user accounts
Operator	A xxxxxxxx employee assigned permission to set specific controller parameters (minimal remote configuration) and execute select operational commands (minimal remote operation) for a specific, or all, monitored sites.
Viewer	A xxxxxxxx employee or an authorized third party representative assigned permission to view customer or site information, or both.

Important! All users have the option to subscribe to daily email alerts for a monitored site or sites. To subscribe to daily email alerts, contact the xxxxxxxx Operations and Maintenance Department. Only an administrator user can enable this option for another user.

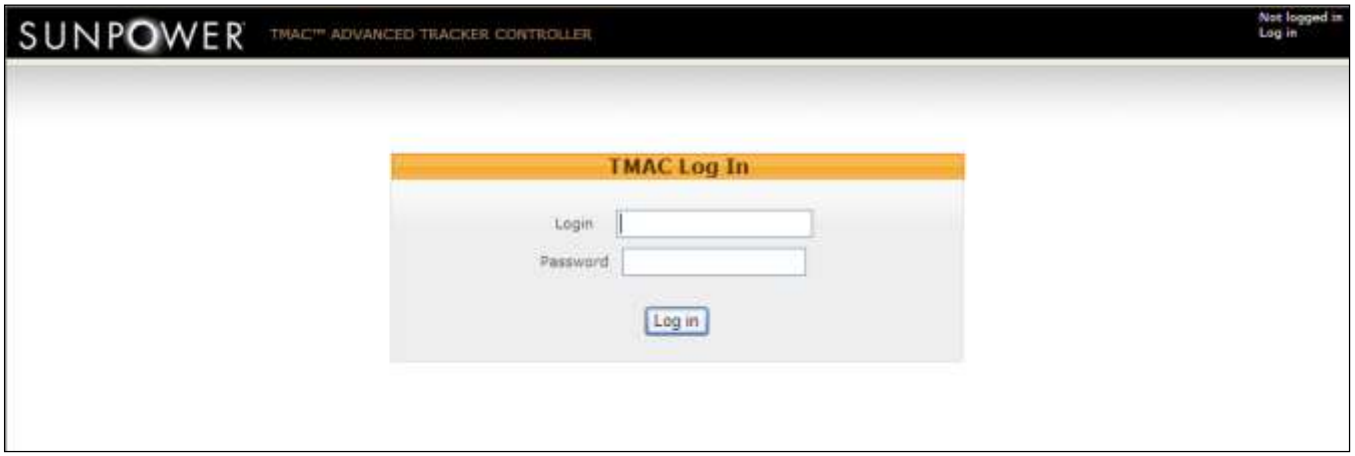
B.3 Accessing the xxxxxxxx TMAC Controller Monitoring Application

Important! To access the xxxxxxxx TMAC Advanced Tracker Controller monitoring application, you need login credentials. Contact the xxxxxxxx Operations and Maintenance Department to have an account set up for you and assign user permissions as necessary.

B.3.1 Logging In

To log in to the application:

1. Navigate to the xxxxxxxx TMAC Advanced Tracker Controller monitoring website http://tmac.xxxxxxxxmonitor.com
2. On the TMAC Log In page, enter your username and password in the **Login** and **Password** fields, respectively and click *Log in.*



TMAC Log In page

Note. Passwords are case sensitive.

3. The application's main page opens (Fig. B1).

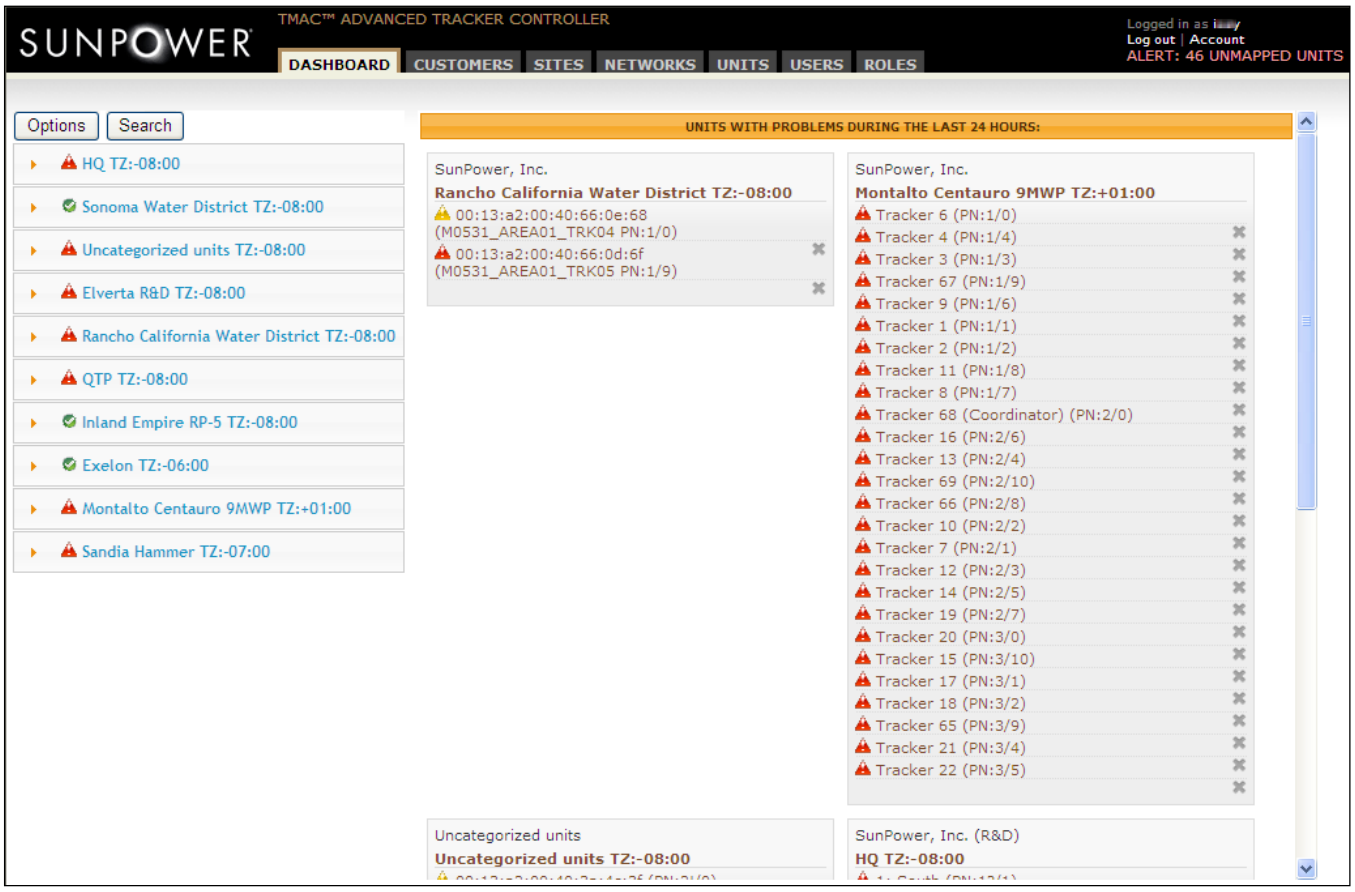


Fig. B1

Important! To administrator and supervisor users, the main page is displayed as the **DASHBOARD** tab page. Dashboard options refer to selections of contents for display on the main page. The **DASHBOARD** and six other tabs in the header of the page are collectively referred to as administrator or admin tabs.

To help you begin using the TMAC application, the main page elements are described in the following table.

Page Element	Description
xxxxxxxx logo	Click to refresh or return to the main or **DASHBOARD** tab page.
Administrator tabs	The seven tabs in the header of the page are available *only* to administrator and supervisor users. • The **DASHBOARD** tab page is the main page and contains the *Options* and *Search* buttons, the site list, and the lists of TMACs per site that have alerts. This page enables you to open the site-, network-, and TMAC unit-level views through links on the page. • The **CUSTOMERS** tab page is the Customer page and contains the list of customers whose tracker systems are monitored through the TMAC application. Links on this page enable you to perform the following:

	○ Create new customer profiles ○ View, edit, or delete customer information ○ Open the **Site for [Customer name]** window that contains the site list for the selected customer, and links that enable you to view, edit, or delete site information • The **SITES** tab page is the Site page and contains the list of all monitored sites. Links on this page enable you to perform the following: ○ Create new site profiles ○ View, edit, or delete site information ○ Open the **Update [Customer name]** window to set options for automatic email reporting for the customer ○ Open the **Network for [Site name]** window to view the network list for the selected site, and to view, edit, or delete network information ○ Open the **Update TMAC:locked, Wireless:locked** window to enter or select TMAC and wireless lock settings ○ Send a command to stow the entire site • The **NETWORKS** tab page is the Network page and contains the list of all monitored networks. Links on this page enable you to perform the following: ○ Create new network profiles ○ View, edit, or delete network information ○ Open the **Update [Site name]** window to update site information ○ Open the **Unit for [Network name]** to view the list of TMACs in the network; view, edit, or delete TMAC unit information; view messages and updates for a TMAC in the network; and map or connect a TMAC unit to a Maximo ID • The **UNITS** tab page is the Unit page and contains the list of all monitored TMACs. Links on this page enable you to perform the following: ○ Create new TMAC unit profiles ○ View, edit, or delete TMAC unit information ○ View messages and updates for a TMAC ○ Map or connect a TMAC unit to a Maximo ID ○ Open the **Update [Network name]** window to update network information ○ Open the window that contains the **REMOTE UPDATE FOR [TMAC UNIT]** and **COMMISSIONING** forms to set or change the controller's configuration parameters

	• The **USERS** tab page is the User page and contains the list of all the authorized users of the TMAC application. Links on this page enable you to perform the following:
	  ○ Create new user accounts
	  ○ View, edit, or delete user information
	  ○ Open the **Role for [User name]** window to create a new role or roles for the selected user; and view, edit, or delete role or roles
	  ○ Change another user's password
	• The **ROLES** tab page is the Usertype page and contains the list of user types and functions assigned to users of the application

Logged in as [login name]	Indicates that access is authorized for the login name displaying; click the login name to view user information in the **Show User** window
Logout	Link to log out of the TMAC application
Account	Link to the **EDIT ACCOUNT SETTINGS FOR [USER NAME]** and **CHANGE PASSWORD FOR [USER NAME]** screens on the **USERS** tab page
ALERT: [No. of] UNMAPPED UNITS	Link to the form for Maximo Mappings on the **UNITS** tab page **Note.** This functionality is available to administrator and supervisor users only.
Options button	Enables you to change view options on the main or **DASHBOARD** tab page
Search button	Enables you to filter the site list by a site name
Site list	Lists all monitored sites. Click the site name to expand the pane. The expanded pane contains links to the site-, network-, and TMAC unit-level views on the main or **DASHBOARD** tab page.
UNITS WITH PROBLEMS DURING THE LAST 24 HOURS:	Lists sites with TMAC units that have alerts, both occurring and persistent. Click the site name to open the site-level view; click the TMAC unit name to open the unit-level view.

To filter the lists on the main page such that only the sites with alerts are displayed:

1. Click *Options* in the upper left of the page.
2. Select (or check) the *Show only errors?* check box in the **Dashboard Options** window and then click *Save changes* (Fig. B2).

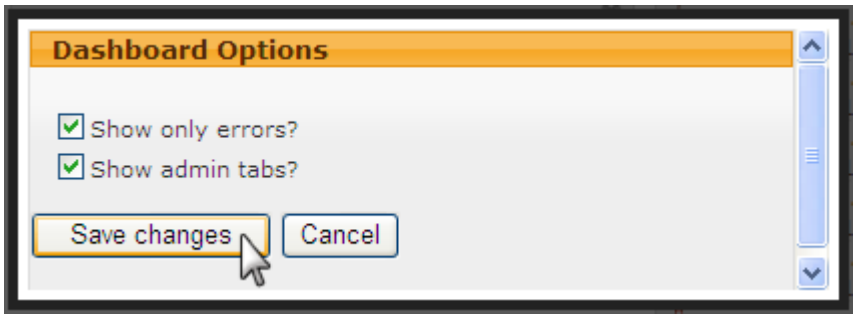


Fig. B2

3. Click *Reload Page* in the confirmation window (Fig. B3).

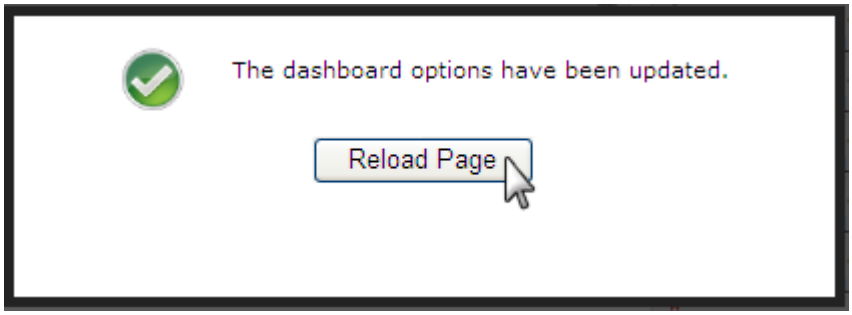


Fig. B3

4. The main page displays the filtered lists showing the sites with alerts during the last 24 hours (Fig. B4). Sites that have TMAC units with persistent alerts (more than 24 hours) are also included in the list.

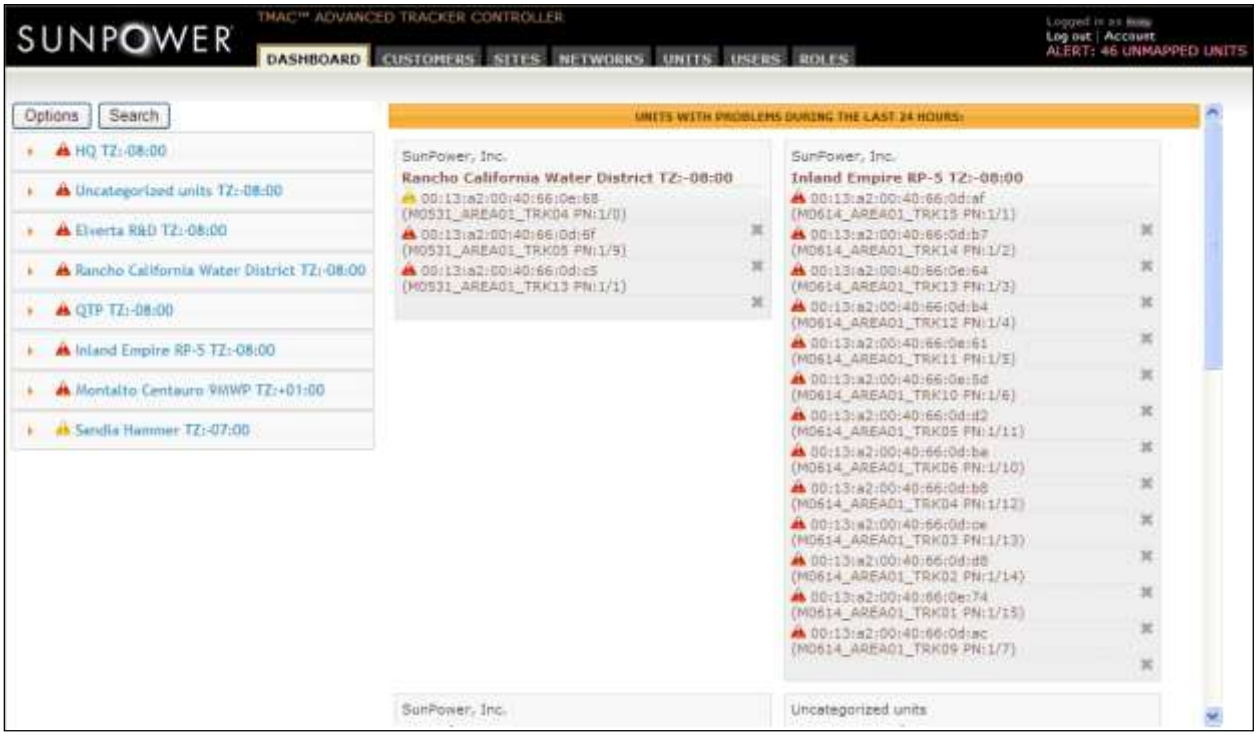


Fig. B4

To view the full list of all monitored sites, click *Options* and then clear (uncheck) the *Show only errors?* in the **Dashboard Options** window before saving the changes and reloading the page.

Important! The site list includes a grouping of new controllers that have yet to be assigned to a site or network, or both. New controllers are grouped under **Uncategorized units TZ:-08:00.** To assign a new controller to a site or network (or both), refer to Section B.3.17.

Note. The **Uncategorized units TZ:-08:00** shows up in the site list for administrator and supervisor users only.

B.3.2 Viewing Site Information

You can view site information through links that display the site-level view on the main or **DASHBOARD** tab page, and in the **Show Site** window that you can open through links on the Customer and Site pages.

B.3.2.1 Using the Main or Dashboard Tab Page

To view site information on the main or **DASHBOARD** tab page:

1. Click the name of the site in the site list (Fig. B5).

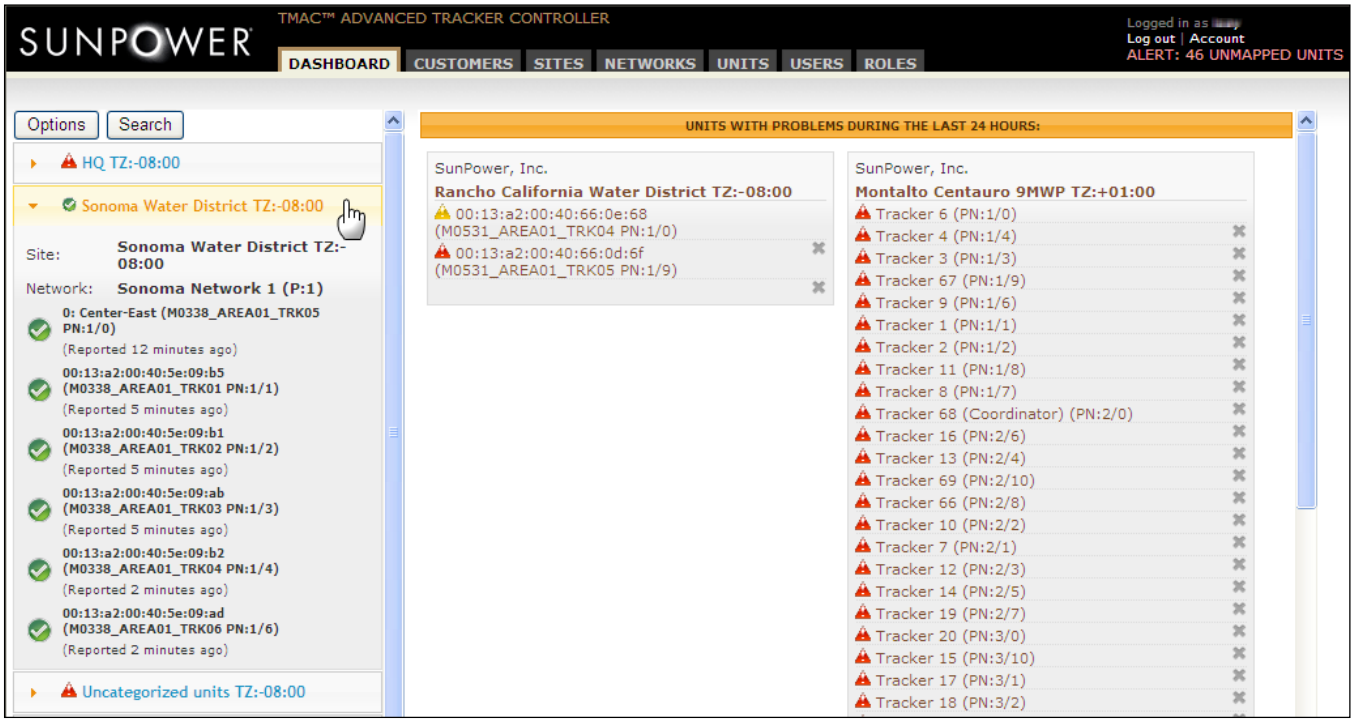


Fig. B5

If the site you want to view has an alert, locate the site name in the **UNITS WITH PROBLEMS DURING THE LAST 24 HOURS:** section and click the site name link to open the site-level view (Fig. B6).

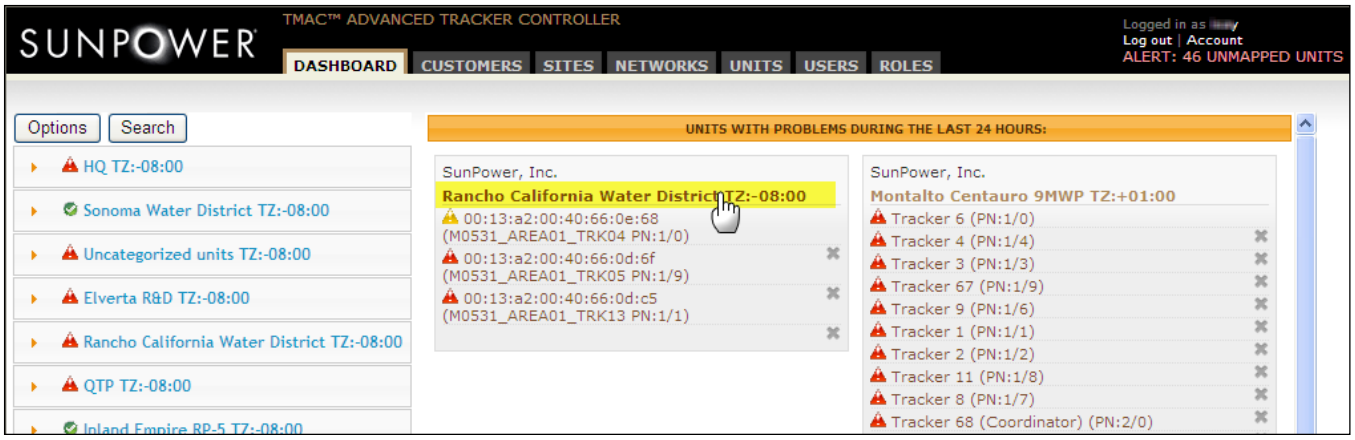


Fig. B6

2. In the expanded pane for the selected site, click the site name link to display the site-level view. The site information is at the topmost section of the page (Fig. B7).

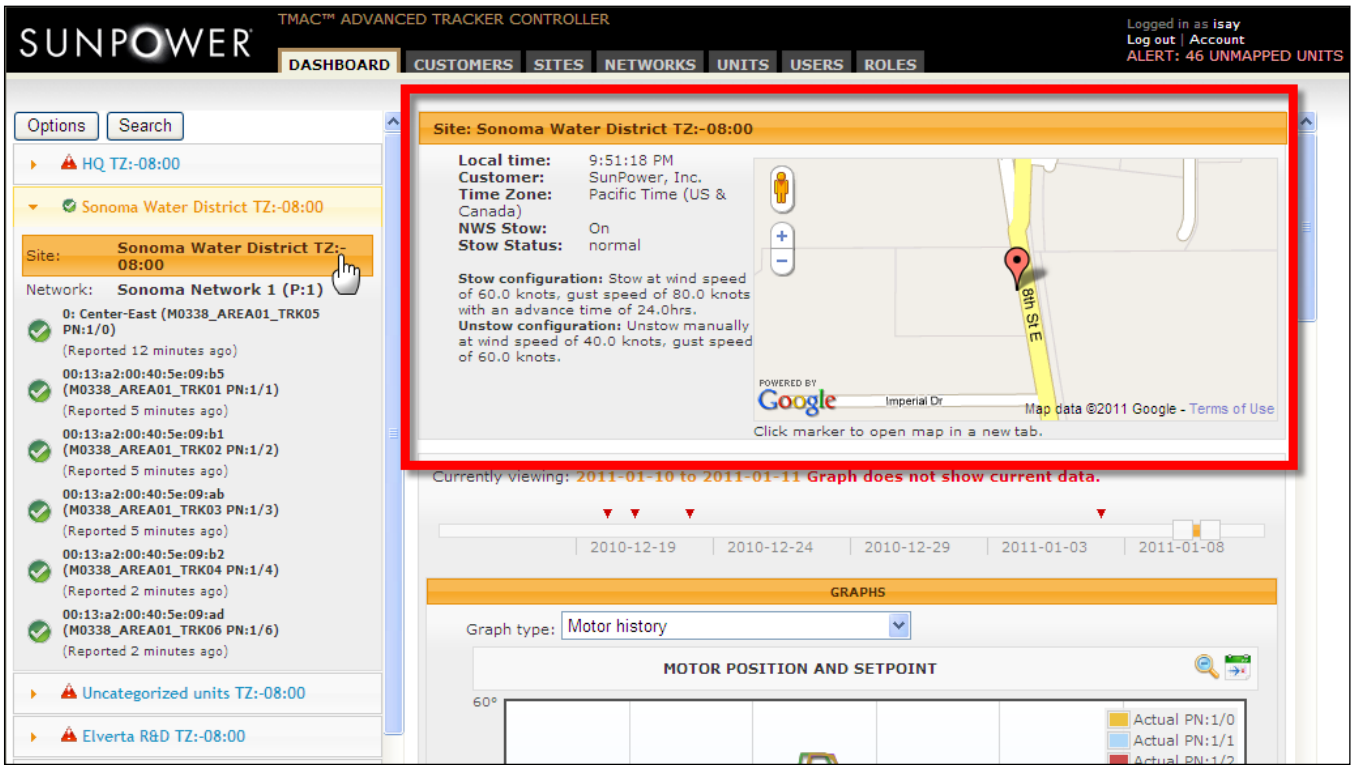


Fig. B7

To view the site location map in a separate window, click the marker on the map.

