# MANUAL, INSTALLATION AND CONFIGURATION, DTMAC™ ADVANCED TRACKER CONTROLLER

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# DTMAC™ Advanced Tracker Controller

## INSTALLATION AND CONFIGURATION MANUAL

SUNPOWER®

# 1.0 Introduction

## 1.1 Overview

The SunPower® Tracker features an embedded computer that controls the movement of the drive unit, which in turn rotates the torque tubes and optimally positions the CPV modules. The Distributed SunPower Tracker Monitoring and Control™ (DTMAC) Advanced Tracker Controller is programmed to optimize the angle of incidence between the sun and the modules. The DTMAC intelligently controls multiple trackers (16) to be synchronous at the same time.

The DTMAC 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 DTMAC units are described in Appendix B.

Here is an inside view of the DTMAC controller (Fig. 1):

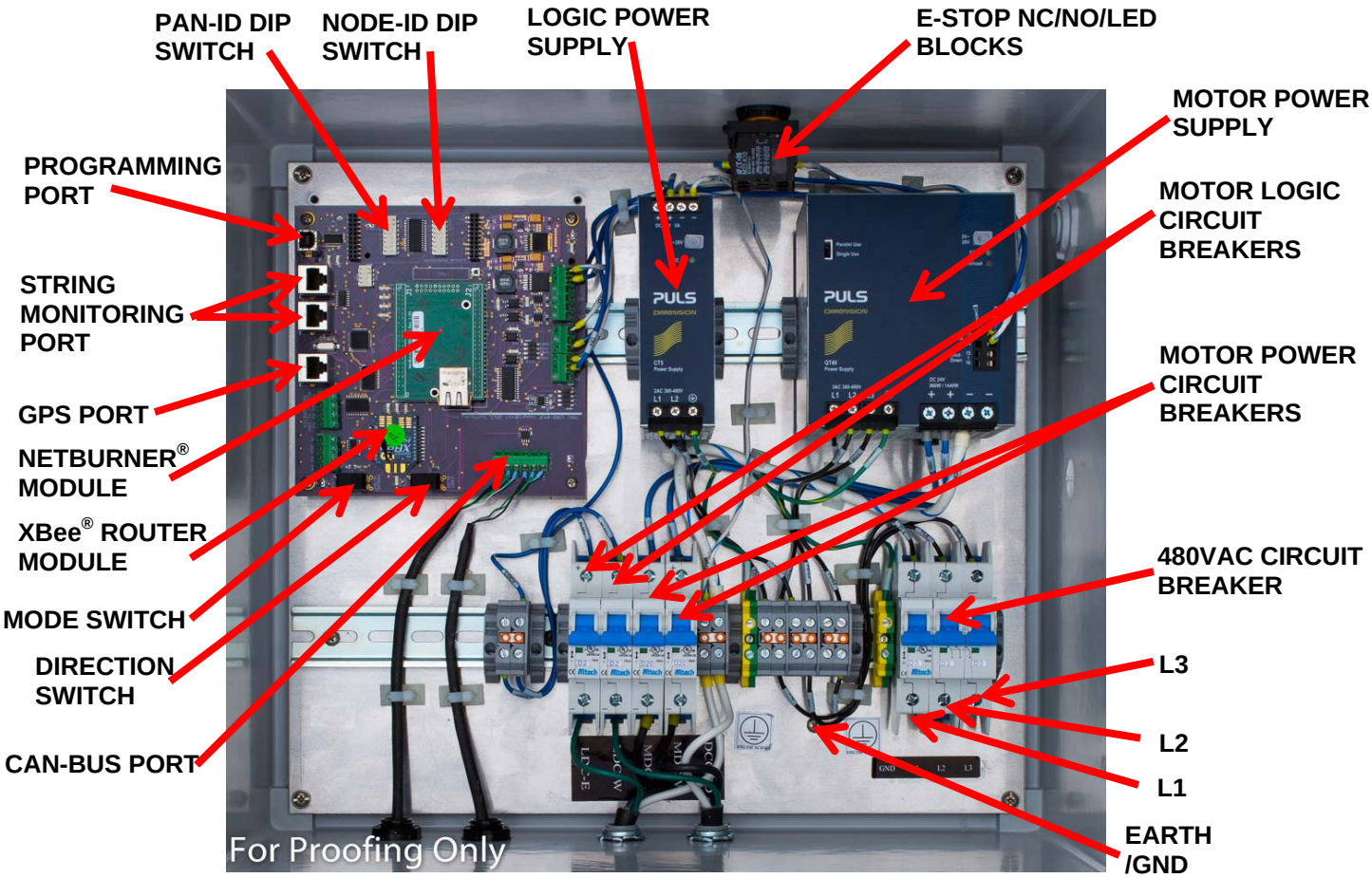



Fig. 1 Internal view of the DTMAC Solar Tracker Controller

## 1.2 Safety Procedures

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

### 1.2.1 Radio Frequency Safety

- The DTMAC controller product is FCC and IC certified.
- The design of the DTMAC 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.