3. View the site information.

Information	Description
Local time	Real-time, 12-hour format local time with AM/PM
Customer	Name of the customer
Time Zone	The time zone in text
NWS Stow	The National Weather Service Stow Enable indicator—*ON* indicates NWS is enabled; *OFF*, disabled. Stow and unstow parameters are defined in the Stow and Unstow Configuration retrospect.
Stow Status	Current system status
Stow Configuration	Defines the parameters at which the controller will stow the panels
Unstow configuration	Defines the parameters at which the controller will allow the panels to resume normal operations

4. Use the sections in the site-level view to perform remote monitoring and control functions:

Section	Description
GRAPHS	Enables you to plot site-level data, both current and historical; for more information about graph types and procedure, refer to Section B.3.5.
REMOTE UPDATES	Enables you to send commands to the controller to either stow or move the tracker to the nighttime position, and to set the nighttime angle for all units at the site Refer to Section B.3.10.
COMPARE UNIT CONFIGURATIONS	Enables you to view parameter settings for each TMAC at the site and compare parameters between controllers

B.3.2.2 Using the Sites Tab Page

To view site information on the **SITES** tab page:

1. Click the **SITES** tab to open the Site page (Fig. B8).

Fig. B8

2. Look for the site name under the **Name** column. Use the scroll bar and page selector at the bottom of the page as necessary. Alternately, you can filter the list by using the search function. Click **Search** and enter any part of the site name (for example, *Rancho)* in the **Search Terms** field and then click *Search* (Fig. B9).

Fig. B9

3. The page displays the filtered list based on the search entry (Fig. B10). Click **Show** under the last (untitled) column to display the site information.

Fig. B10

4. View the site information in the **Show Site** window (Fig. B11).

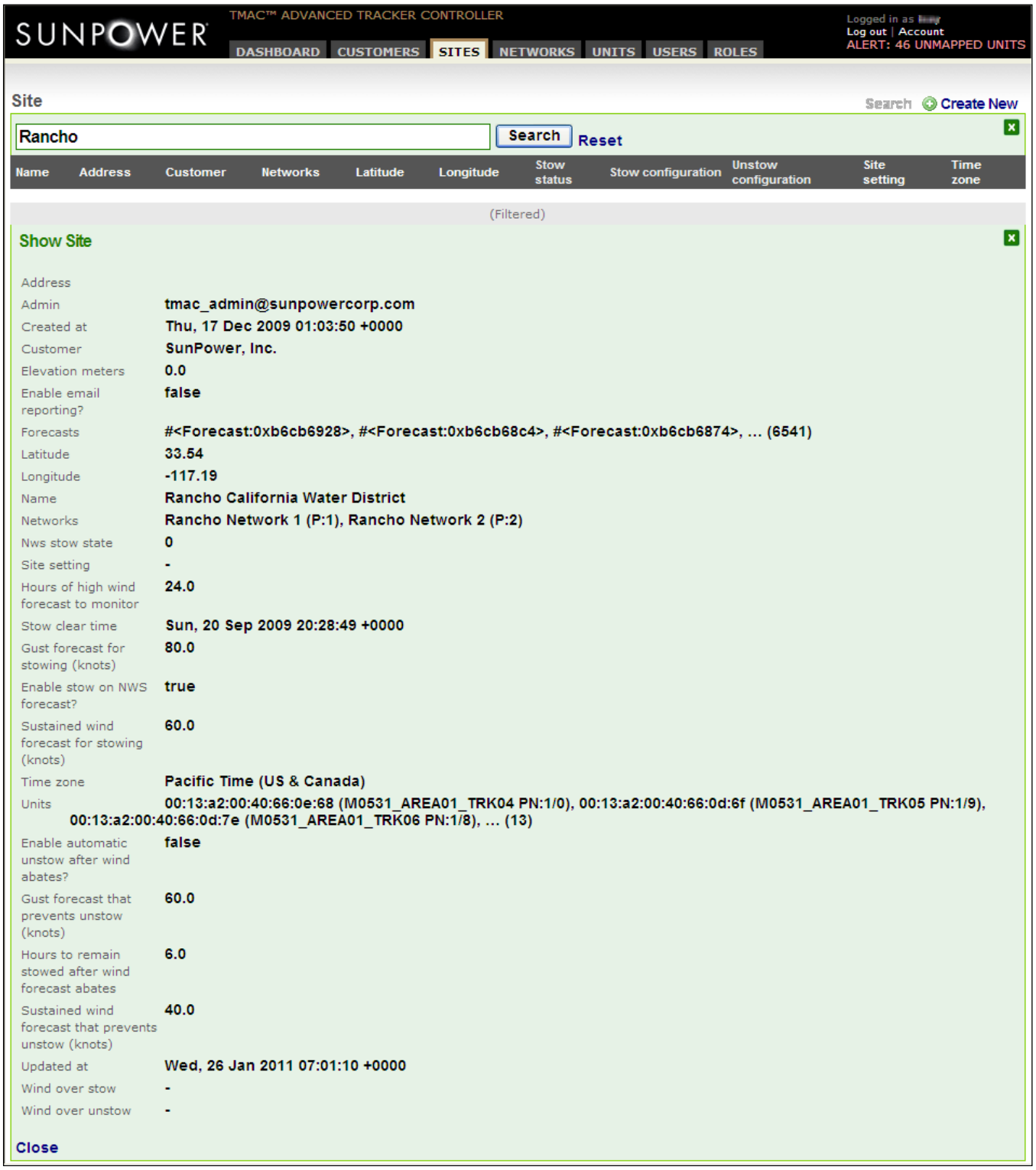


Fig. B11

Click **Close** or the X button to close the **Show Site** window. Click **Reset** to display the complete site list.

B.3.2.3 Using the Customers Tab Page

To view site information on the **CUSTOMERS** tab page:

1. Click the **CUSTOMERS** tab to open the Customer page (Fig. B12).

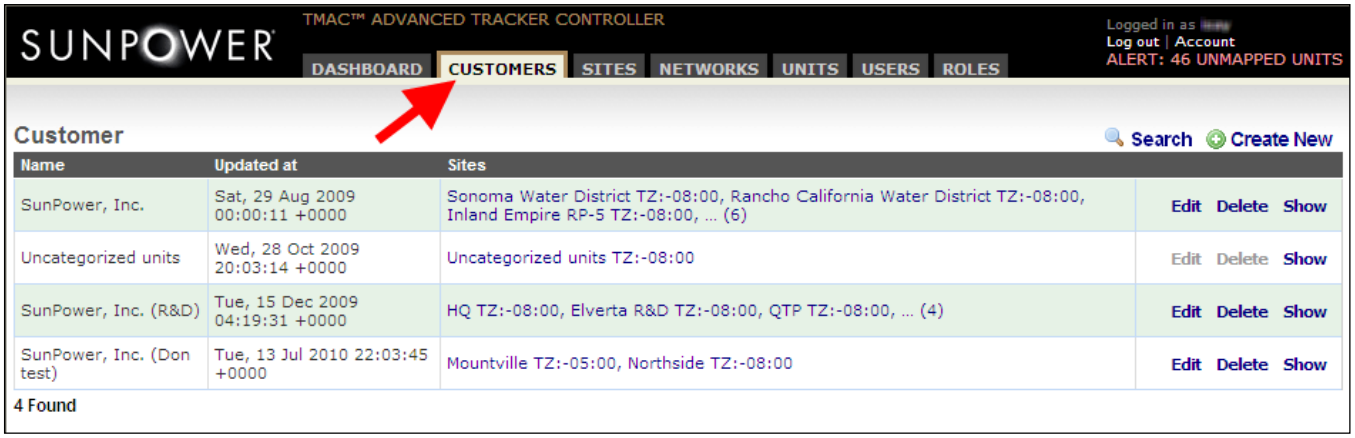


Fig. B12

2. Look for the customer name under the **Name** column. If it is a big list, use the search function to filter the list.
3. To open the **Site for [Customer name]** window, click the site link under the **Sites** column for the customer row (Fig. B13).

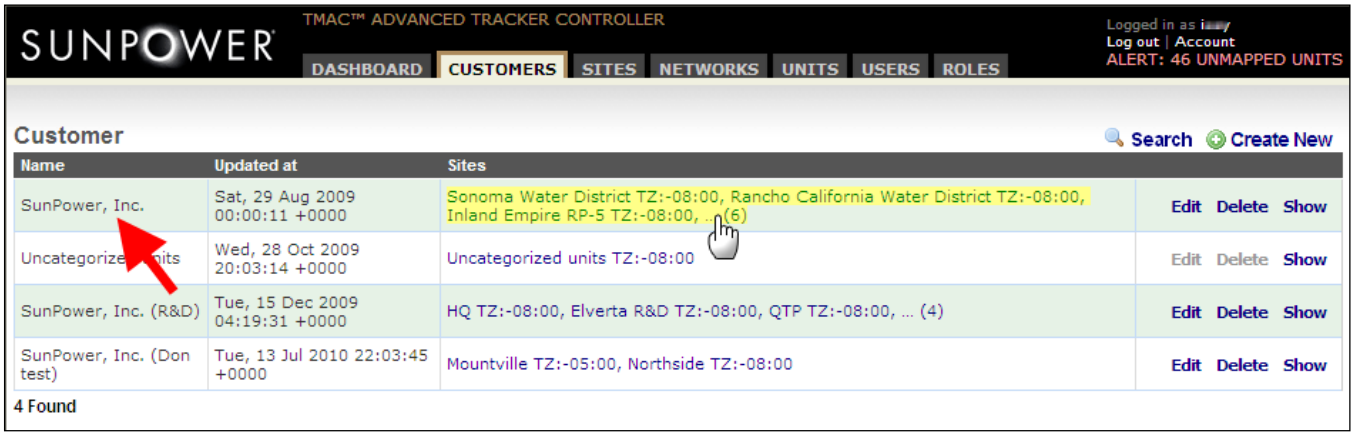


Fig. B13

4. In the **Site for [Customer name]** window, look for the site name under the **Name** column or click **Search** (at the top right corner of the window) to filter the list by the site name. Click **Show** under the last (untitled) column to display the site information (Fig. B14).

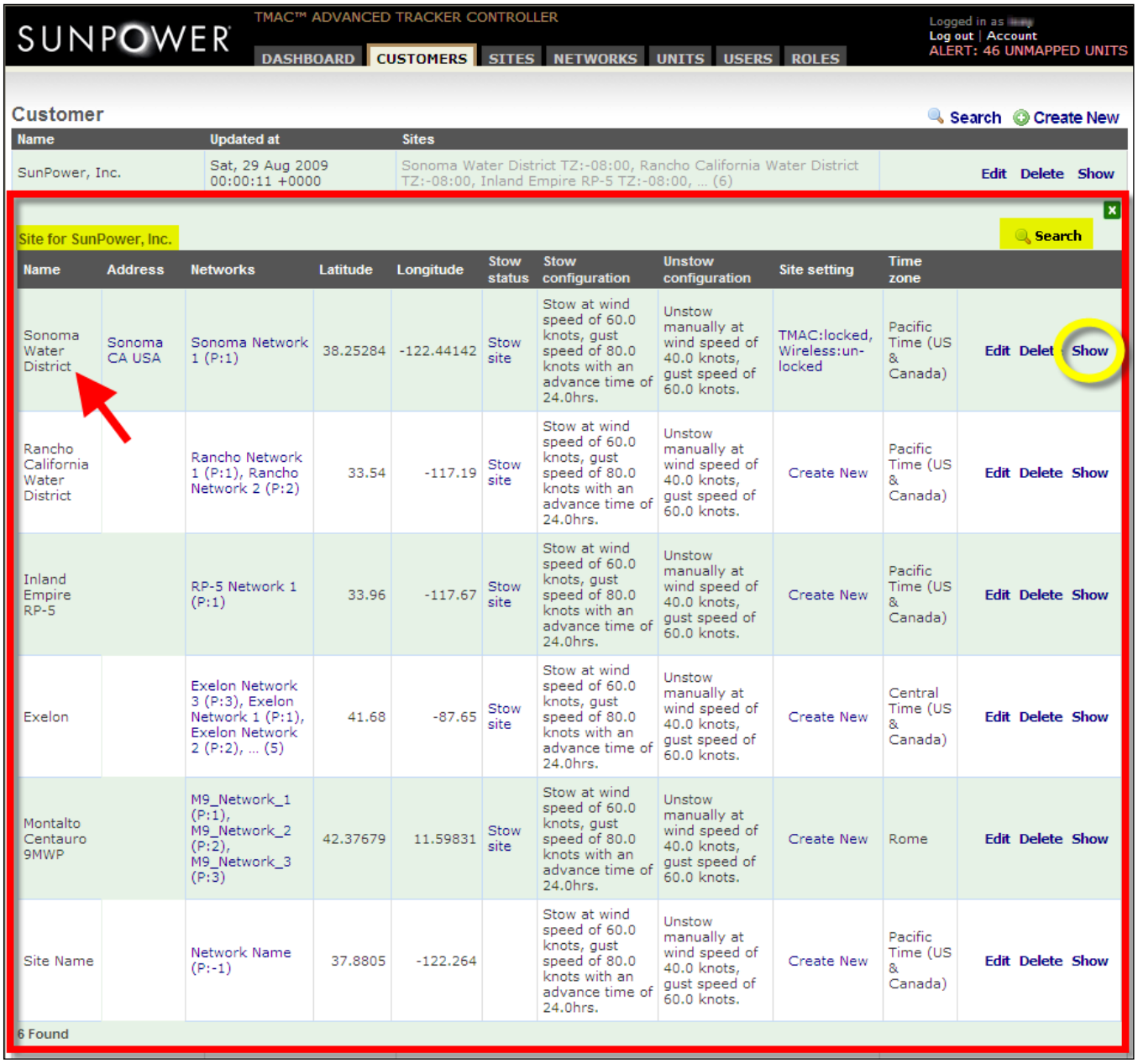


Fig. B14

5. View the site information in the **Show Site** window (Fig. B15).

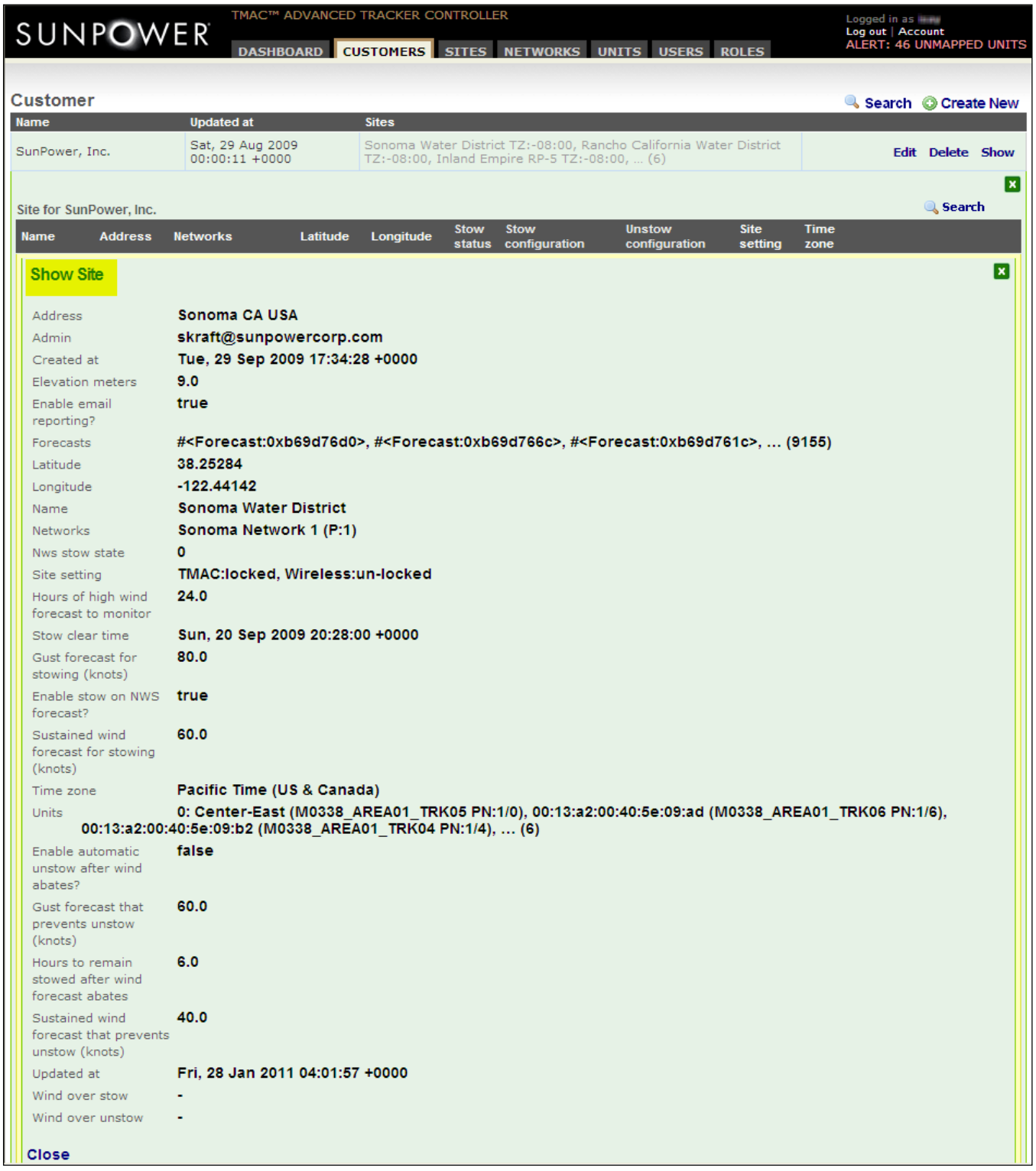


Fig. B15

6. Click **Close** or the X button to close the **Show Site** window. Click the **CUSTOMERS** tab to refresh the page.

B.3.3 Viewing Network Information

You can view network information through links that display the network-level view on the main or **DASHBOARD** tab page, and in the **Show Network** window that you can open through links on the Customer, Site, and Network pages.

B.3.3.1 Using the Main or Dashboard Tab Page

To view network information on the main or **DASHBOARD** tab page:

1. Click the site name in the site list.
2. In the expanded pane for the selected site, click the network name link to display the network-level view. The network information is at the topmost section of the page (Fig. B16).

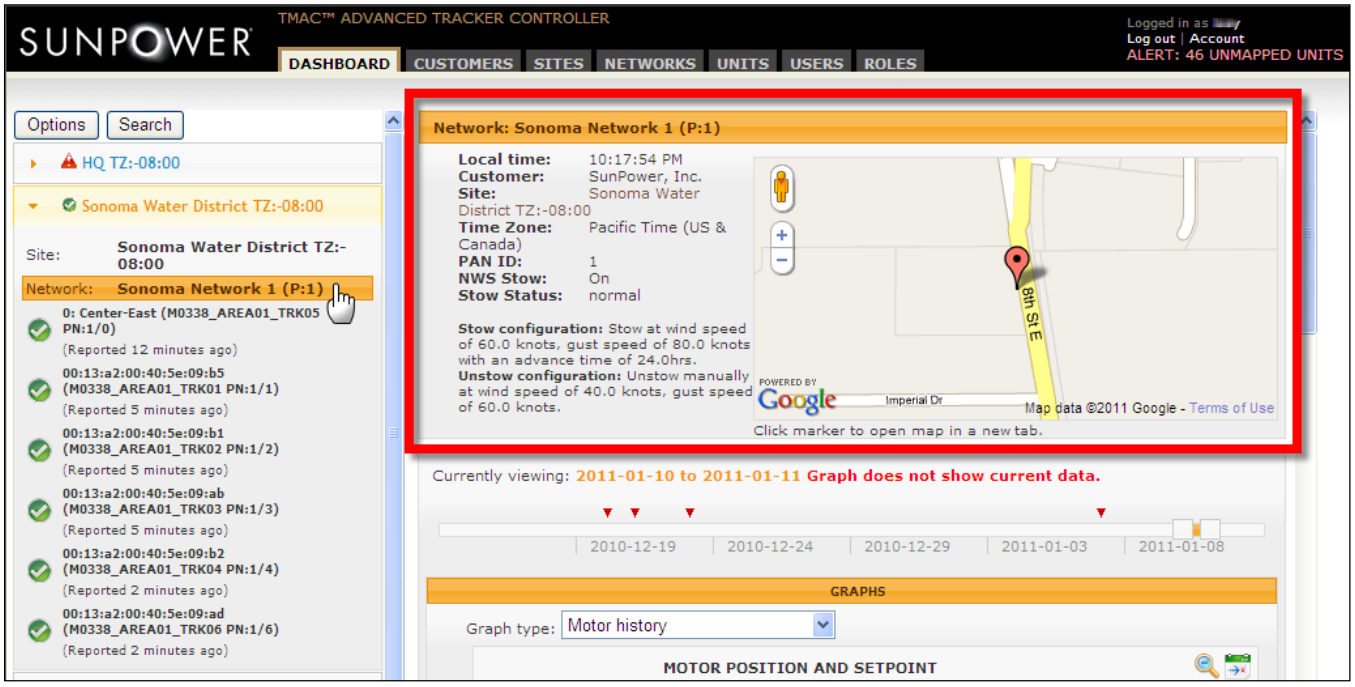


Fig. B16

To view the site location map in a separate window, click the marker on the map.

3. View the network information.

Information	Description
Local time	Real-time, 12-hour format local time with AM/PM
Customer	Name of the customer
Site	The site name **Note.** The site name is an active link. Click to view the site information (refer to Section B.3.2).
Time Zone	The time zone in text
PAN ID	The tracker group address used by the network communication
NWS Stow	The National Weather Service Stow Enable indicator—*ON* indicates NWS is enabled; *OFF*, disabled. Stow and unstow parameters are defined in the Stow and Unstow configuration retrospect.
Stow Status	Current system status
Stow Configuration	Defines the parameters at which the controller will stow the panels
Unstow configuration	Defines the parameters at which the controller will allow the panels to resume normal operations

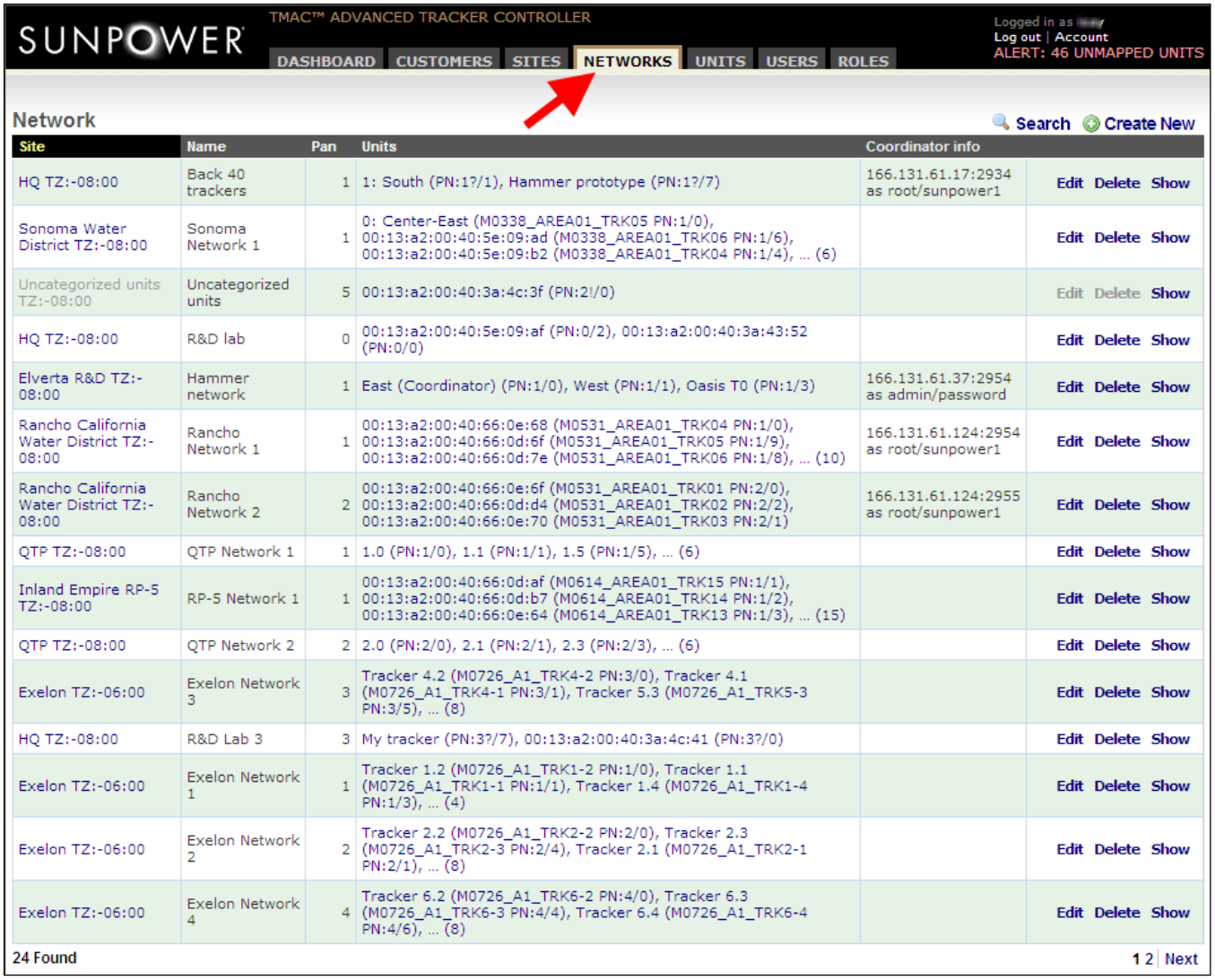
4. Use the sections in the network-level view to perform monitoring functions:

Section	Description
GRAPHS	Enables you to plot network-level data, both current and historical; for more information, refer to Section B.3.5.
COMPARE UNIT CONFIGURATIONS	Enables you to view parameter settings for each TMAC at the site and compare parameters between controllers

B.3.3.2 Using the Networks Tab Page

To view network information on the **NETWORKS** tab page:

1. Click the **NETWORKS** tab to open the Network page (Fig. B17).



Site	Name	Pan	Units	Coordinator info	
HQ TZ:-08:00	Back 40 trackers	1	1: South (PN:1?/1), Hammer prototype (PN:1?/7)	166.131.61.17:2934 as root/sunpower1	Edit Delete Show
Sonoma Water District TZ:-08:00	Sonoma Network 1	1	0: Center-East (M0338_AREA01_TRK05 PN:1/0), 00:13:a2:00:40:5e:09:ad (M0338_AREA01_TRK06 PN:1/6), 00:13:a2:00:40:5e:09:b2 (M0338_AREA01_TRK04 PN:1/4), ... (6)		Edit Delete Show
Uncategorized units TZ:-08:00	Uncategorized units	5	00:13:a2:00:40:3a:4c:3f (PN:2!/0)		Edit Delete Show
HQ TZ:-08:00	R&D lab	0	00:13:a2:00:40:5e:09:af (PN:0/2), 00:13:a2:00:40:3a:43:52 (PN:0/0)		Edit Delete Show
Elverta R&D TZ:-08:00	Hammer network	1	East (Coordinator) (PN:1/0), West (PN:1/1), Oasis T0 (PN:1/3)	166.131.61.37:2954 as admin/password	Edit Delete Show
Rancho California Water District TZ:-08:00	Rancho Network 1	1	00:13:a2:00:40:66:0e:68 (M0531_AREA01_TRK04 PN:1/0), 00:13:a2:00:40:66:0d:6f (M0531_AREA01_TRK05 PN:1/9), 00:13:a2:00:40:66:0d:7e (M0531_AREA01_TRK06 PN:1/8), ... (10)	166.131.61.124:2954 as root/sunpower1	Edit Delete Show
Rancho California Water District TZ:-08:00	Rancho Network 2	2	00:13:a2:00:40:66:0e:6f (M0531_AREA01_TRK01 PN:2/0), 00:13:a2:00:40:66:0d:d4 (M0531_AREA01_TRK02 PN:2/2), 00:13:a2:00:40:66:0e:70 (M0531_AREA01_TRK03 PN:2/1)	166.131.61.124:2955 as root/sunpower1	Edit Delete Show
QTP TZ:-08:00	QTP Network 1	1	1.0 (PN:1/0), 1.1 (PN:1/1), 1.5 (PN:1/5), ... (6)		Edit Delete Show
Inland Empire RP-5 TZ:-08:00	RP-5 Network 1	1	00:13:a2:00:40:66:0d:af (M0614_AREA01_TRK15 PN:1/1), 00:13:a2:00:40:66:0d:b7 (M0614_AREA01_TRK14 PN:1/2), 00:13:a2:00:40:66:0e:64 (M0614_AREA01_TRK13 PN:1/3), ... (15)		Edit Delete Show
QTP TZ:-08:00	QTP Network 2	2	2.0 (PN:2/0), 2.1 (PN:2/1), 2.3 (PN:2/3), ... (6)		Edit Delete Show
Exelon TZ:-06:00	Exelon Network 3	3	Tracker 4.2 (M0726_A1_TRK4-2 PN:3/0), Tracker 4.1 (M0726_A1_TRK4-1 PN:3/1), Tracker 5.3 (M0726_A1_TRK5-3 PN:3/5), ... (8)		Edit Delete Show
HQ TZ:-08:00	R&D Lab 3	3	My tracker (PN:3?/7), 00:13:a2:00:40:3a:4c:41 (PN:3?/0)		Edit Delete Show
Exelon TZ:-06:00	Exelon Network 1	1	Tracker 1.2 (M0726_A1_TRK1-2 PN:1/0), Tracker 1.1 (M0726_A1_TRK1-1 PN:1/1), Tracker 1.4 (M0726_A1_TRK1-4 PN:1/3), ... (4)		Edit Delete Show
Exelon TZ:-06:00	Exelon Network 2	2	Tracker 2.2 (M0726_A1_TRK2-2 PN:2/0), Tracker 2.3 (M0726_A1_TRK2-3 PN:2/4), Tracker 2.1 (M0726_A1_TRK2-1 PN:2/1), ... (8)		Edit Delete Show
Exelon TZ:-06:00	Exelon Network 4	4	Tracker 6.2 (M0726_A1_TRK6-2 PN:4/0), Tracker 6.3 (M0726_A1_TRK6-3 PN:4/4), Tracker 6.4 (M0726_A1_TRK6-4 PN:4/6), ... (8)		Edit Delete Show

24 Found 1 2 | Next

Fig. B17

2. Look for the site and network names under the **Site** and **Name** columns, respectively. Use the scroll bar and page selector at the bottom of the page as necessary. Alternately, you can filter the list by using the search function. Click **Search** and enter any part of the site or network name (for example, *Sonoma)* in the **Search Terms** field and then click *Search* (Fig. B18).

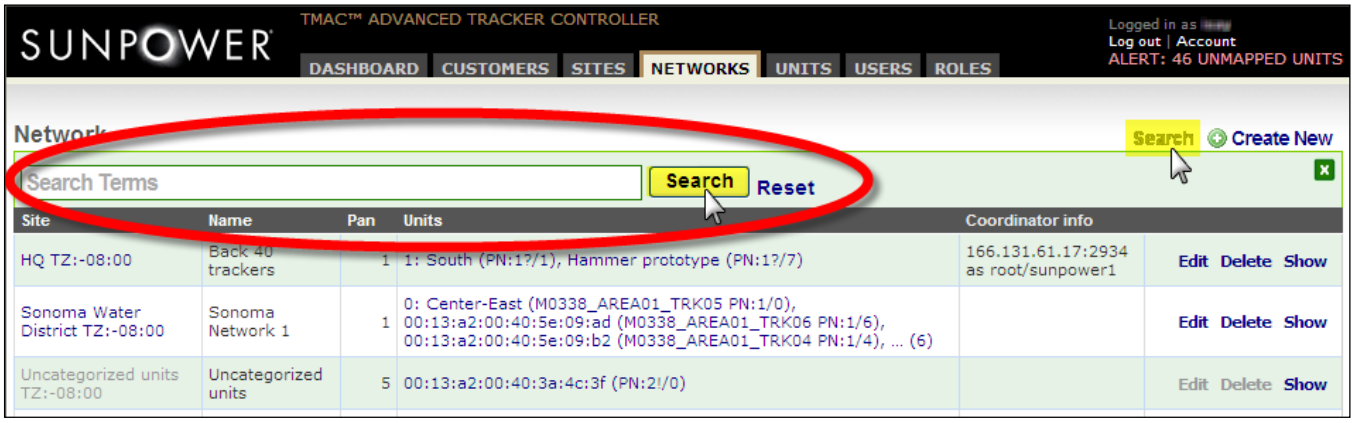


Fig. B18

3. The page displays the filtered list based on the search entry (Fig. B19). The searched network or all networks in the searched site are listed on the page. Click **Show** under the last (untitled) column to display the network information for the network you want to view.

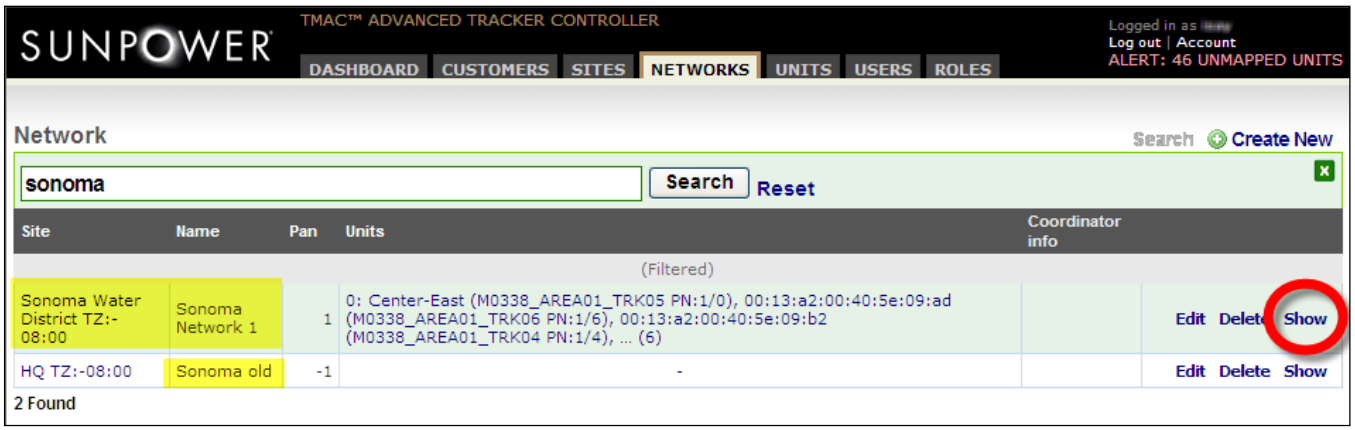


Fig. B19

4. View the network information in the **Show Network** window (Fig. B20).

Fig. B20

5. Click **Close** or the X button to close the **Show Network** window. Click **Reset** to display the complete network list.

B.3.3.3 Using the Customers Tab Page

To view network information on the **CUSTOMERS** tab page:

1. Click the **CUSTOMERS** tab to open the Customer page.
2. Look for the customer name under the **Name** column and then click the site link for the customer under the **Sites** column. The **Site for [Customer name]** window opens (Fig. B21).

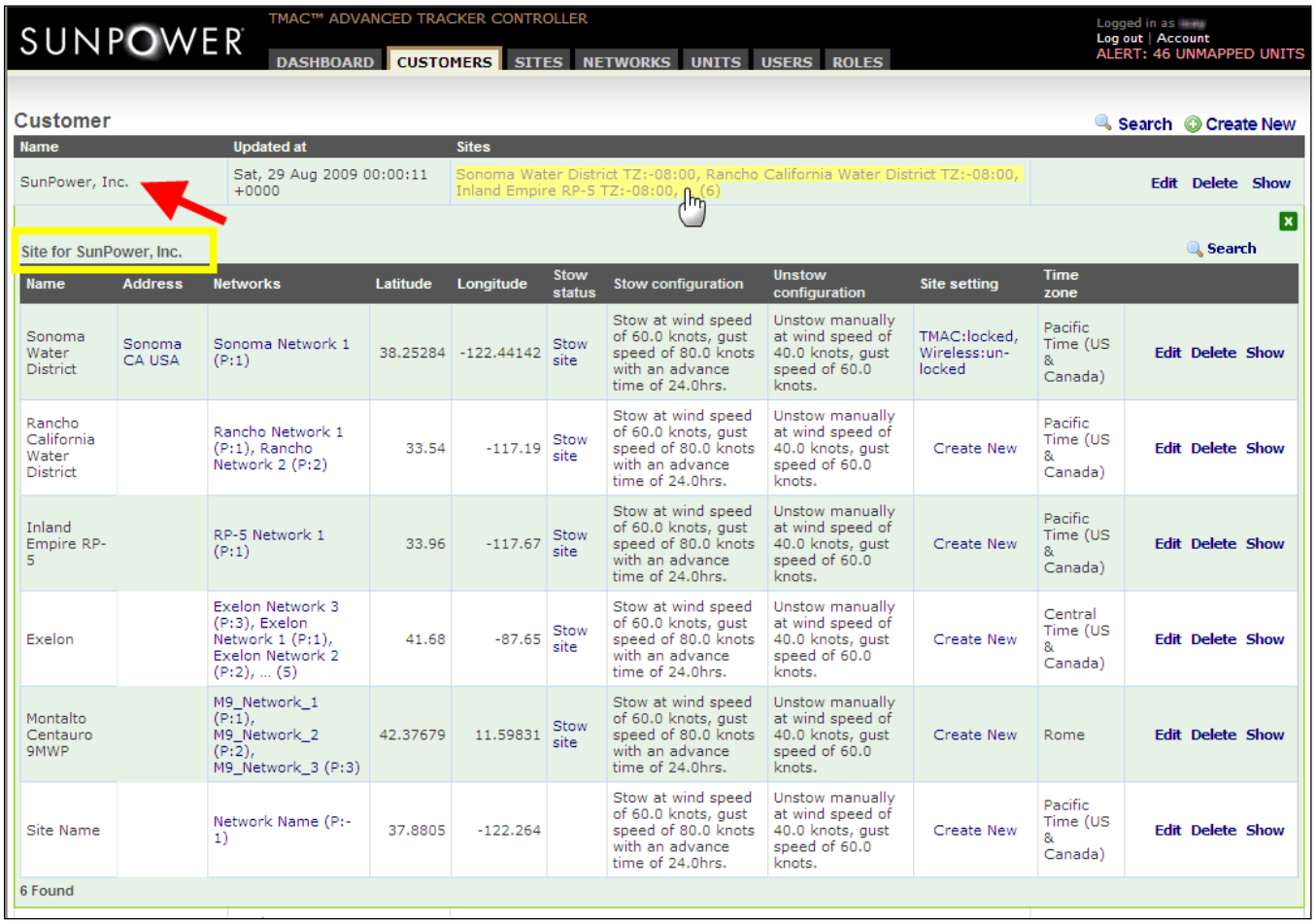


Fig. B21

3. Locate the site under the **Name** column and then click the network link for the site under the **Networks** column. The **Network for [Site name]** window appears (Fig. B22).

Fig. B22

4. Locate the network under the **Name** column and then click **Show** under the rightmost column. The **Show Network** window appears (Fig. B23).

Fig. B23

5. Click **Close** or the X button to close the windows.

B.3.3.4 Using the Sites Tab Page

To view network information on the **SITES** tab page:

1. Click the **SITES** tab to open the Site page.
2. Locate the site name under the **Name** column and then click the network link for the site under the **Networks** column. The **Network for [Site name]** window opens (Fig. B24).

Fig. B24

3. Locate the network under the **Name** column and then click **Show** under the rightmost column. The **Show Network** window appears (Fig. B25).

Fig. B25

4. Click **Close** or the X button to close the windows.

B.3.4 Viewing TMAC Unit Information

You can view TMAC unit information through links that display the unit-level view on the main or **DASHBOARD** tab page, and in the **Show Unit** window that you can open through links on the Network and Unit pages.

B.3.4.1 Using the Main or Dashboard Tab Page

To view TMAC unit information on the main or **DASHBOARD** tab page:

1. Click the site name in the site list.
2. In the expanded pane for the selected site, click the TMAC unit link to display the unit-level view. The information about the selected TMAC unit is at the topmost section of the page (Fig. B26).

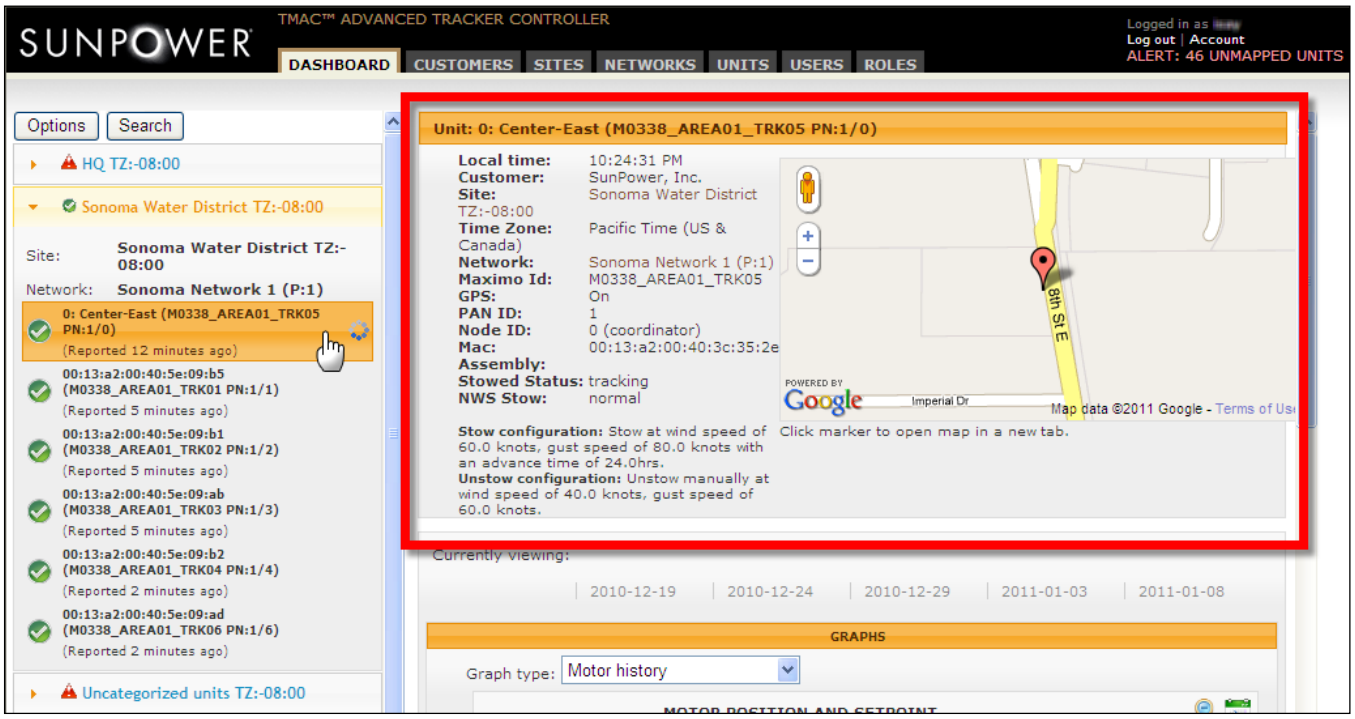


Fig. B26

To view the site location map in a separate window, click the marker on the map.

3. View the TMAC unit information.

Information	Description
Local time	Real-time, 12-hour format local time with AM/PM
Customer	Name of the customer
Site	The site name **Note.** The site name is an active link. Click to view the site information (refer to Section B.3.2).
Time Zone	The time zone in text
Network	The name of the network to which the TMAC unit belongs **Note.** The network name is an active link. Click to view the network information (refer to Section B.3.3).
Maximo Id	The description or name of the TMAC used as identifier for reporting in Maximo
GPS	GPS is enabled (or *On*) when a GPS receiver and antenna is installed into the TMAC unit
PAN ID	The tracker group address
Node ID	The individual tracker network address
Mac	This address is programmed at the factory in the network interface and cannot be changed
Assembly	[To be added]
Stowed Status	Current system status
NWS Stow	The National Weather Service Stow-Enable indicator—*ON* indicates NWS is enabled; *OFF*, disabled. Stow and unstow parameters are defined in the Stow and Unstow configuration retrospect.
Stow configuration	Defines the parameters at which the controller will stow the panels
Unstow configuration	Defines the parameters at which the controller will allow the panels to resume normal operations

4. Use the sections in the unit-level view to perform remote monitoring and control functions:

Section	Description
GRAPHS	Enables you to plot unit-level data, both current and historical; for more information about graph types and procedure (refer to Section B.3.5)
SYSTEM STATUS	Enables you to view details of system status indicators by message types (refer to Section B.3.6)
CONTROLLER EVENTS	Enables you to view and add details of event reports for the controller (refer to Section B.3.7)
REMOTE UPDATES	Enables you to perform the following tasks: • Set or modify controller parameters • Send commands to the controller to either stow or move the tracker to the nighttime position • Set the nighttime angle for all units at the site Refer to Section B.3.8, Section B.3.9, and Section B.3.10.
RECENT UPDATES	Enables you to view records of updates, changes, and upgrades done for the controller Refer to Section B.3.11.

B.3.4.2 Using the Units Tab Page

To view TMAC unit information on the **UNITS** tab page:

1. Click the **UNITS** tab to open the Unit page (Fig. B27).

Name	Maximo	Mac	Network	Description	Nodeid	Force	Assembly name	
-	-	00:13:a2:00:40:3a:4c:3f	Uncategorized units (P:5)	original pan_id=2	0	version 3760		Updates Messages Edit Delete Show
1: South	-	00:13:a2:00:40:3c:35:49	Back 40 trackers (P:1)	South unit, router	1	version 3105		Updates Messages Edit Delete Show
0: Center-East	M0338_AREA01_TRK05	00:13:a2:00:40:3c:35:2e	Sonoma Network 1 (P:1)	Coordinator (#5)	0	version 404		Updates Messages Edit Delete Show
Hammer prototype	-	00:13:a2:00:40:3a:43:51	Back 40 trackers (P:1)	Unnamed	7	version 3073		Updates Messages Edit Delete Show
Tracker 1.2	M0726_A1_TRK1-2	00:13:a2:00:40:54:f7:a3	Exelon Network 1 (P:1)	original pan_id=2	0	version 119		Updates Messages Edit Delete Show
My tracker	-	00:13:a2:00:40:4c:1b:00	R&D Lab 3 (P:3)	original pan_id=3	7	version 44		Updates Messages Edit Delete Show
-	-	00:13:a2:00:40:3a:4c:41	R&D Lab 3 (P:3)	original pan_id=3	0	version 564		Updates Messages Edit Delete Show
Tracker 1.1	M0726_A1_TRK1-1	00:13:a2:00:40:3a:43:55	Exelon Network 1 (P:1)	original pan_id=1	1	version 78		Updates Messages Edit Delete Show
Tracker 1.4	M0726_A1_TRK1-4	00:13:a2:00:40:3c:35:33	Exelon Network 1 (P:1)	original pan_id=1	3	version 74		Updates Messages Edit Delete Show
Tracker 2.2	M0726_A1_TRK2-2	00:13:a2:00:40:54:f7:ad	Exelon Network 2 (P:2)	original pan_id=2	0	version 81		Updates Messages Edit Delete Show
Tracker 2.3	M0726_A1_TRK2-3	00:13:a2:00:40:3c:35:3b	Exelon Network 2 (P:2)	original pan_id=2	4	version 67		Updates Messages Edit Delete Show
Tracker 2.1	M0726_A1_TRK2-1	00:13:a2:00:40:3b:b5:85	Exelon Network 2 (P:2)	original pan_id=2	1	version 73		Updates Messages Edit Delete Show
Tracker 6.2	M0726_A1_TRK6-2	00:13:a2:00:40:3a:43:5b	Exelon Network 4 (P:4)	original pan_id=4	0	version 86		Updates Messages Edit Delete Show
Tracker 6.3	M0726_A1_TRK6-3	00:13:a2:00:40:3b:b5:52	Exelon Network 4 (P:4)	original pan_id=4	4	version 69		Updates Messages Edit Delete Show
Tracker 6.4	M0726_A1_TRK6-4	00:13:a2:00:40:3b:b5:51	Exelon Network 4 (P:4)	original pan_id=4	6	version 67		Updates Messages Edit Delete Show

120 Found

1 2 3 .. 8 | Next

Fig. B27

2. Locate the TMAC unit by its name, Maximo ID, or Mac address under the **Name, Maximo,** or **Mac** column, respectively, and the name of the network to which the controller belongs. Use the scroll bar or page selector at the bottom of the page as necessary.

   Alternately, you can filter the list by using the search function. Click **Search** and enter the controller unit name, Maximo ID, or Mac address (for example, Maximo ID *MO726_A1_TRK-2)* in the **Search Terms** field and then click *Search* (Fig. B28).

Fig. B28

3. The page displays the filtered list based on the search entry (Fig. B29). Click **Show** under the last (untitled) column to display the TMAC unit information.

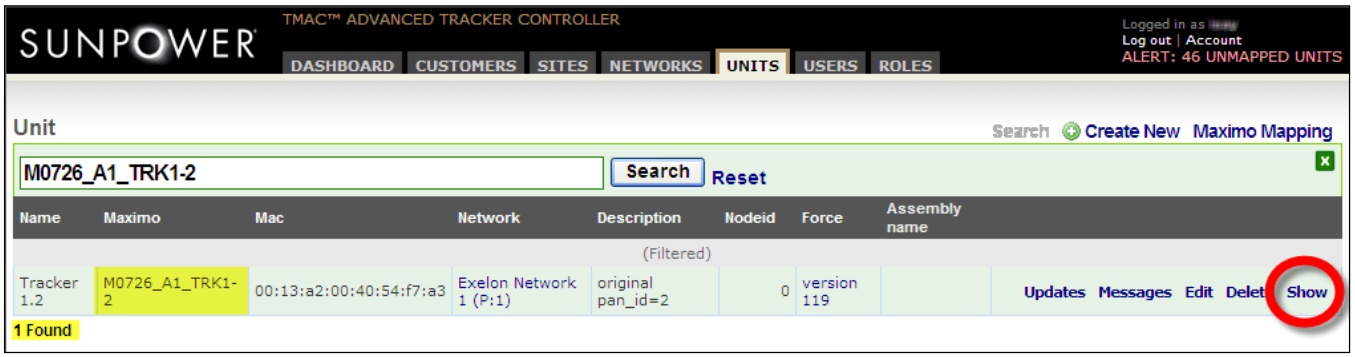


Fig. B29

4. View the TMAC unit information in the **Show Unit** window (Fig. B30).

Fig. B30

5. Click **Close** or the X button to close the **Show Unit** window. Click **Reset** to display the complete unit list.

B.3.4.3 Using the Networks Tab Page

To view TMAC unit information on the **NETWORKS** tab page:

1. Click the **NETWORKS** tab to open the Network page.
2. Locate the site and network names under the **Site** and **Name** columns, respectively. Use the search function to filter the list by the network name.
3. Click the TMAC unit link under the **Units** column to open the **Unit for [Network name]** window (Fig. B31).

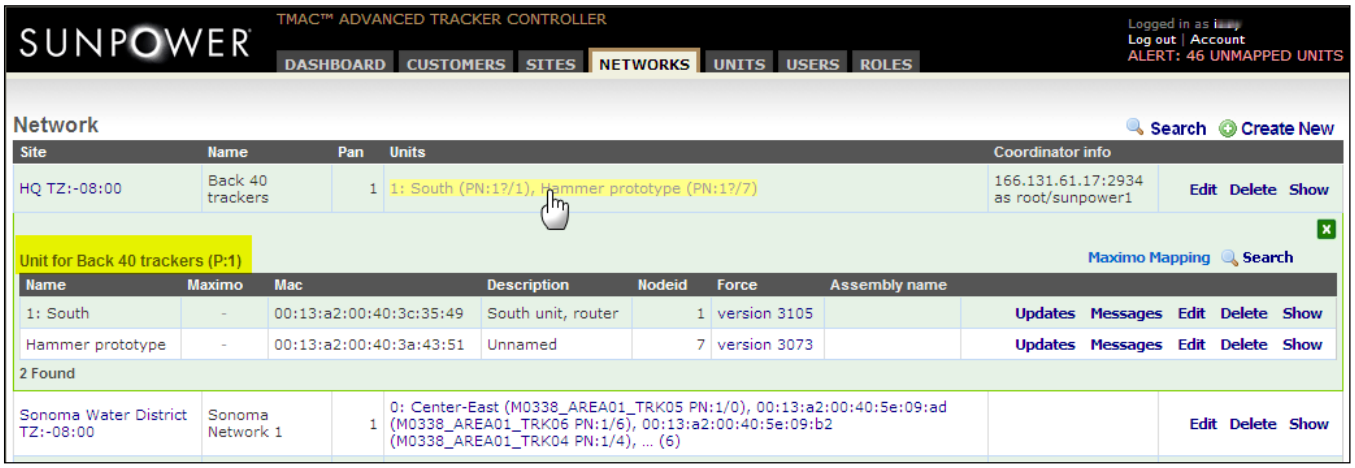


Fig. B31

4. Click **Show** within the row for the TMAC unit you want to view. The **Show Unit** window appears (Fig. B32).

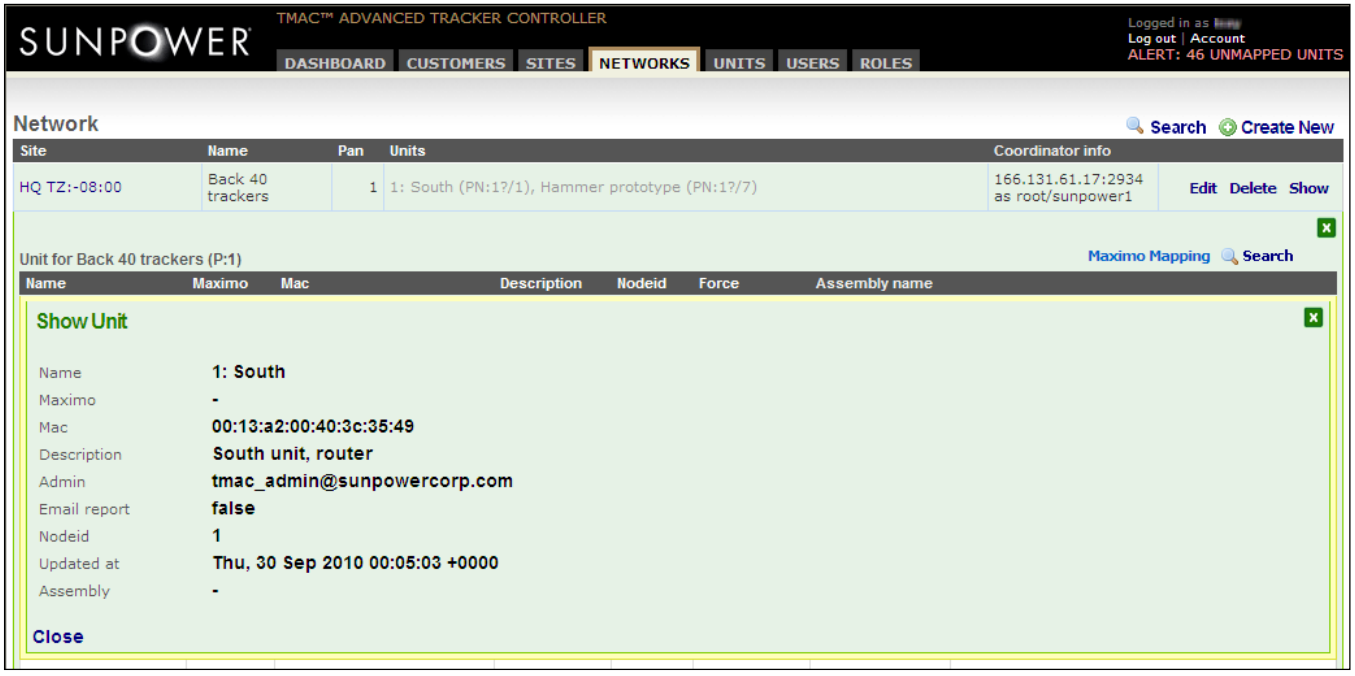


Fig. B32

5. Click **Close** or the X button to close the windows.

B.3.5 Using the Graph

On the main or **DASHBOARD** tab page, you can plot the following graph types for a site, network, or TMAC unit:

Level	Graph type	Description
Site	**Motor history**	Plots motor position against programmed setpoint values for each tracker in the site
	Motor ontime	Plots the amount of time that the motor is turned on for each tracker in the site
	Motor cycles	Plots the number of times that the motor is switched on and off for each tracker in the site
	Motor errors	Plots the differential between motor position and setpoint values for each tracker in the site
	Torque-tube slope	Plots the torque tube Pitch against Roll for each tracker in the site
	Current wireless signal strength	Plots current minimum, maximum, and average signal strength values (in dB) for each tracker in the site
	Wireless signal strength history	Plots historical signal strength values (in dB) for each tracker in the site
	Enclosure temperature	Plots temperature values inside the control cabinet and the ambient temperature forecasted by the Global Forecast System (GFS) for each tracker in the site
	Enclosure temperature rise	Plots the rise in temperature from ambient for each tracker in the site
	Ambient temperature forecast history	Plots the ambient temperature forecast for the current 24 hours for the site
	Ambient temperature forecast	Plots the ambient temperature forecast for the next three days for the site
	Wind forecast history	Plots wind and gust speed forecast for the site
	Wind forecast	Plots wind and gust speed forecast for the next three days for the site
	Cloud cover forecast history	Plots cloud cover and relative humidity forecast for the current 24 hours for the site
	Cloud cover forecast	Plots cloud cover and relative humidity forecast for the next three days for the site

	UV-B downward solar flux forecast history	Plots the UV-B solar flux and clear sky solar flux forecast for the current 24 hours for the site
	UV-B downward solar flux forecast	Plots the UV-B solar flux and clear sky solar flux forecast for the next three days for the site
	Analog standard deviation	Plots the analog input deviation in millivolts for the site
Network	**Motor history**	Plots motor position against programmed setpoint values for each tracker within the network
	Motor ontime	Plots the amount of time that the motor is turned on for each tracker attached to the TMAC Coordinator unit
	Motor cycles	Plots the number of times that the motor is switched on and off for each tracker within the network (attached to the TMAC Coordinator unit)
	Motor errors	Plots the differential between motor position and setpoint values for each tracker within the network
	Torque-tube slope	Plots the torque tube Pitch against Roll for each tracker within the network
	Current wireless signal strength	Plots current minimum, maximum, and average signal strength values (in dB) for each tracker within the network
	Wireless signal strength history	Plots historical signal strength values (in dB) for each tracker within the network
	Enclosure temperature	Plots temperature values inside the control cabinet and the ambient temperature forecasted by GFS for each tracker within the network
	Enclosure temperature rise	Plots the rise in temperature from ambient for each tracker within the network
	Analog standard deviation	Plots the analog input deviation in millivolts for each tracker within the network
TMAC Unit	**Motor history**	Plots motor position against programmed setpoint values for each tracker
	Motor ontime	Plots the direction and the amount of time the tracker motor is turned on

	Motor cycles	Plots the number of times the tracker motor is switched on and off

	Motor errors	Plots the differential between the motor position and setpoint values for each tracker
	Torque-tube slope	Plots the torque tube Pitch against Roll for each tracker
	Wireless signal strength	Plots current minimum, maximum, and average signal strength values (in dB) for each tracker
	Enclosure temperature	Plots the enclosure temperature and ambient temperature for each tracker
	Sun position	Plots the position of the sun
	Server history	Plots the quality of connection to the TMAC Admin Server for each tracker
	Server performance	Plots the transaction time in milliseconds from the server
	Wireless RX	Plots the quality of received data
	Wireless AT	Plots the quality of the transmitted data on the wireless network
	Wireless TX	Plots the quality of transmitted data to the TMAC Admin Server
	Analog limit	Plots the minimum and maximum analog limits in millivolts for the tracker
	Analog standard deviation	Plots the analog input deviation in millivolts for the tracker

To illustrate, perform the following steps to view on the graph the motor position error data for a TMAC unit—for example, *Center-East (M0338_AREA01_TRK05 PN:1/0)* installed at *Sonoma Water District TZ:-08:00*—over the last three days.

1. On the main or **DASHBOARD** tab page, click *Sonoma Water District TZ:-08:00* in the site list.
2. In the expanded pane for the site, click *Center-East (M0338_AREA01_TRK05 PN:1/0).*

3. In the **GRAPHS** section, select *Motor errors* in the **Graph type** drop-down list (Fig. B33).

   Note. The **GRAPHS** section is right below the **Unit: [TMAC Unit]** section. Use the scroll bar on the right side of the page.

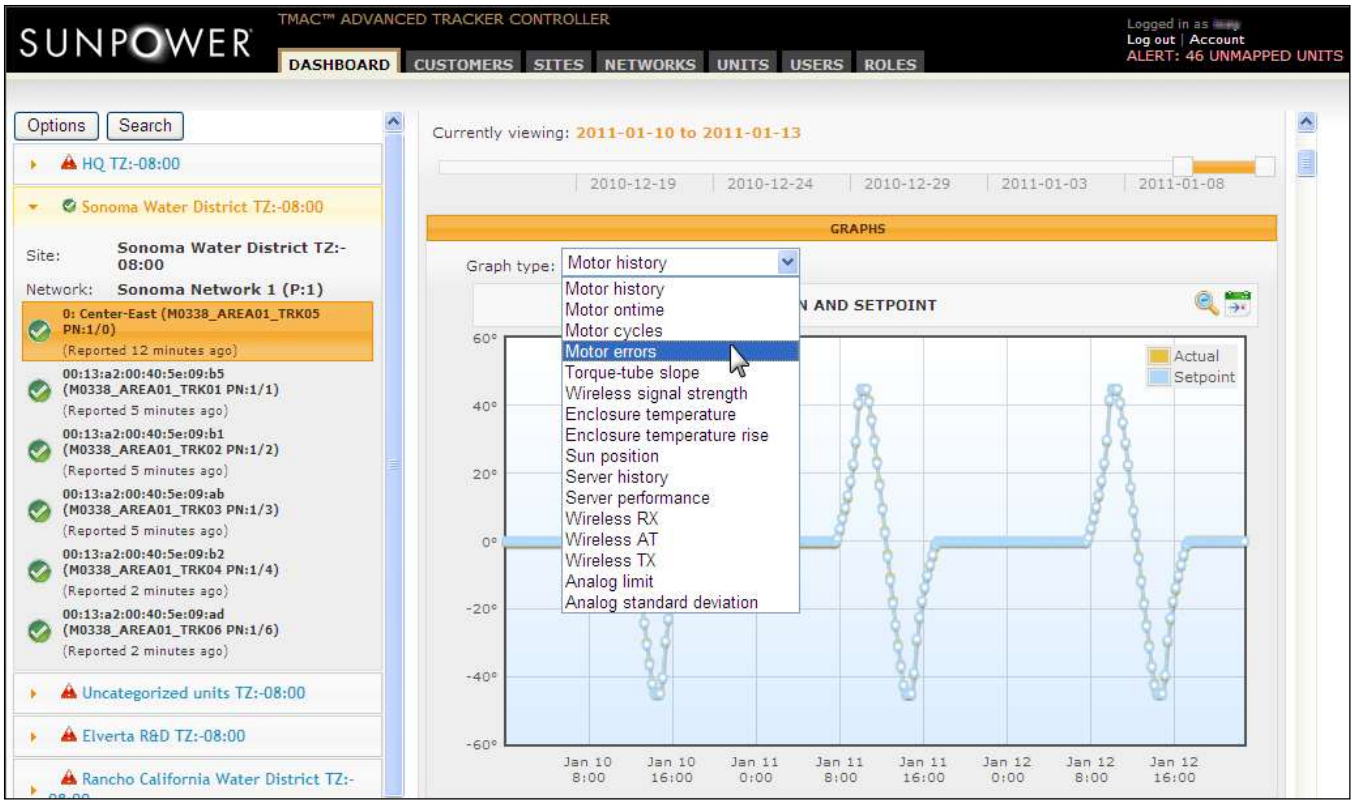


Fig. B33

4. View the **MOTOR POSITION ERROR** graph for *Center-East (M0338_AREA01_TRK05 PN:1/0)* (Fig. B34). Check the days for which you are viewing data indicated above the **GRAPHS** title bar.

Fig. B34

5. To view older data, move the left-end square of the slider to the left. At a time, you can plot up to three days' worth of data. To view data two or a day at a time, decrease the width of the slider by moving the right-end square to the left (Fig. B35). The message *Graph does not show current data* is displayed if the graph currently plotted is for historical data.

Fig. B35

To view graph data for a site or network, click the site or network name link to display the site- or network-level view, respectively, and then select a graph type in the **Graph type** drop-down list.

Fig. B36 shows *Sonoma Water District TZ:-08:00* selected as site view and the site-level **Graph type** options.

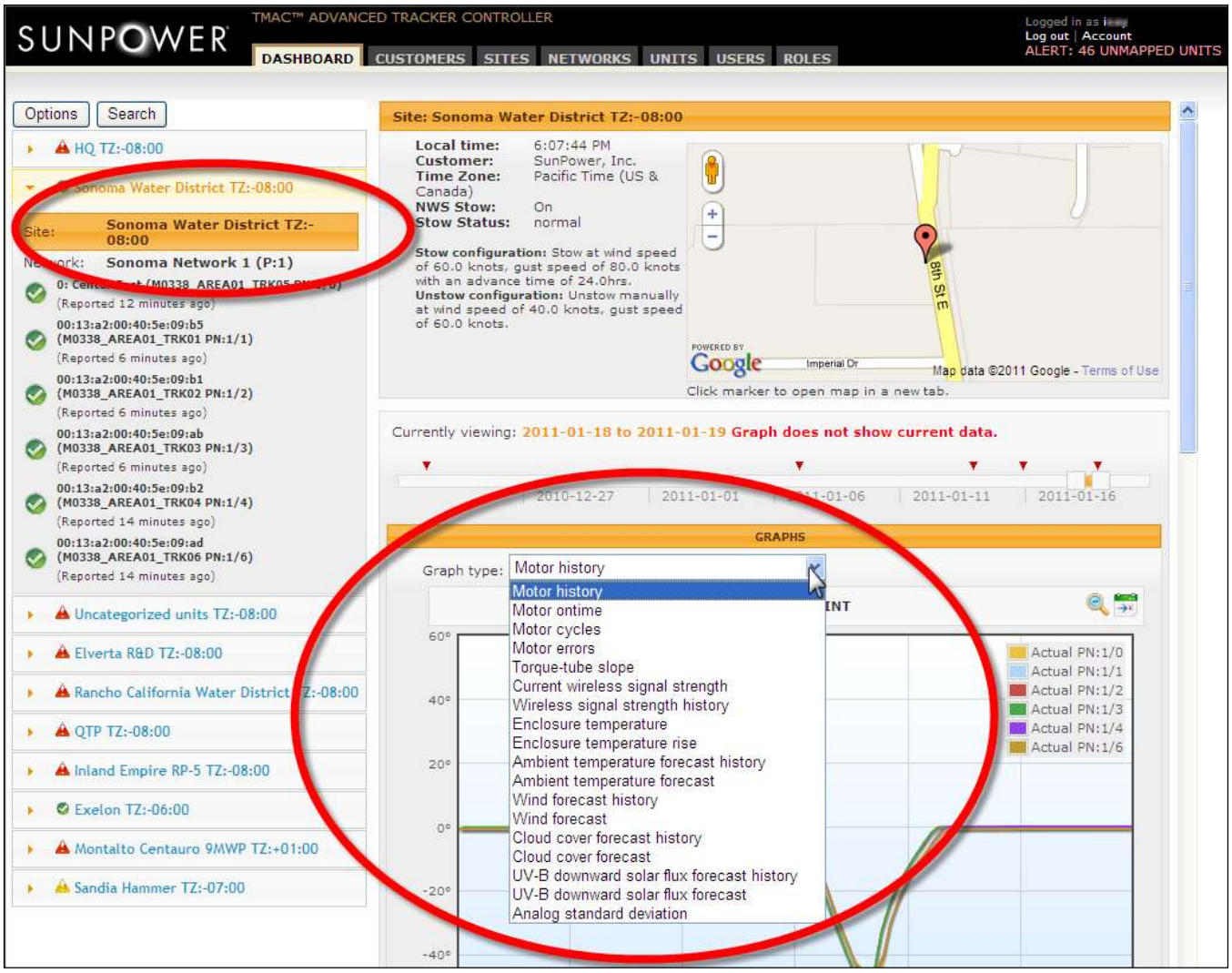


Fig. B36

B.3.6 Viewing System Status

On the main or **DASHBOARD** tab page, you can view system status indicators by message types for each TMAC unit:

1. In the site list, click the site name and then the TMAC unit link to display the unit-level view.
2. Scroll down to the **SYSTEM STATUS** section (below the **GRAPHS** section) where message types are listed according to when each was last received (Fig. B37).

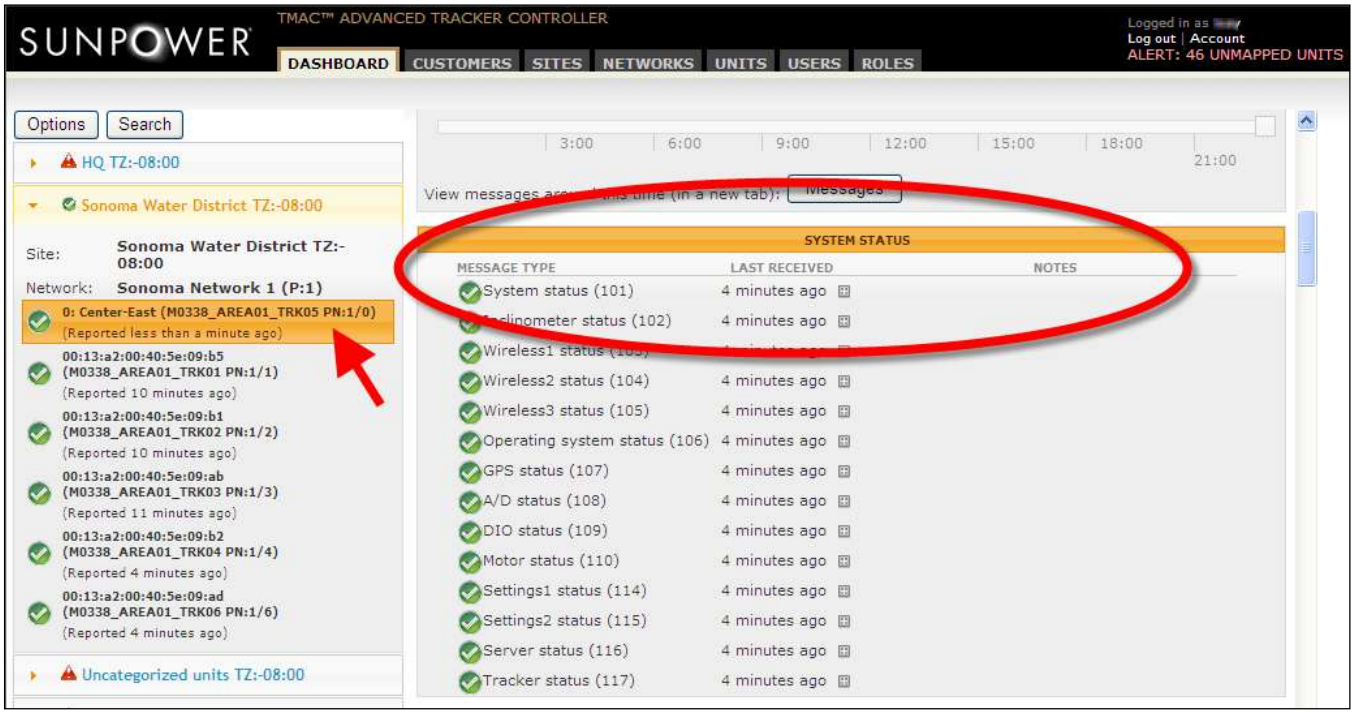


Fig. B37

3. To view the details of a message type—for example, *Inclinometer status (102)*, click the (Expand) button under the **LAST RECEIVED** column to expand the row (Fig. B38).

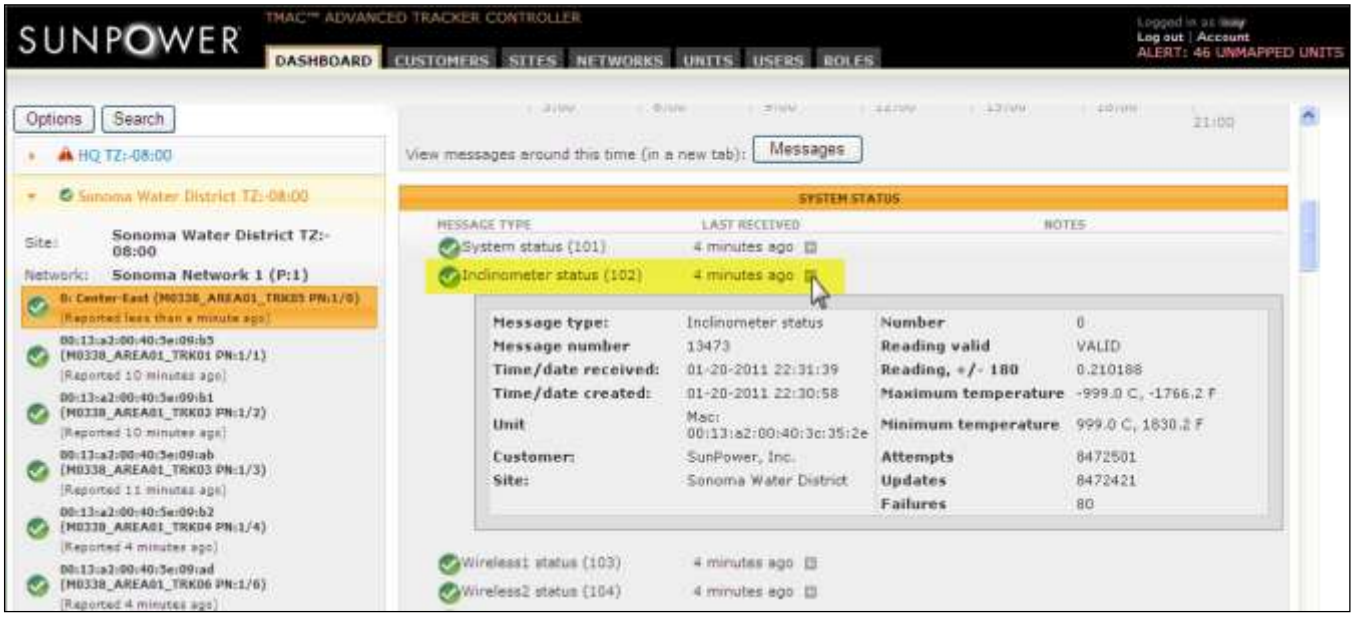


Fig. B38

4. Click the (Collapse) button to hide the details.
5. Perform Steps 3–4 to view the details of other message types.

B.3.7 Viewing and Adding Controller Events

On the main or **DASHBOARD** tab page, you can view details of controller events for each TMAC unit.

B.3.7.1 Viewing Controller Events

1. In the site list, click the site name and then the TMAC unit link to display the unit-level view.
2. Scroll down to the **CONTROLLER EVENTS** section where controller events are listed according to when they were last received (Fig. B39).

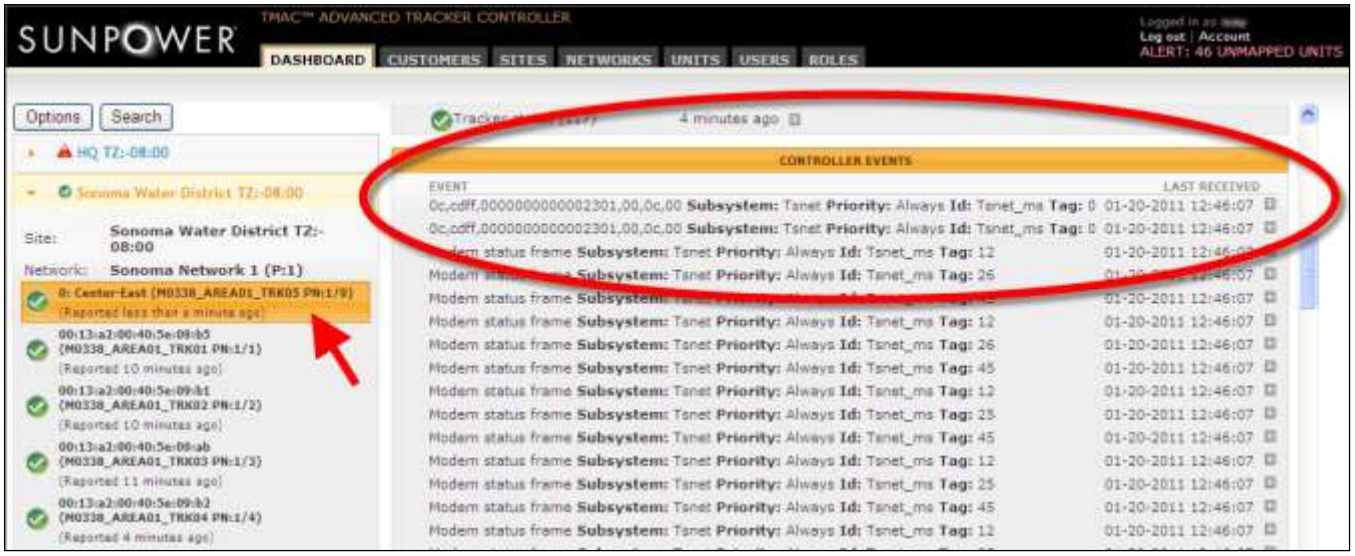


Fig. B39

3. To view the details of a controller event—for example, the event report at the top of the list, click the (Expand) button under the **LAST RECEIVED** column to expand the row (Fig. B40).

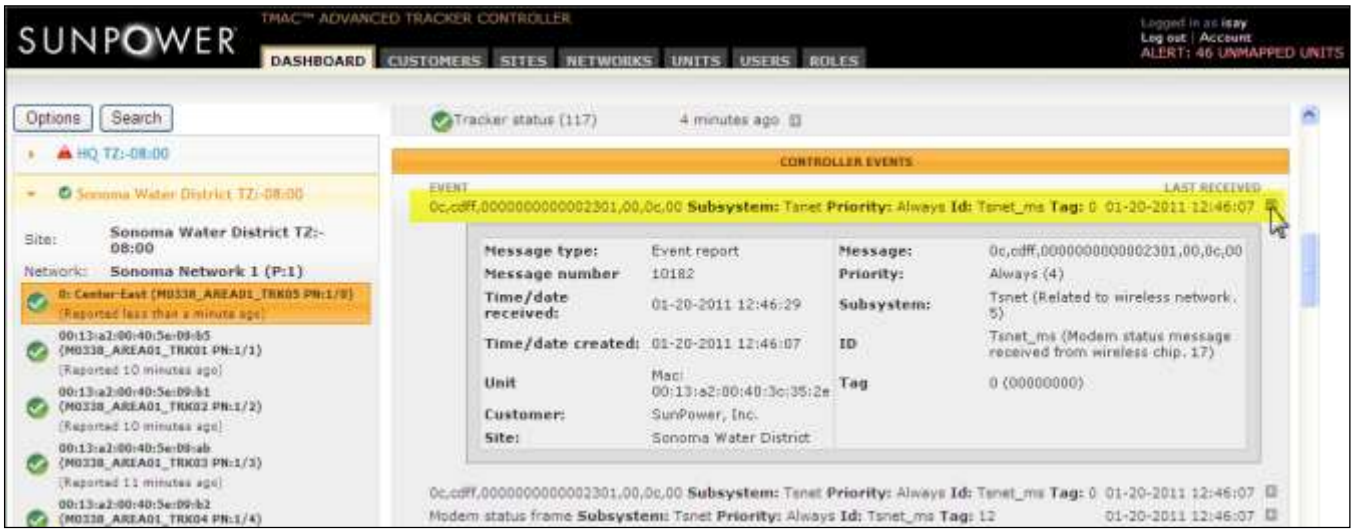


Fig. B40

4. Click the (Collapse) button to hide the details.
5. Perform Steps 3–4 to view the details of other controller events.

B.3.7.2 Adding Controller Events

1. Scroll down to the bottom of the **CONTROLLER EVENTS** section.
2. Click *Add event.*
3. Enter the controller event report in the **Explore User Prompt** screen and then click *OK* (Fig. B41).

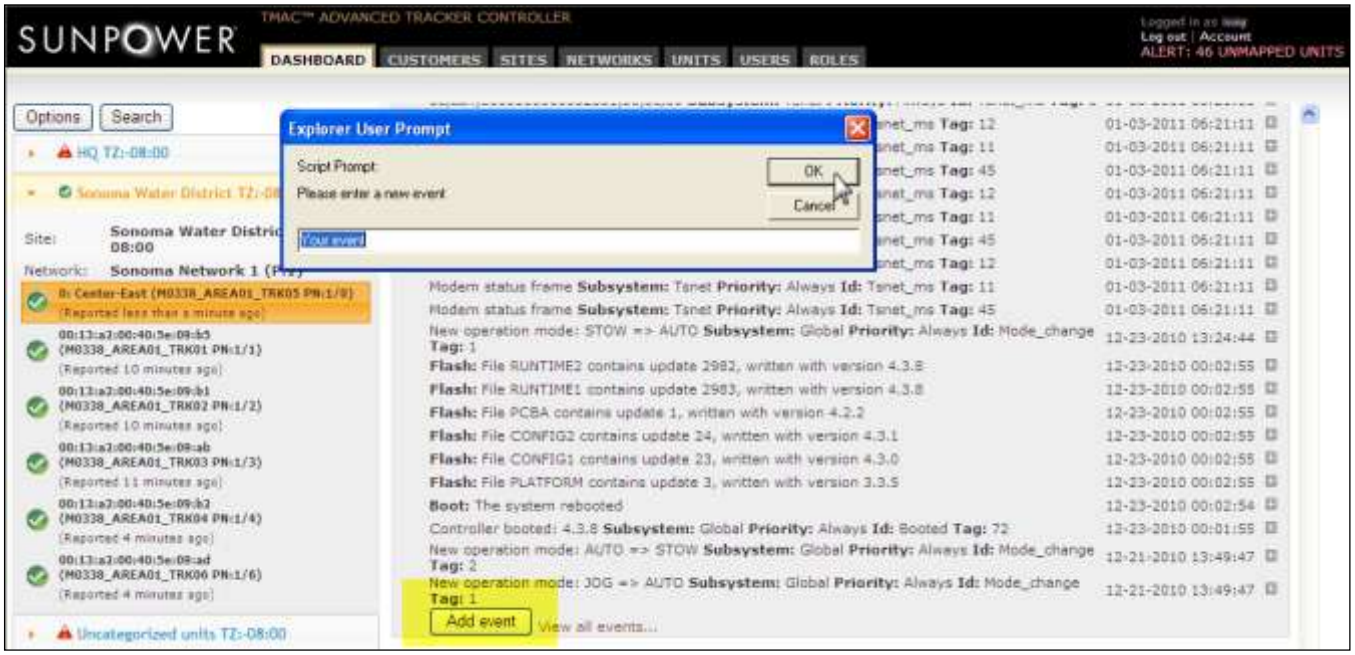


Fig. B41

B.3.8 Setting or Modifying Configuration Parameters

Important! Each controller is programmed to check the TMAC server for updates approximately every 5 minutes. Ensure that you carefully enter and verify values before sending a remote command to set or modify a controller's configuration parameters.

You enter or select values to configure or send updates to the controller through a screen that contains the **REMOTE UPDATE FOR [TMAC UNIT]** and **COMMISSIONING** forms. The screen can be accessed through links on the main and Unit pages.

B.3.8.1 Using the Main or Dashboard Tab Page

To set or modify controller configuration parameters:

1. In the site list, click the site name and then the TMAC unit link to display the unit-level view.
2. Scroll down to the **REMOTE UPDATES** section.
3. Click *Remote update* (Fig. B42).

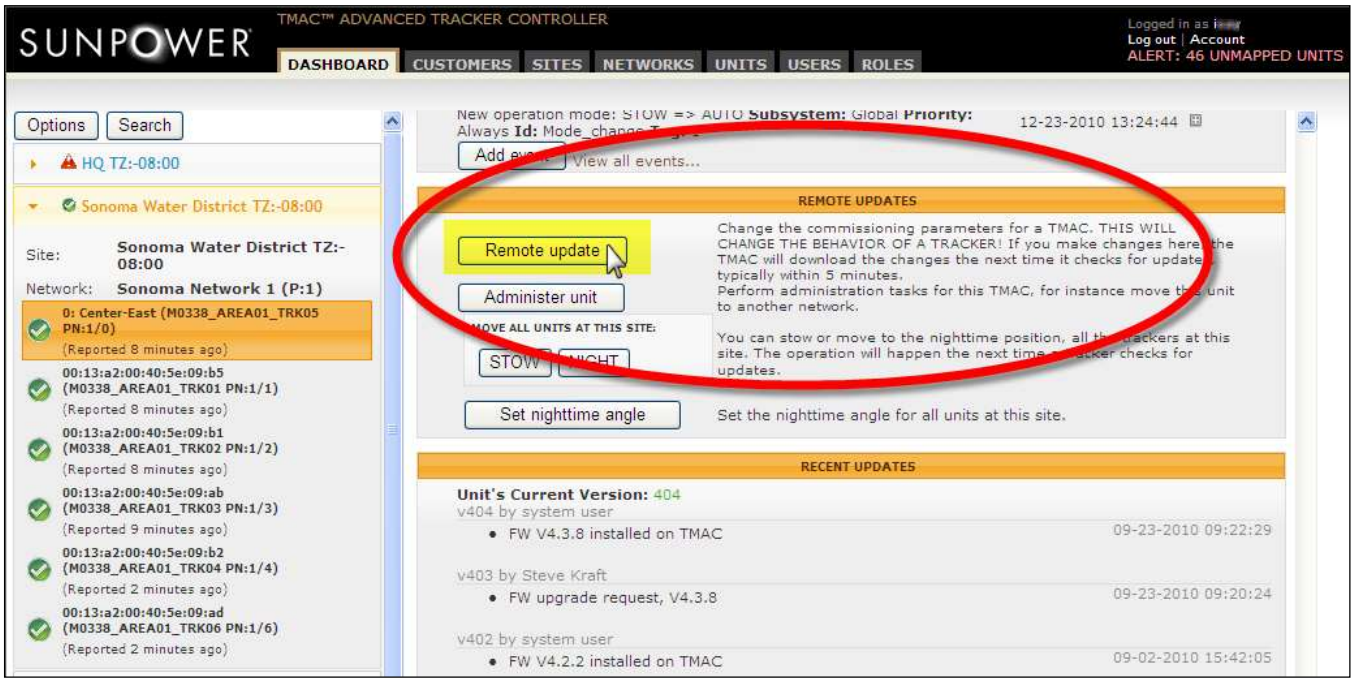


Fig. B42

4. The screen with the **REMOTE UPDATE FOR [TMAC UNIT]** and **COMMISSIONING** forms appears (Fig. B43).

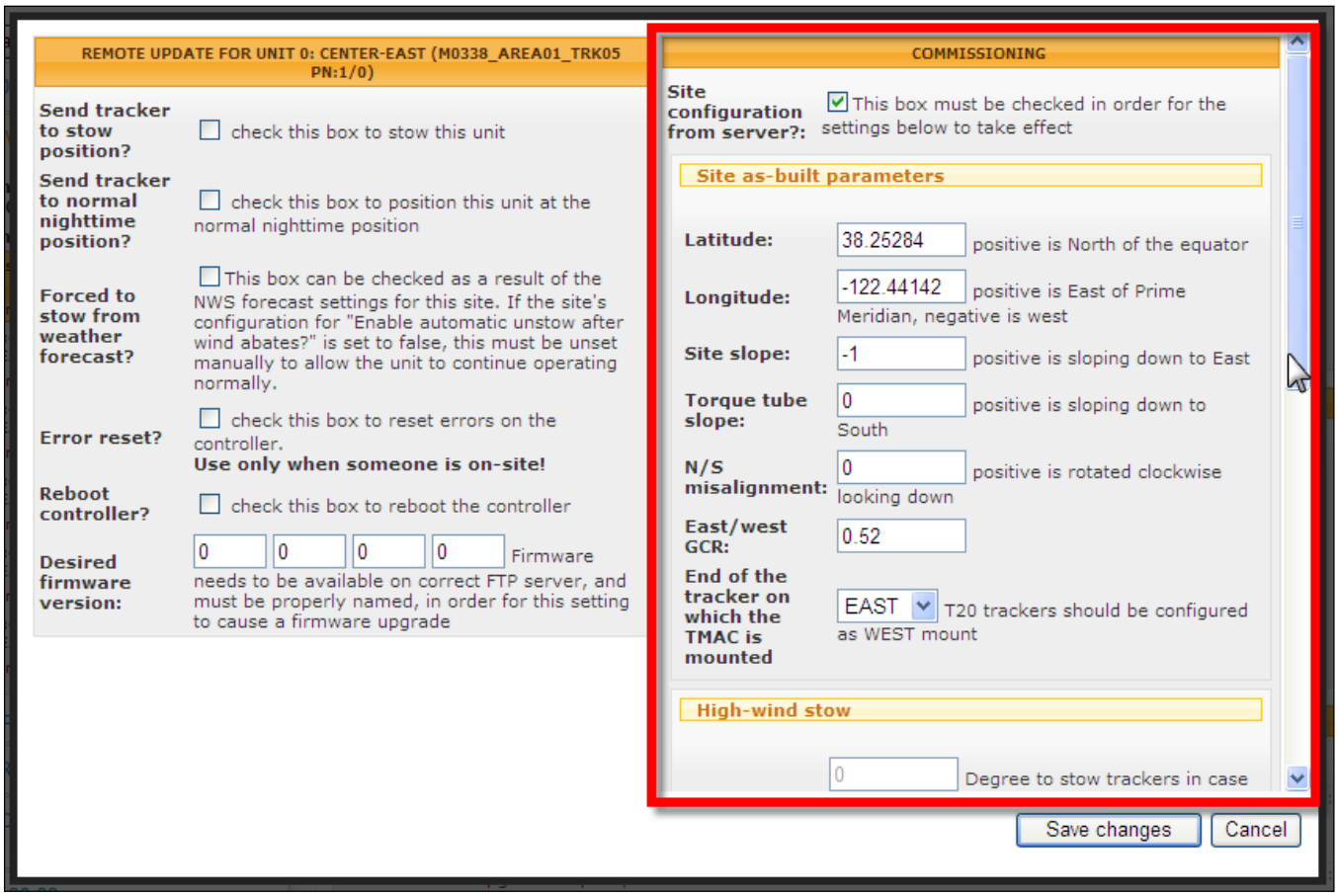


Fig. B43

Enter or select the following under the **COMMISSIONING** section and then click *Save changes* at the lower right of the screen:

Site configuration from server?:	Select this check box after you enter all values in the parameter fields and before you click *Save changes.*
Site as-built parameters	
Latitude:	Enter latitude coordinates.
Longitude:	Enter longitude coordinates.
Site slope:	Enter the site slope.
Torque tube slope:	Enter the slope of the fully installed torque tubes. The value is positive when the south end of the array is lower than the north.

N/S misalignment:	Enter the number of degrees by which the torque tube alignment is off from true N–S. If the value is positive, the tube alignment is clockwise from true N–S when assessed from overhead.
East/west GCR:	Enter the percentage of total ground surface taken up by the system when viewed from above with the modules flat. A smaller GCR means that modules are proportionally farther apart. GCR should typically be in the range of 0.35 for a ground-mounted system, and 0.50 for an elevated system.
End of the tracker on which the TMAC is mounted	Select the side of the array on which the drive unit is installed. ***Important!*** Always select *WEST* for T20 Trackers.
High-wind stow	
Stow position	Enter the number of degrees at which the modules are positioned during high wind.
Stow on disconnect?	Select this check box to command the controller to stow the tracker 24 hours after loss of network connection.
Nighttime behavior	
Nighttime position	Enter the number of degrees at which the modules are positioned and at which they remain overnight.
Alternate nights?	Select this check box to command the controller to set the tracker at the nighttime position on even/odd days.
Motor	
Deadband	Enter the deadband value.
Hysteresis	Enter the hysteresis value.
Debug	
Status interval:	Enter the value that corresponds to the number of minutes between status messages. A status interval of *0* (typical) corresponds to default interval of 15 minutes.
Configure additional error reporting:	Select a preference for error reporting.

B.3.8.2 Using the Units Tab Page

To set or modify controller configuration parameters:

1. Click the **UNITS** tab to open the Unit page.
2. Locate the TMAC unit using the search function. Enter the controller name, Maximo ID, or Mac address in the **Search Terms** field and click *Search.*
3. Click the version link under the **Force** column to open the window that contains the **REMOTE UPDATE FOR [TMAC UNIT]** and **COMMISSIONING** forms (Fig. B44).

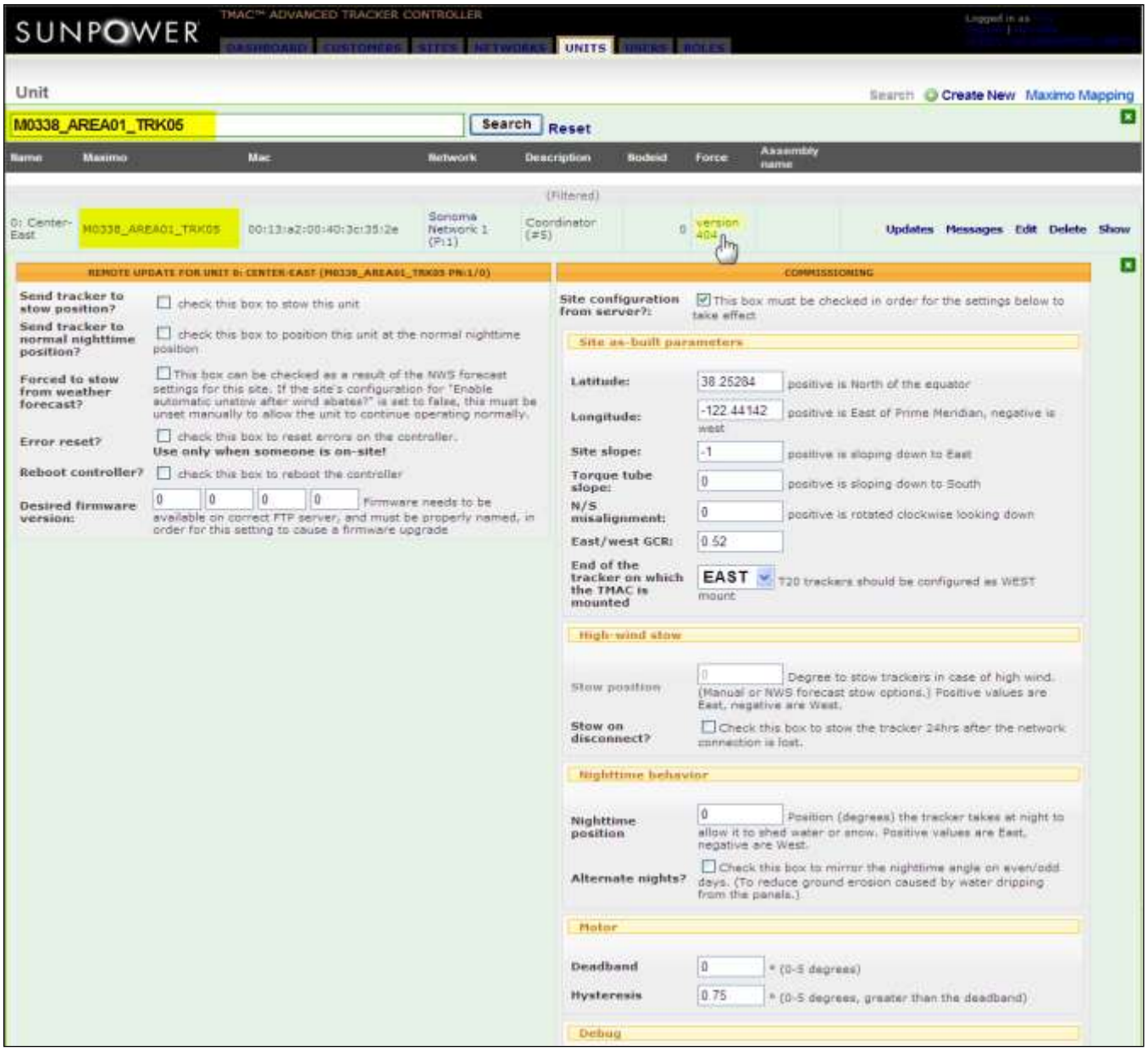


Fig. B44

4. Enter or select values in the **COMMISSIONING** form and save the changes (refer to table of parameters in this section).

B.3.9 Sending Remote Updates

Important! Each controller is programmed to check the TMAC server for updates approximately every 5 minutes. Ensure that you carefully enter settings or verify parameters before sending an operational command to the controller.

You enter or select values to configure or send updates for a controller through a screen that contains the **REMOTE UPDATE FOR [TMAC UNIT]** and **COMMISSIONING** forms. The screen can be accessed through links on the main and Unit pages.

B.3.9.1 Using the Main or Dashboard Tab Page

To send updates for a controller using the main or **DASHBOARD** tab page:

1. In the site list, click the site name and then the TMAC unit link to open the unit-level view.
2. Scroll down to the **REMOTE UPDATES** section and click *Remote update.*
3. Select check boxes or enter values in the **REMOTE UPDATE FOR [TMAC UNIT]** form in the screen (Fig. B45). Click *Save changes* to commit the information and send the command.

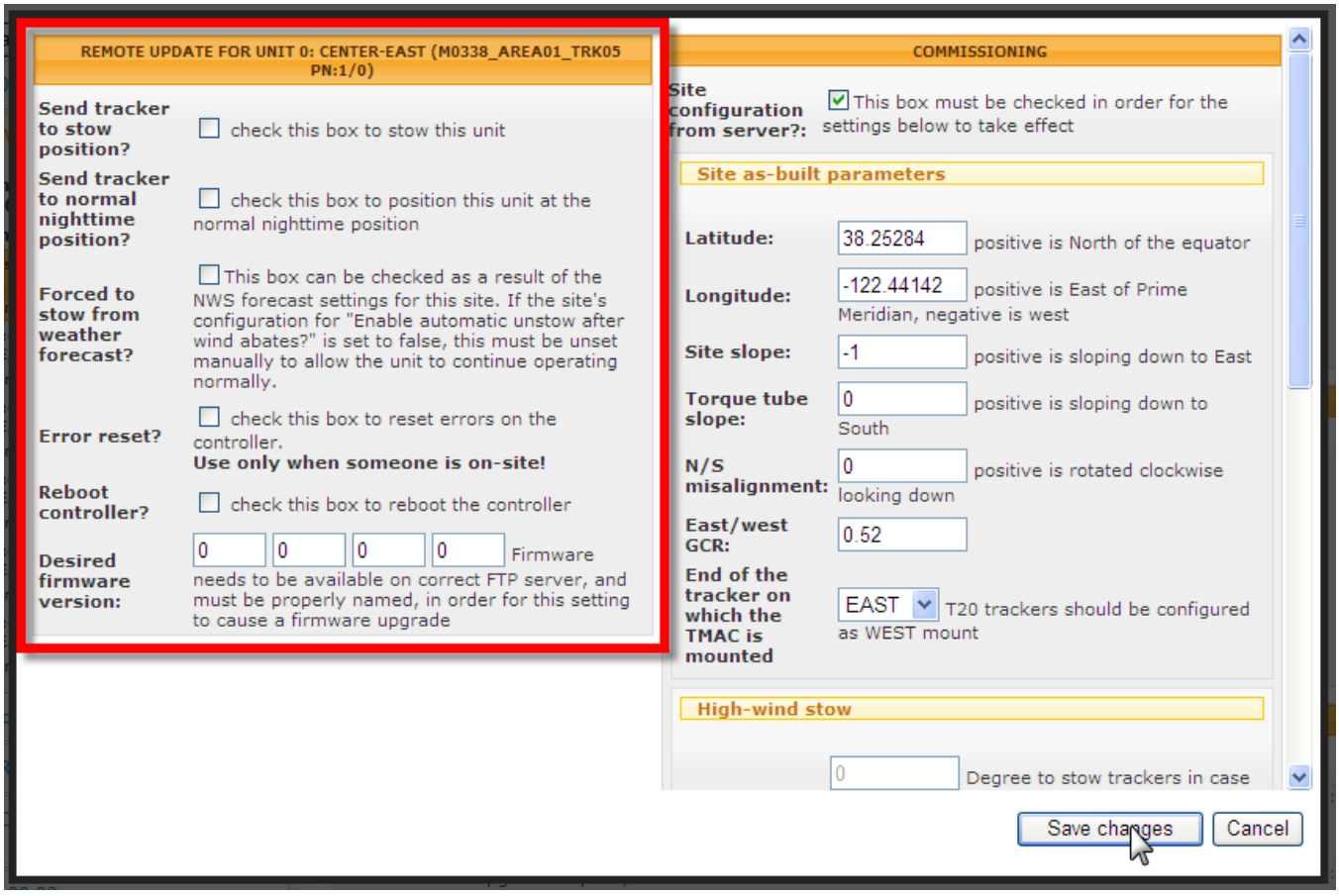


Fig. B45

Send tracker to stow position?	Select this check box to send the command to the controller to place the tracker unit in Stow at an angle entered in the **Stow position** field in the **High-Wind Stow** section under **COMMISSIONING.**
Send tracker to normal nighttime position?	Select this check box to send the command to the controller to place the tracker in the normal nighttime position. The tracker will remain in this nighttime position until you clear (deselect) this check box.
Forced to stow from weather forecast?	Select this check box to send the command to the controller to place the tracker unit in nighttime position at an angle indicated in the **Nighttime behavior** section under **COMMISSIONING.** If the **Enable automatic unstow after wind abates?** is set to *False* in the configuration for the site, this must be unset manually to allow the unit to continue operating normally.
Error reset?	Select this check box to reset errors in the controller.
Reboot controller?	Select this check box to reboot the controller. ***Warning!*** Use this command only when authorized personnel are onsite.
Desired firmware version:	Enter the firmware version to remotely send a firmware upgrade to the controller.

B.3.9.2 Using the Units Tab Page

To send updates for a controller using the **UNITS** tab page:

1. Click the **UNITS** tab to open the Unit page.
1. Locate the TMAC unit using the search function. Enter the controller name, Maximo ID, or Mac address in the **Search Terms** field and click *Search.*
2. Click the version link under the **Force** column to open the window that contains the **REMOTE UPDATE FOR [TMAC UNIT]** and **COMMISSIONING** forms.
3. Enter or select values in the **REMOTE UPDATE FOR [TMAC UNIT]** form in the screen (refer to table of parameters in this section). Click *Save changes* to commit the information.
4. To verify the update after the periodic check between the controller and the TMAC server, refer to Section B.3.11.

B.3.10 Stowing the Array and Setting the Nighttime Angle

On the main or **DASHBOARD** tab page, you can send the command to stow or move an array to the nighttime position, and set the nighttime angle for an array.

1. In the site list, click the site name and then the site name link to open the site-level view.
2. Scroll down to the **REMOTE UPDATES** section.
   - To stow the array:
     a. Click *STOW* (Fig. B46).

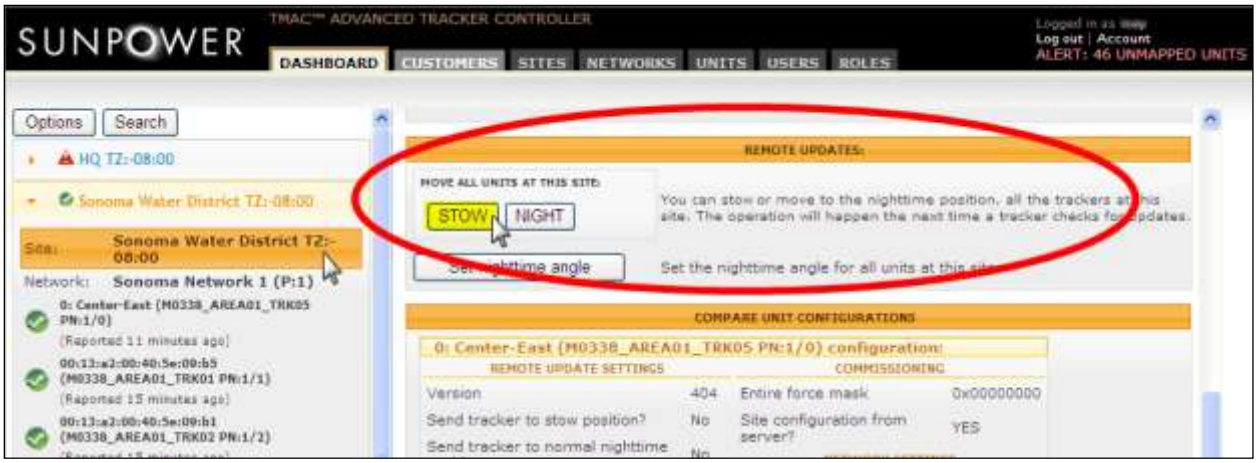


Fig. B46

b. Click *OK* in the confirmation window (Fig. B47).

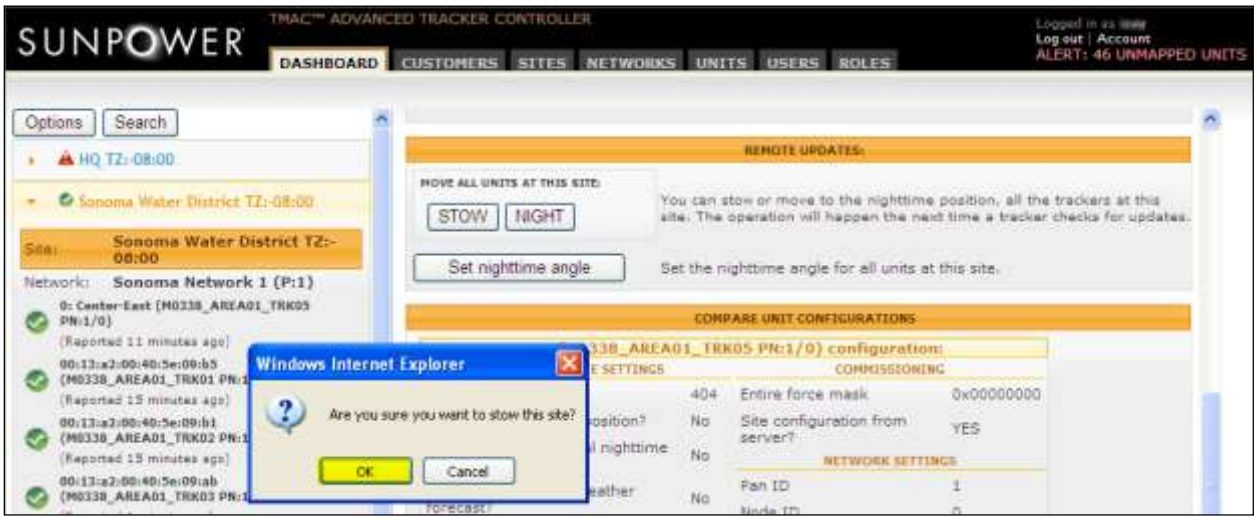


Fig. B47

- To move the array to the nighttime position:
  a. Click *NIGHT*.
  b. Click *OK* in the confirmation window (Fig. B48).

Fig. B48

- To set the nighttime angle for the array:
  a. Click *Set nighttime angle.*
  b. Enter the nighttime position in the **Explorer User Prompt** screen and click OK (Fig. B49).

Fig. B49

Important! You can also send these commands using the **REMOTE UPDATES** section in the unit-level view for any TMAC installed in the site. To open the unit-level view, refer to Section B.3.4.

B.3.11 Viewing Recent Updates

Updates for a TMAC include records of changes in the controller configuration parameters, and both the requested and executed operational commands. You can view recent updates for a TMAC unit on the main and Unit pages.

B.3.11.1 Using the Main or Dashboard Tab Page

1. In the site list, click the site name and then the TMAC unit link to open the unit-level view.
2. Scroll down to the **RECENT UPDATES** section (Fig. B50).

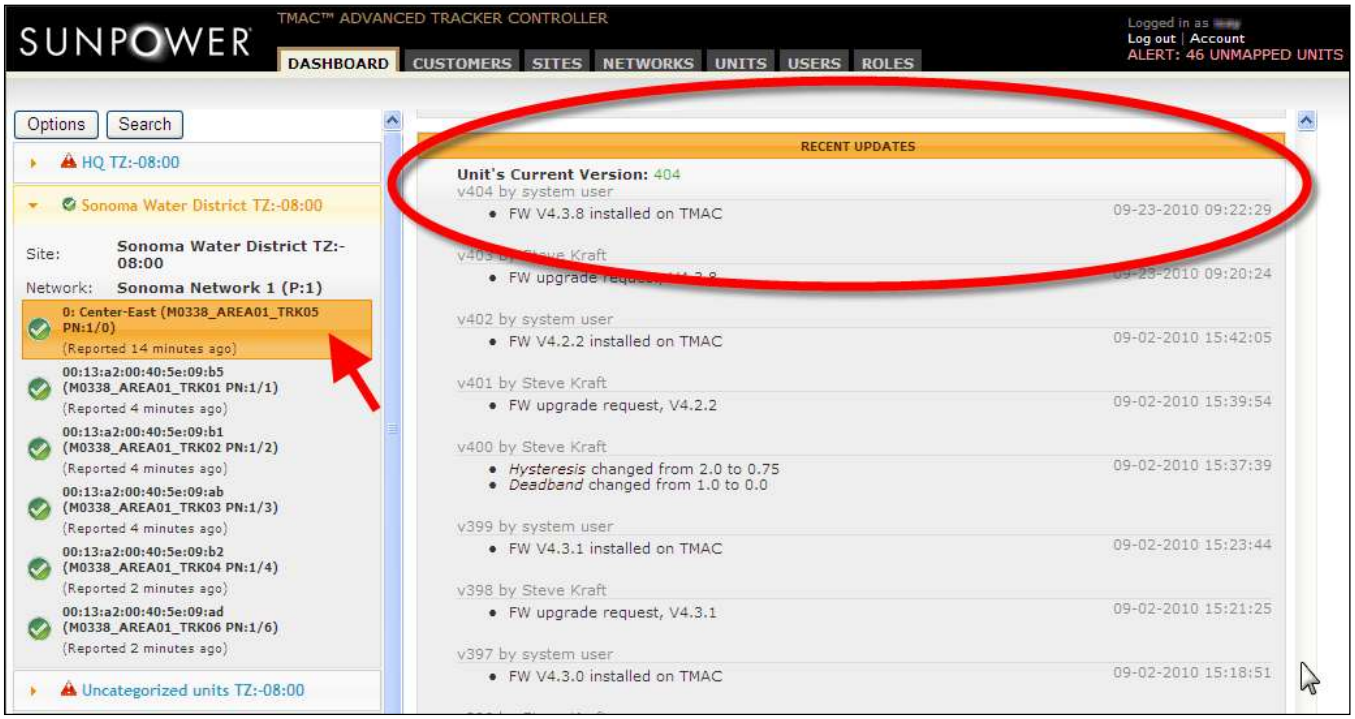


Fig. B50

B.3.11.2 Using the Units Tab Page

1. Click the **UNITS** tab to open the Unit page.
2. Locate the TMAC unit using the search function. Enter the controller unit name, Maximo ID, or Mac address in the **Search Terms** field and click *Search.*
3. Click **Updates** under the last column to open the **Forcehistory for [TMAC unit]** window (Fig. B51).

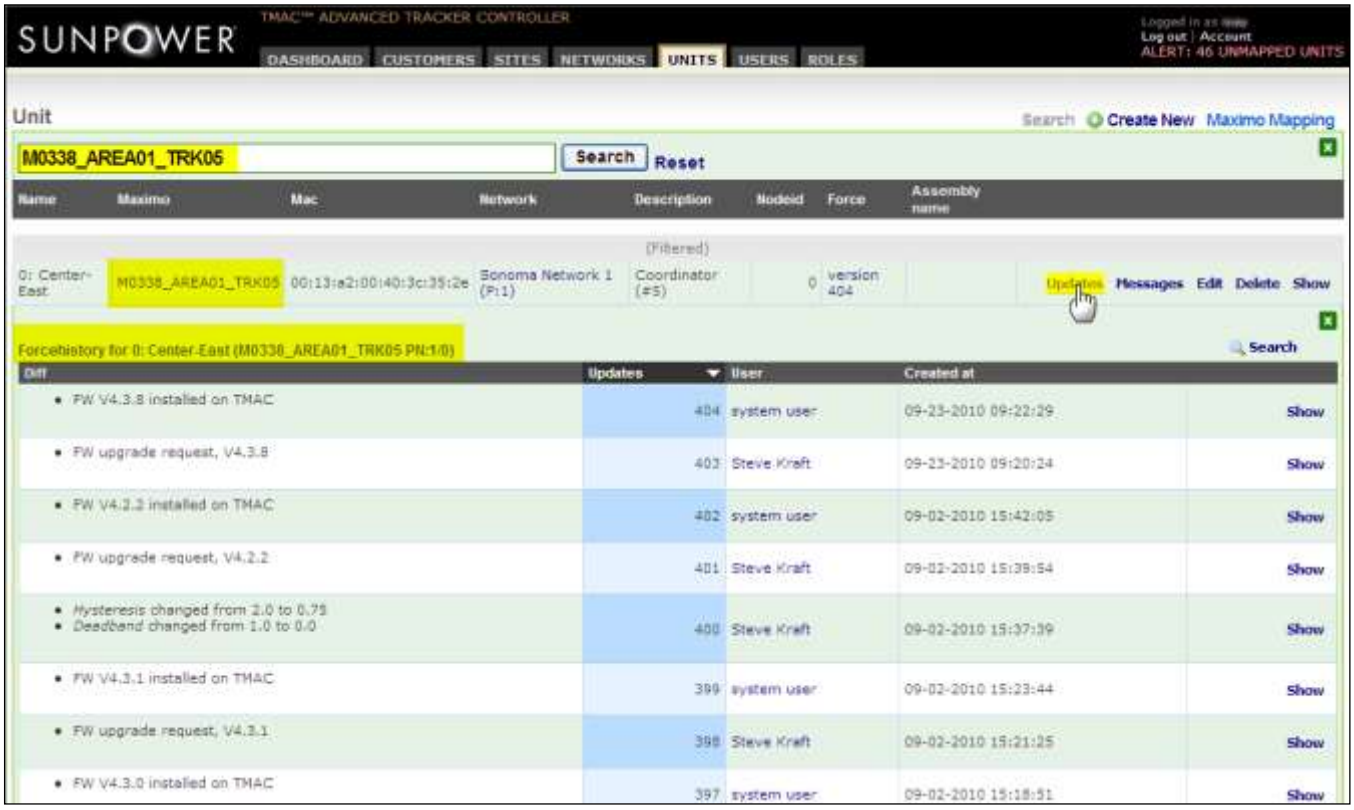


Fig. B51

4. Click **Show** under the rightmost column to view the details of each row of update in the **Force data** window (Fig. B52).

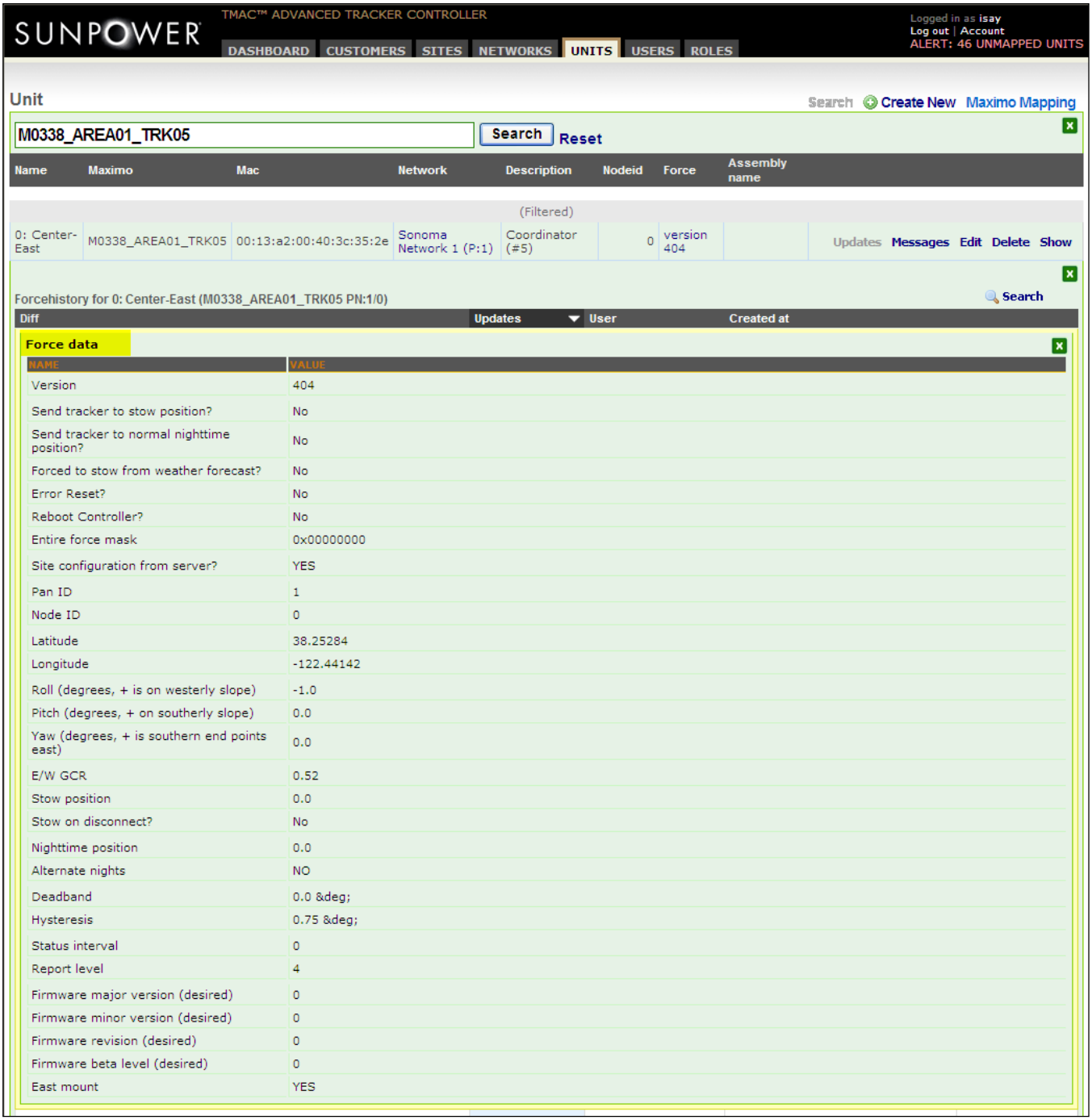


Fig. B52

B.3.12 Viewing Messages

Messages for a TMAC consist of event and boot reports, flash status, and the different types of system status indicators. You can view messages for a controller through links on the main and Unit pages.

B.3.12.1 Using the Main or Dashboard Tab Page

1. In the site list, click the site name and then the TMAC unit link to open the unit-level view.
2. Scroll down to the **GRAPHS** section and click the *Messages* button below the graph area (Fig. B53).

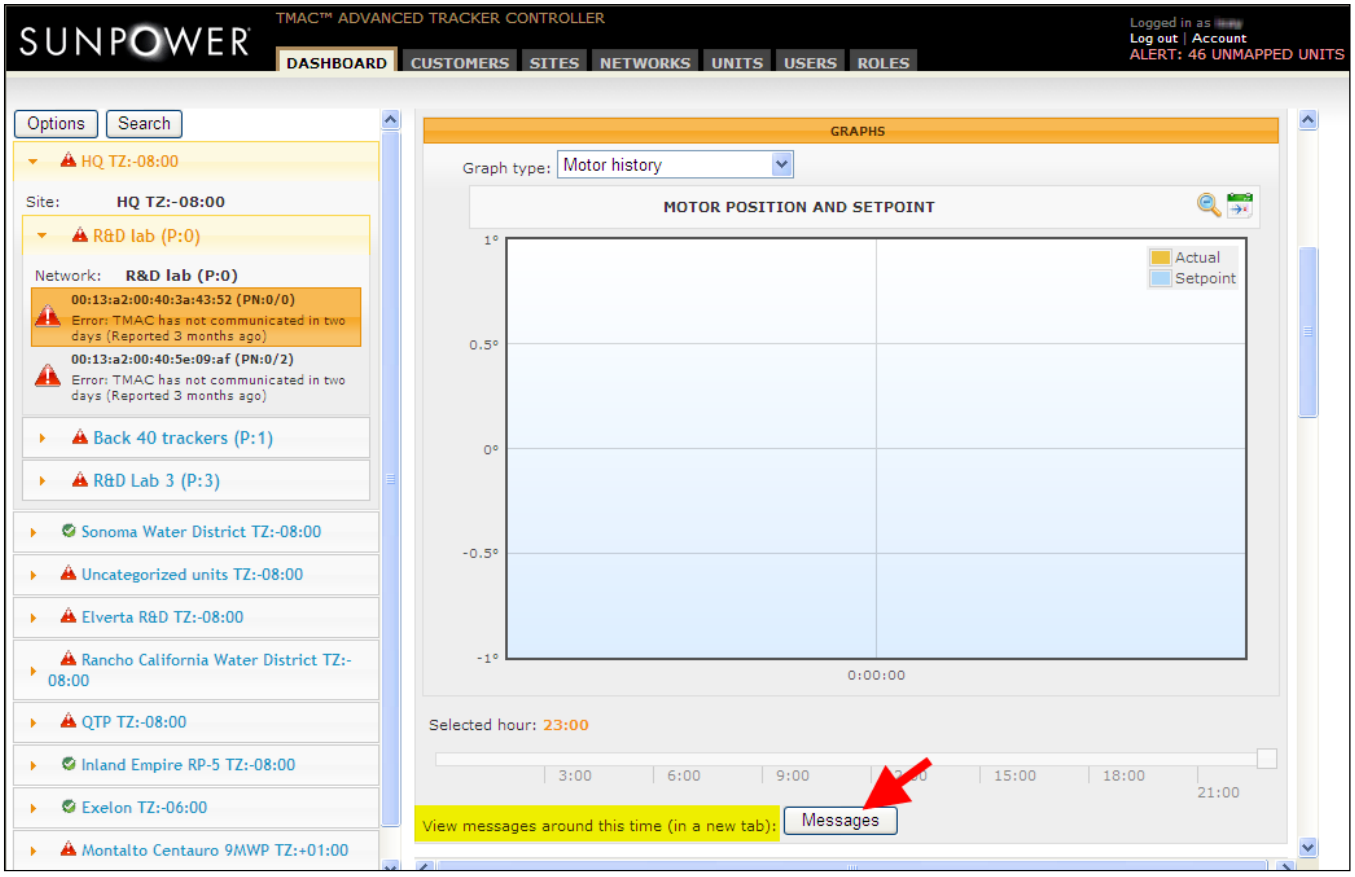


Fig. B53

3. The Message page opens in a separate window (Fig. B54).

Fig. B54

4. Click **Show** under the rightmost column to view the details of each message type (Fig. B55).

Fig. B55

B.3.12.2 Using the Units Tab Page

1. Click the **UNITS** tab to open the Unit page.
2. Locate the TMAC unit using the search function. Enter the controller unit name, Maximo ID, or Mac address in the **Search Terms** field and click *Search.*
3. Click **Messages** under the last column to open the **Message for [TMAC unit]** window (Fig. B56).

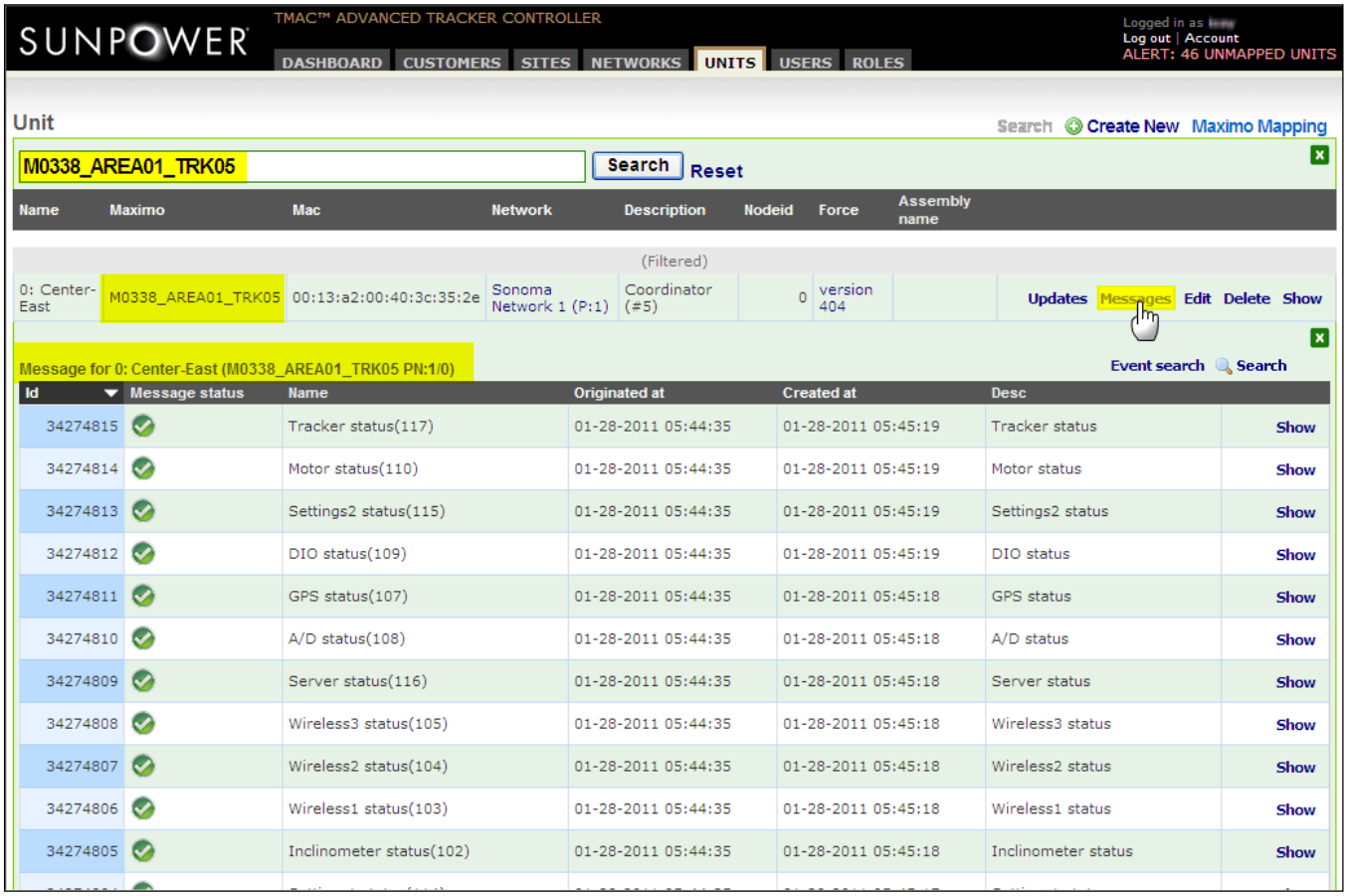


Fig. B56

4. Click **Show** under the rightmost column to view the details of each message type.

B.3.13 Viewing Alerts

Upon logging in, the main or **DASHBOARD** tab page displays the site list (on the left) and the lists of TMACs per site that have alerts (Fig. B57). The lists under **UNITS WITH PROBLEMS DURING THE LAST 24 HOURS:** also include units that have persistent alerts (more than 24 hours).

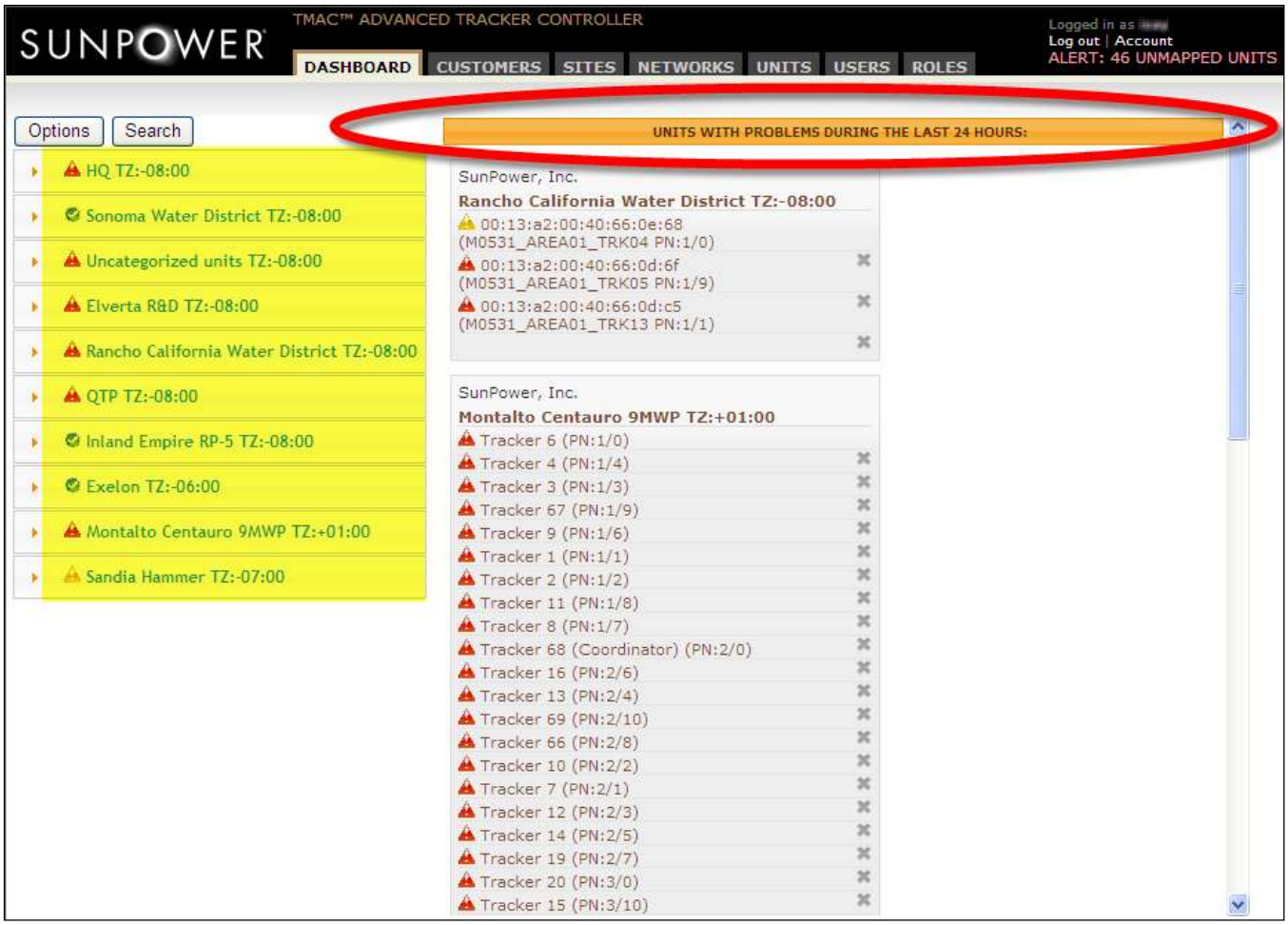


Fig. B57

A symbol precedes each site name to indicate the alert status for the site:

- (check mark enclosed in green circle) indicates that all TMACs at the site are operating normally
- (exclamation mark enclosed in yellow triangle) indicates a warning for possible errors in one or more controllers at the site
- (exclamation mark enclosed in red triangle) indicates that one or more controllers at the site have a system status error

Note. To filter the lists on the main page such that only sites with warnings and alerts are displayed, click the *Options* button above the site list, select the *Show only errors?* check box and click *Save changes* in the **Dashboard Options** window, and then click *Reload Page* in the confirmation window (refer to Section B.3.1).

To view the issue summary, mouse over the TMAC unit name (Fig. B58).

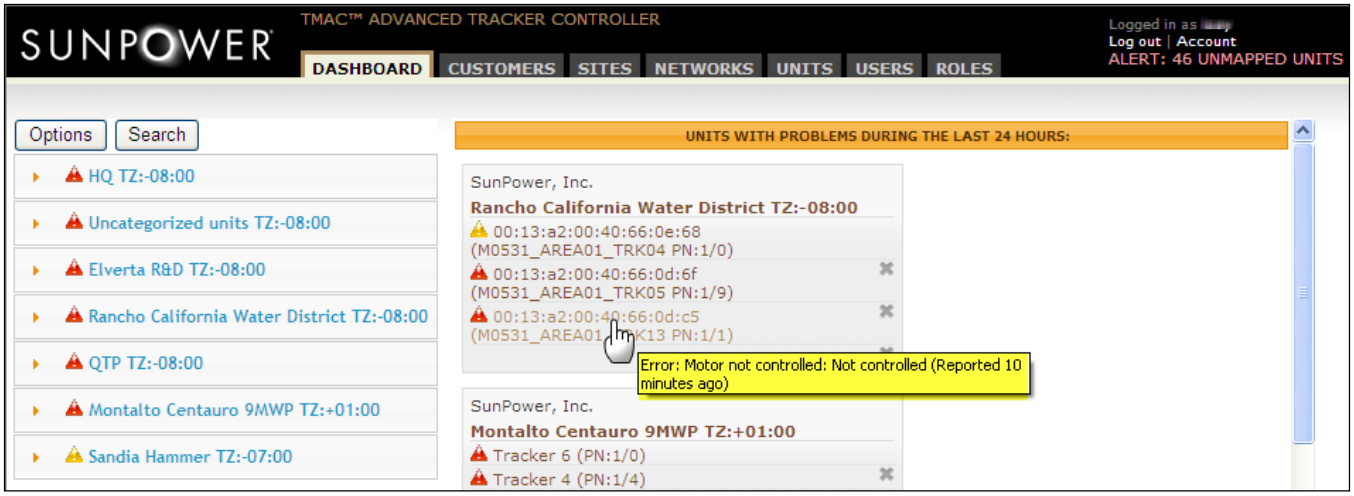


Fig. B58

To gather more information about the occurring (or persistent) alert, click the TMAC unit name link to display the unit-level view (Fig. B59). View the unit information and use the different sections on the page to investigate the error, verify parameters, and perform troubleshooting by modifying settings or executing remote operational commands.

The **GRAPHS** section allows you to view graphical data based on selections of graph types and dates (Fig. B59). The default graph type is *Motor history;* select other graphs in the **Graph type** drop-down list. Use the slider to select a date or inclusive dates for which to view data. For more information, refer to Section B.3.5.

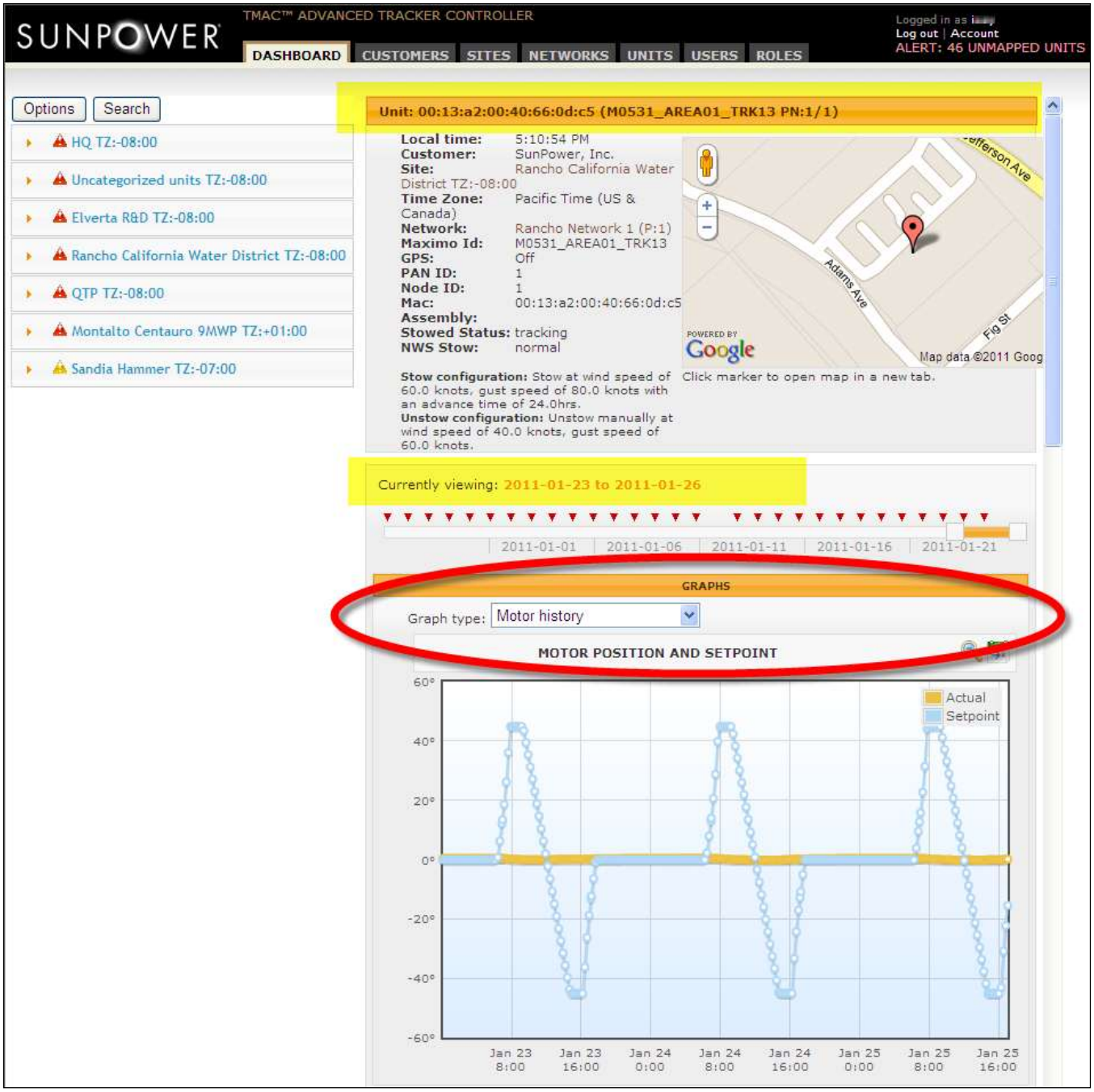


Fig. B59

The **SYSTEM STATUS** section lists system status indicators by message types. An alert symbol precedes each message type to indicate the alert status (Fig. B60). Refer to Section B.3.6 and Section B.3.12.

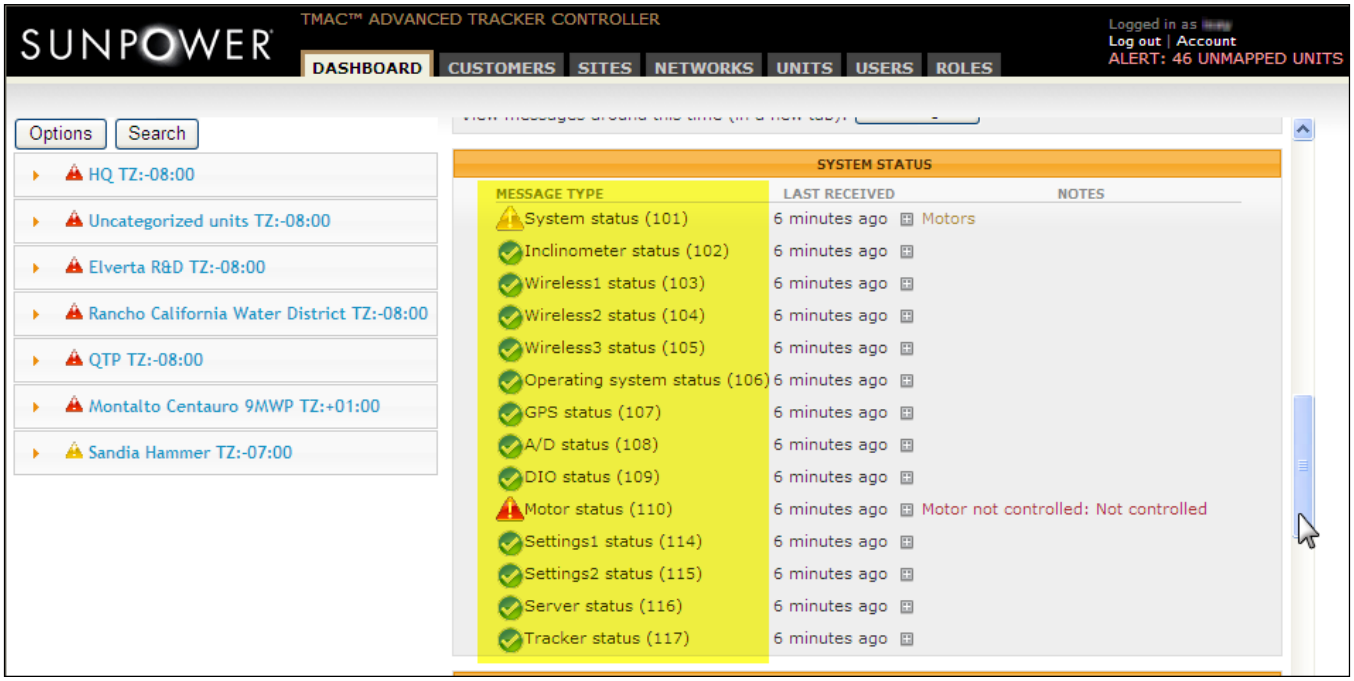


Fig. B60

To view, verify, or add records of events for the TMAC unit, use the **CONTROLLER EVENTS** section (Fig. B61). Use the ⊞ (Expand) and ⊟ (Collapse) buttons to display and hide details of each message type. Refer to Section B.3.7 and Section B.3.12.

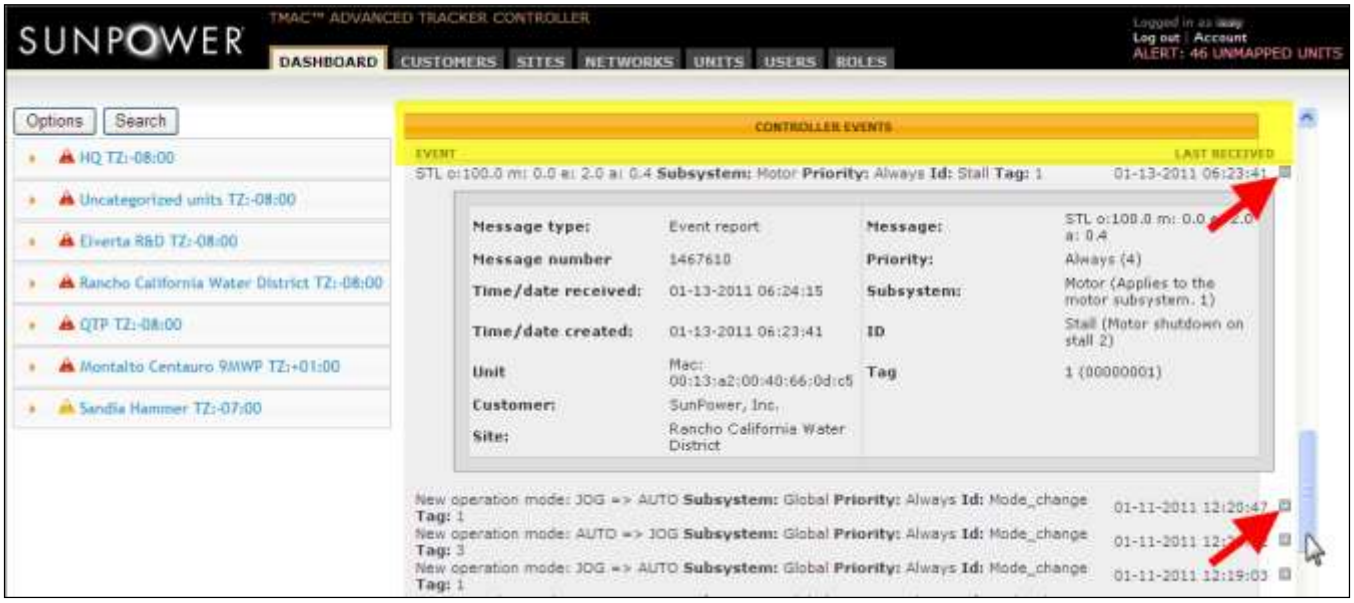


Fig. B61

B.3.14 Creating, Editing, and Deleting Customer Information

Administrator users can create, edit, and delete customer profiles on the Customer page. Supervisor users can only edit customer information.

1. Click the **CUSTOMERS** tab to open the Customer page.
2. Create and manage customer profiles using links on the page.
   - To create new customer profiles:
     a. Click **Create New.**
     b. In the **Create Customer** window, enter the customer name and select an option for email reporting (Fig. B62).

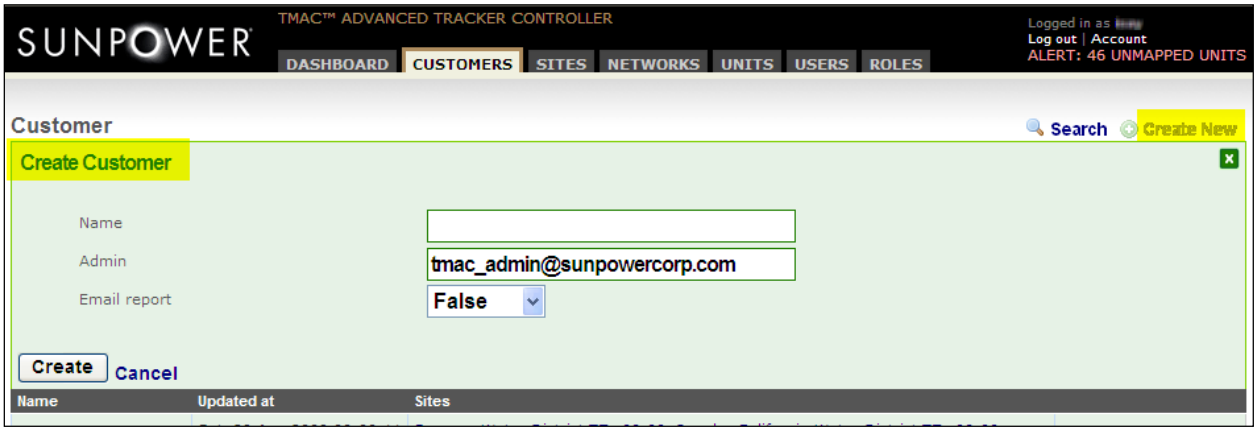


Fig. B62

     c. Click *Create.*

- To edit customer profiles:
  a. Locate the customer name in the list. If it is a big list, use the search function. Enter the customer name in the **Search Terms** field and click *Search.*
  b. Click **Edit** under the rightmost column.
  c. Enter or select values in the **Update [Customer name]** window (Fig. B63).

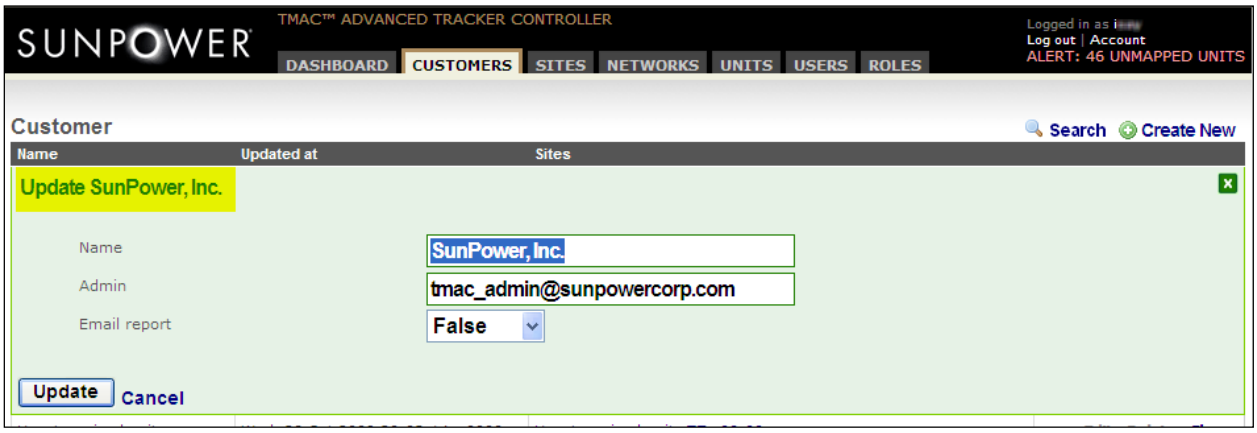


Fig. B63

  d. Click *Update.*

- To delete customer profiles:
  a. Locate the customer name in the list.
  b. Click **Delete** under the rightmost column.
  c. Click *OK* in the confirmation window (Fig. B64).

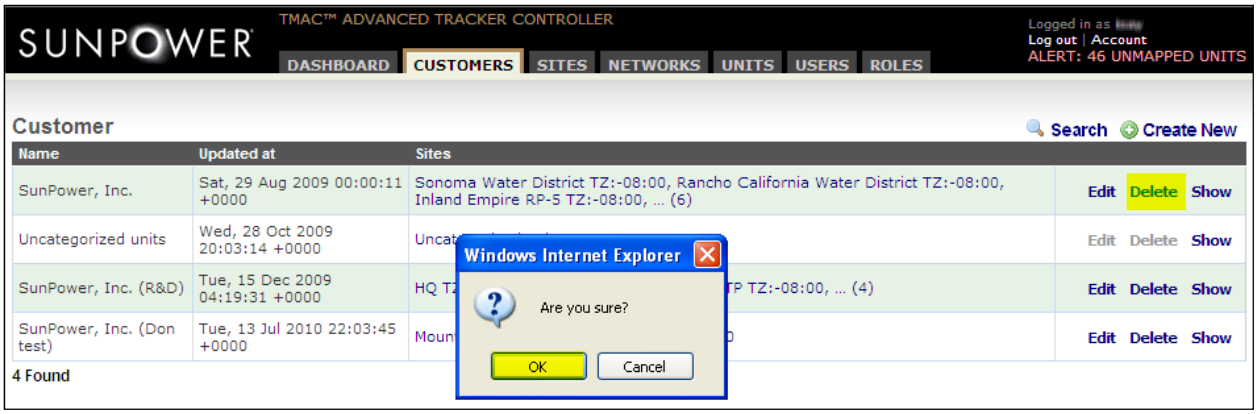


Fig. B64

B.3.15 Creating, Editing, and Deleting Site Information

Administrator users can create, edit, and delete site profiles on the Site page. Supervisor users can only edit site information.

1. Click the **SITES** tab to open the Site page.
2. Create and manage site profiles using links on the page.
   - To create a new site:
     a. Click **Create New.**
     b. In the **Create Site** window, enter and select site details as indicated in the project drawings (Fig. B65).

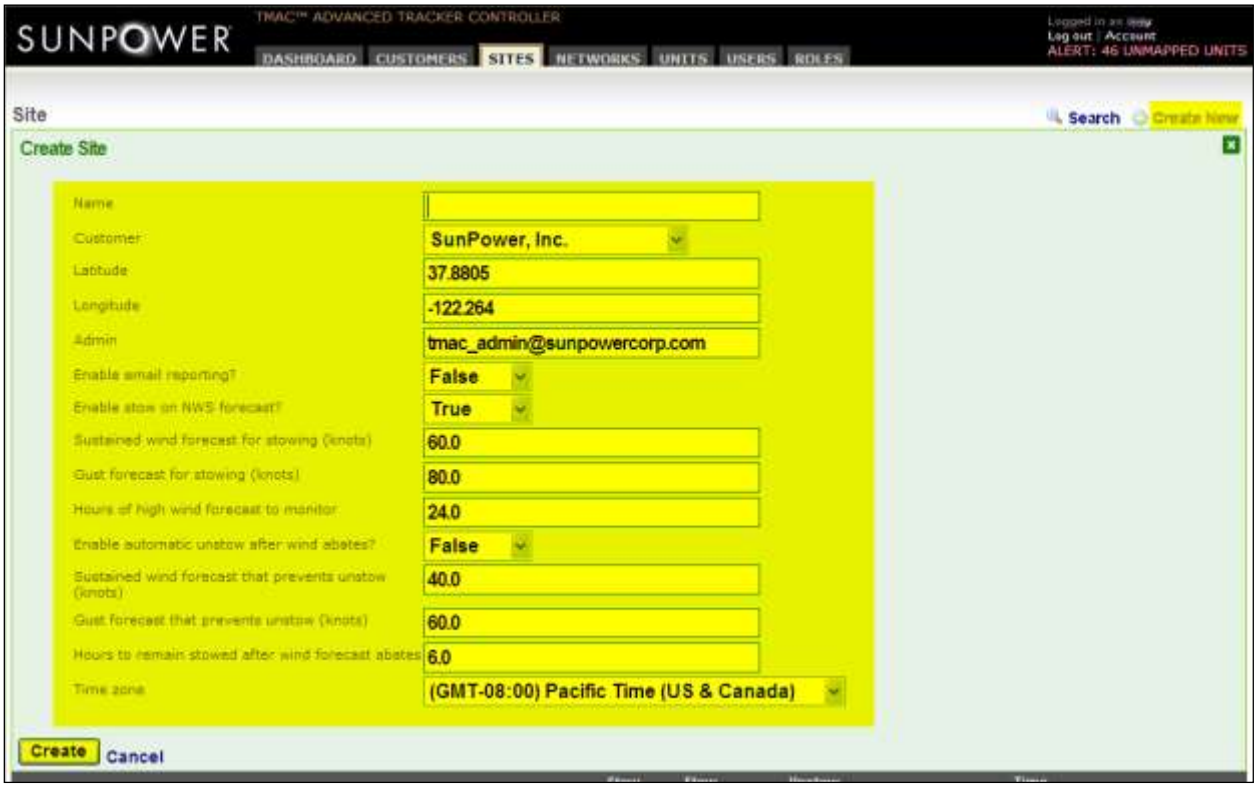


Fig. B65

Important! The values in the **Create Site** window are not generic. Ensure that you carefully enter or select values as they are indicated in the project drawings.

c. Click *Create.*

- To edit site profiles:
  a. Locate the site profile using the search function. Enter the site name in the **Search Terms** field and click *Search.*
  b. Click **Edit** under the rightmost column.
  c. Enter or select values in the **Update [Site name]** window (Fig. B66).

Fig. B66

  d. Click *Update.*

- To delete site profiles:
  a. Locate the site you want to edit or delete using the search function. Enter the site name in the **Search Terms** field and click *Search.*
  b. Click **Delete** under the rightmost column.
  c. Click *OK* in the confirmation window (Fig. B67).

Fig. B67

B.3.16 Creating, Editing, and Deleting Network Information

Administrator users can create, edit, and delete network profiles on the Network page.

1. Click the **NETWORKS** tab to open the Network page.
2. Create and manage network profiles using links on the page.

- To create a new network or networks for a site:

  a. Click **Create New** in the upper right of the page.

  b. In the **Create Network** window, enter and select network details as indicated in the project drawings (Fig. B68).

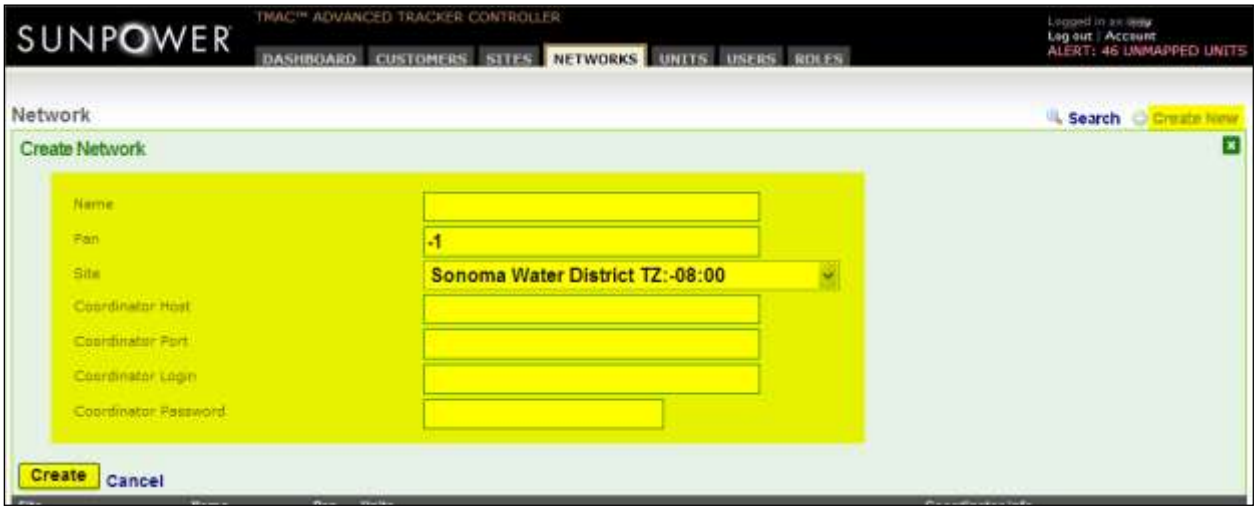


Fig. B68

Important! The values in the **Create Network** window are not generic. Ensure that you carefully enter or select values as they are indicated in the project drawings.

  c. Click *Create.*

- To edit network profiles:

  a. Locate the network profile using the search function. Enter the network name in the **Search Terms** field and click *Search.*

  b. Click **Edit** under the rightmost column.

  c. Enter or select values in the **Update [Network name]** window (Fig. B69).

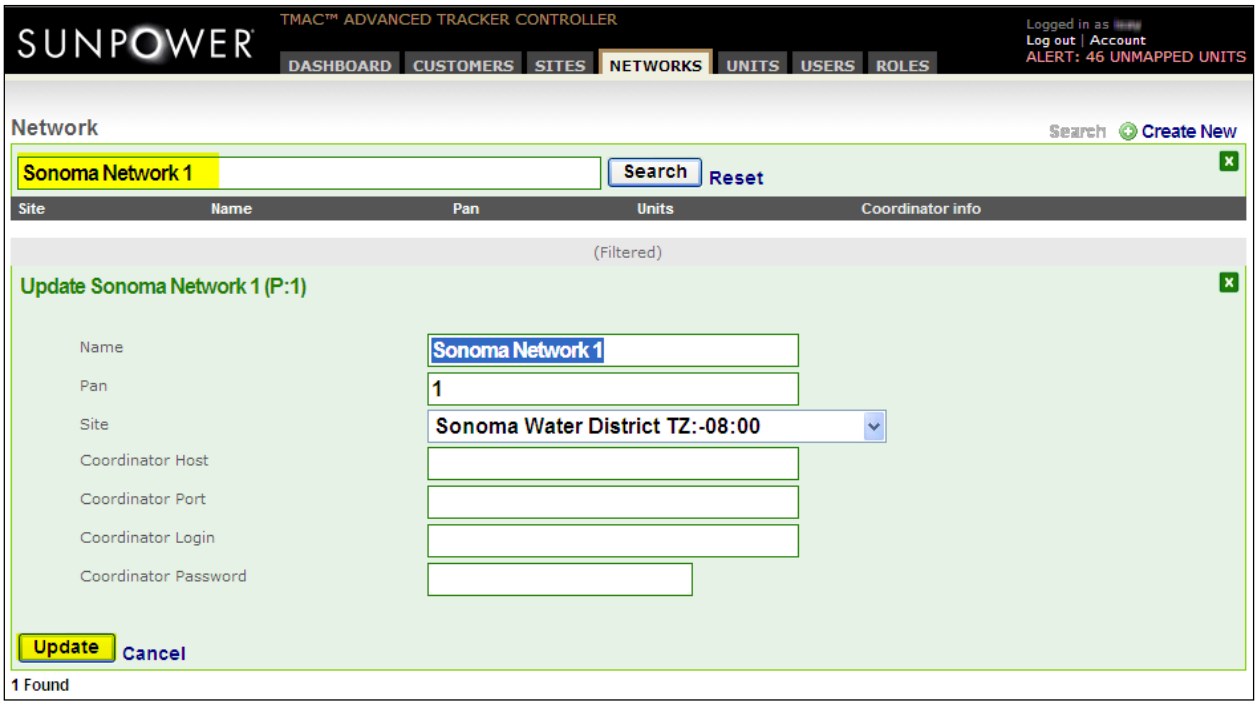


Fig. B69

d. Click *Update.*

- To delete network profiles:

a. Locate the network profile using the search function. Enter the network name in the **Search Terms** field and click *Search.*

b. Click **Delete** under the rightmost column.

c. Click *OK* in the confirmation window (Fig. B70).

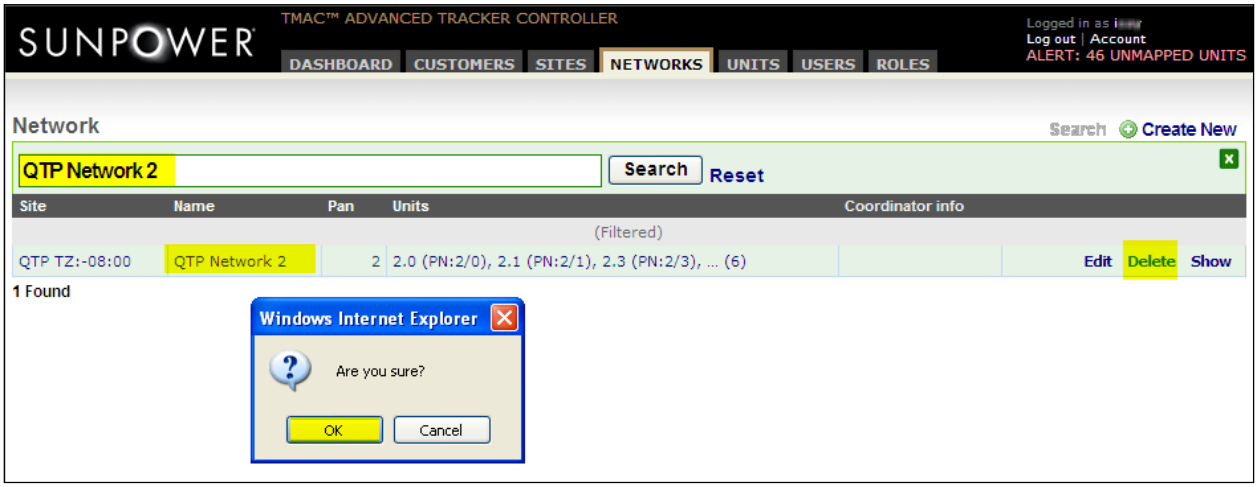


Fig. B70

B.3.17 Assigning TMAC Units

New controllers show up in the **Uncategorized units TZ:-08:00** item in the site list on the main or **DASHBOARD** tab page. The new TMACs are grouped together according to their GPS location to differentiate the controllers when multiple sites come online or communicate to the server.

Note. Only administrator and supervisor users can administer new TMAC units.

1. On the main or **DASHBOARD** tab page, click *Uncategorized units TZ:-08:00* in the site list.
2. In the expanded pane, click the TMAC unit link you want to assign to a site or network, or both.
3. The unit-level view is displayed on the page. Scroll down to the **SYSTEM STATUS** section and click the (Expand) button for *System status (101)* (Fig. B71).

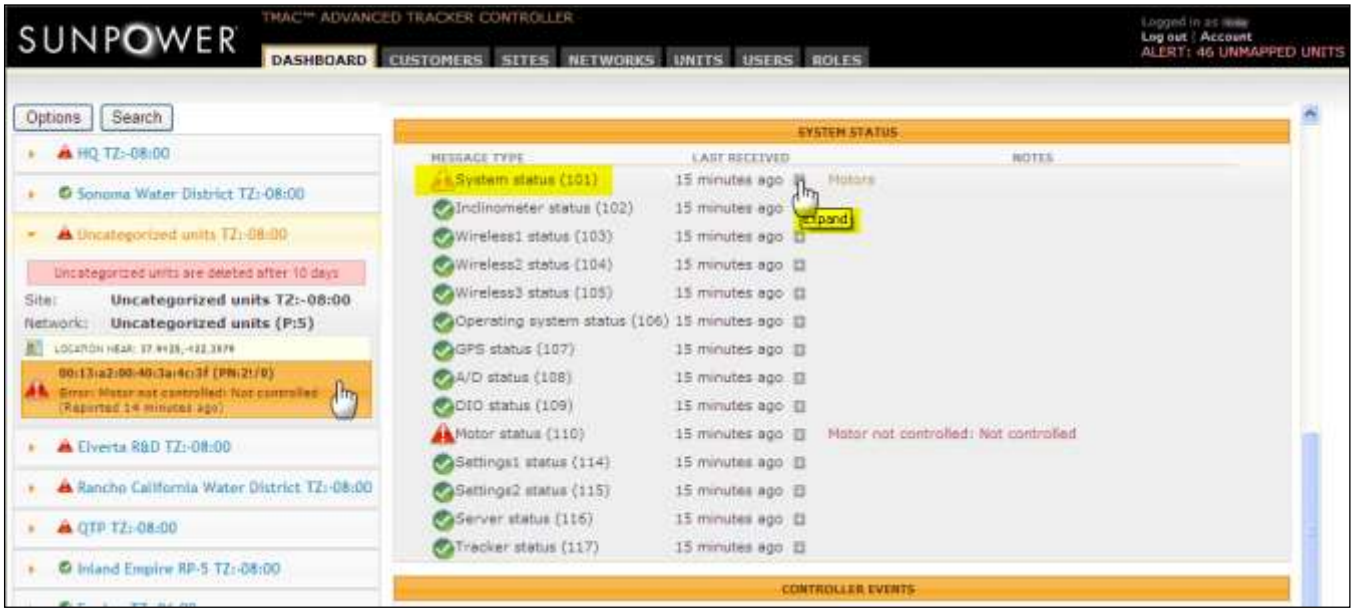


Fig. B71

4. Locate and take note of the **NodeID inputs** and **PanID inputs** values (Fig. B72).

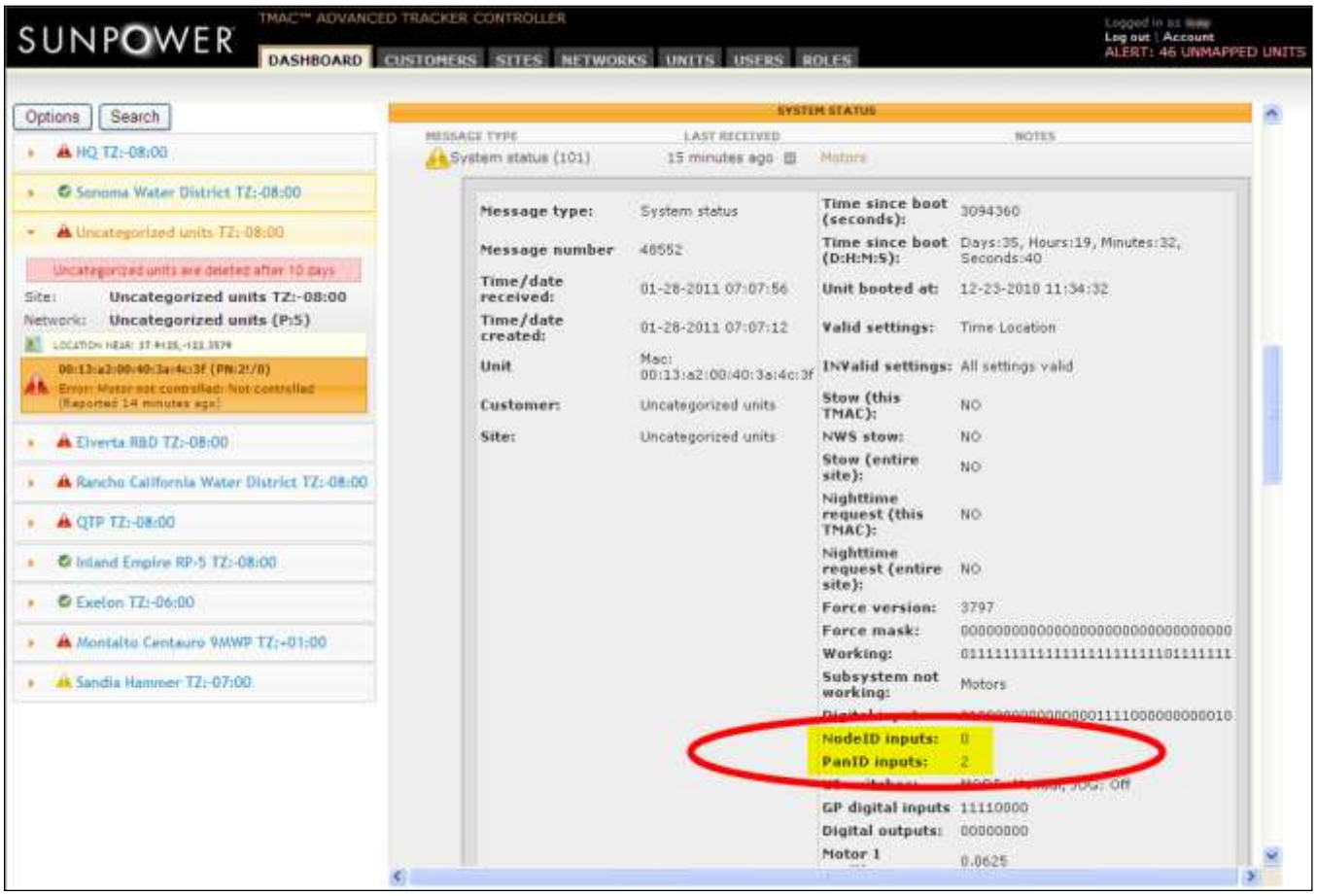


Fig. B72

5. Scroll down the page to the **REMOTE UPDATES** section and click *Administer unit* (Fig. B73).

Fig. B73

6. The **EDIT FOR UNIT [TMAC UNIT]** screen appears (Fig. B74).

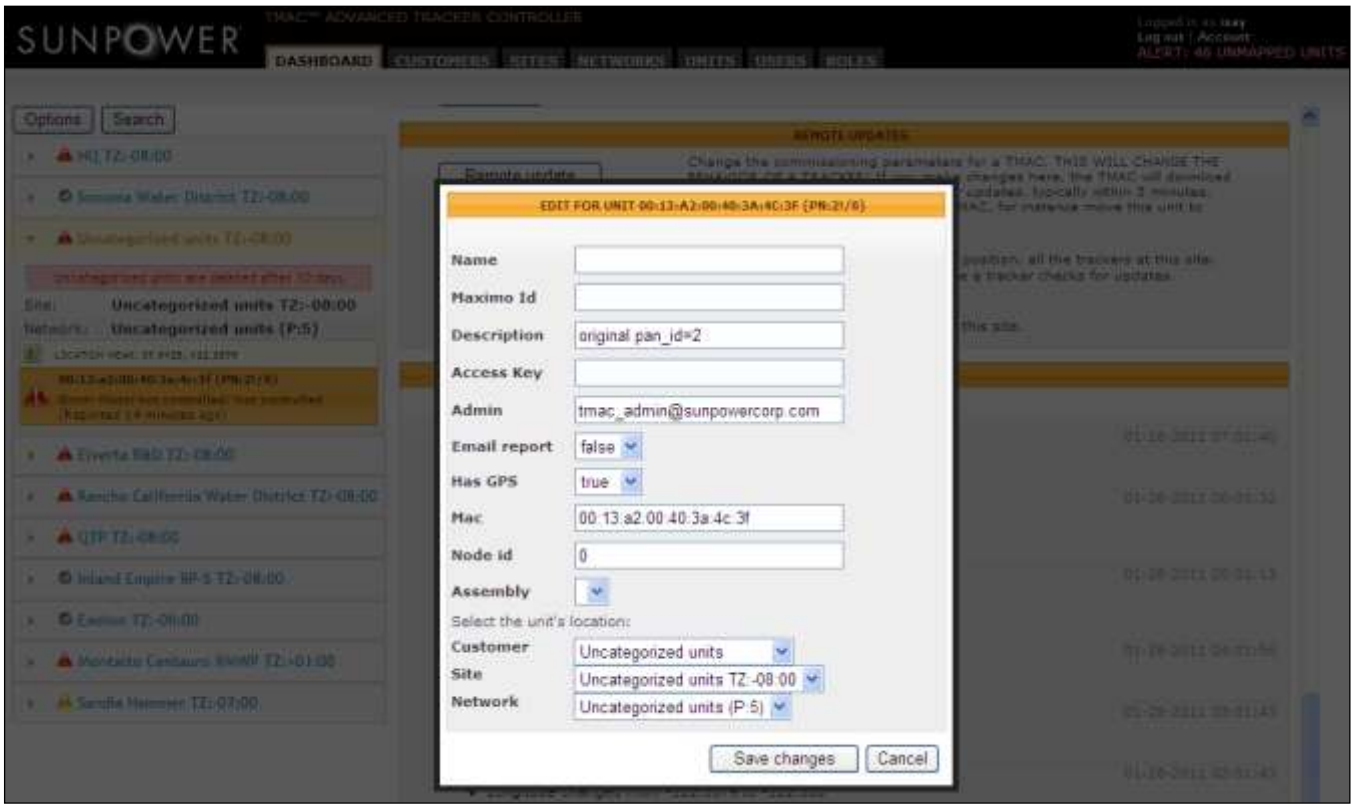


Fig. B74

7. Referring to the project drawings, enter or select values in the fields.

Name	Enter the TMAC name.
Maximo Id	Enter the Maximo ID in this format: MXXX_AREAXX_TRKXX • The MXXX value is the project number • The AREAXX value is the location number • The TRKXX value is the tracker number
Description	Enter the description for the TMAC.
Access Key	Enter the access key.
Admin	Enter the email address of the authorized administrator.
Email report	Select option to indicate agreement between O&M and the customer for email reporting.
Has GPS	Select option to indicate if a GPS unit is installed in the TMAC.
Mac	Enter the Mac address.
Node id	Enter the Node ID as indicated in the *System status (101)* details.
Assembly	Select option for assembly.
Customer	Select the customer name in the drop-down list.
Site	Select the site name in the drop-down list.
Network	Select the network name in the drop-down list.

8. Click *Save changes.*

B.3.18 Editing and Deleting TMAC Unit Information

Administrator users can edit or delete TMAC unit information using the **UNITS** tab. Supervisor users can only edit TMAC unit information.

1. Click the **UNITS** tab to open the Unit page.
2. Manage TMAC unit profiles using links on the page.
   - To edit a TMAC unit profile:
     a. Locate the TMAC unit using the search function. Enter the TMAC unit name, Maximo ID, or Mac address in the **Search Terms** field and click *Search.*
     b. Click **Edit** under the rightmost column.
     c. Enter or select values in the **EDIT FOR UNIT [UNIT NAME]** window (Fig. B75).

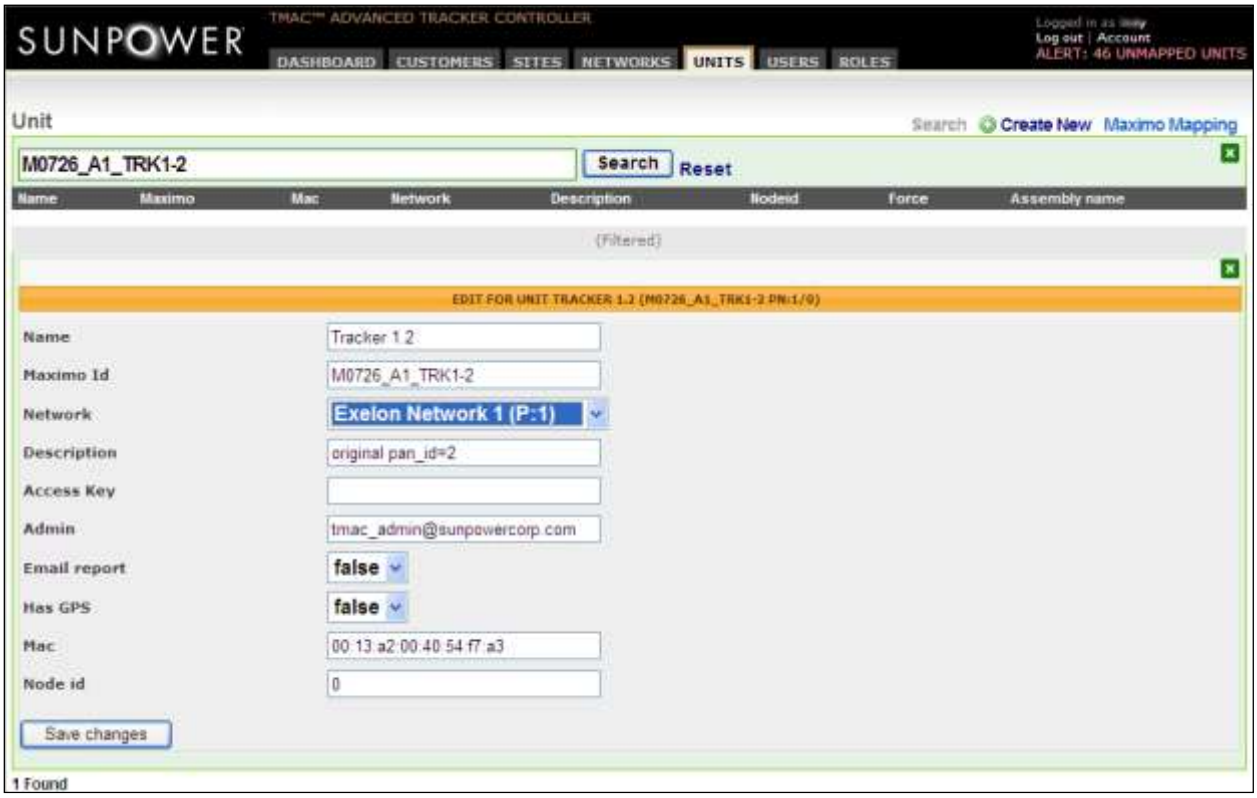


Fig. B75

- To delete a TMAC unit profile:
  a. Locate the TMAC unit using the search function. Enter the TMAC unit name, Maximo ID, or Mac address in the **Search Terms** field and click *Search.*
  b. Click **Delete** under the rightmost column.
  c. Click *OK* in the confirmation window (Fig. B76).

Fig. B76