***FCC Notice 15.105:***

*This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.*

***FCC Notice 15.21:***

*Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment*

***IC CES-003 - CAN ICES-3 (B)/NMB-3(B):***

*This devices complies with Industry Canada license-exempt RSS standard(s). Operation is subject to*

*the following two conditions:*

*1.This device may not cause harmful interference;*

*2.This device must accept any interference received, including interference that may cause undesired operation of the device.*

*This product meets the applicable Industry Canada technical specifications.*

*Cet appareil est conforme à Industrie Canada une licence standard RSS exonérés (s). Son fonctionnement est soumis aux deux conditions suivantes:*

*1. Cet appareil ne doit pas provoquer d'interférences*

*2. Cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant provoquer un fonctionnement indésirable de l'appareil.*

*Ce produit est conforme aux spécifications d'Industrie Canada.*

## 1.2.2 Electrostatic Discharge

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

To avoid static charge buildup or discharge into the equipment:

- Before touching or connecting a laptop to the DTMAC controller, SunPower 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 DTMAC controller.
- Use a grounding strap when working on the DTMAC logic board.

## 1.2.3 Shock Hazards

***Warning!*** Lethal voltages are present in the DTMAC controller box. SunPower 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 DTMAC controller is designed to operate at 380 VAC–480 VAC 3-Phase power. Other voltages are not compatible.
- The DTMAC controller is designed with finger guards to protect the user from electrical shock. However, SunPower requires that all personnel working on the equipment wear rubber insulating gloves.

## 1.2.4 Temperature Hazards

***Warning!*** The temperatures inside the DTMAC enclosure can go well above 70 degrees depending on the ambient temperatures. The surfaces inside the enclosure can be hot and care must be taken to let the enclosure cool down and the power must be shut-off before performing any kind of maintenance or installation operations.

- The DTMAC controller is designed to operate in the temperature range of -25 to +60 degrees C.

## 1.2.5 Handling Hazards

***Warning!*** The DTMAC product needs to be handled properly by able bodied personnel in order to move the product or during installation, as the product weighs 30lbs and can pose physical harm when dropped or not handled right. The product also has a hinged cover which needs to be secured before moving or installing the product.

- The handling and orientation of the DTMAC controller is provided on the field assembly sheets and in this document.

# 2.0 Configuring the DTMAC Tracker Controller

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

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

## 2.1 Mounting the Controller

The DTMAC needs to be mounted to the pier using the two clamps (Fig. 2) which come with the DTMAC packaging. Mount the DTMAC at the specified height from ground level and at the specified location on the pier, this information should be obtained from the project drawings. The DTMAC needs to be mounted vertical (Fig. 3) and it should be facing the geographical direction as specified in the project drawings.

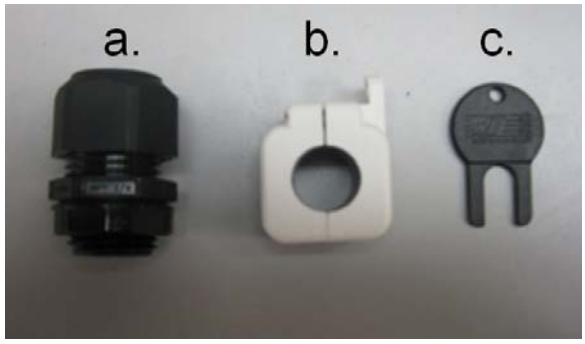
## 2.2 Wiring the Controller

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

- the controller designated as the "Coordinator" DTMAC for the network
- the controller to be installed with a GPS unit
- the mounting orientation of the DTMAC box and identifying the East, West branch motor wires
- the controller to be installed with a String Monitor connection.

These units have unique hole-drilling and wiring requirements.

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

| | |
|---|---|
| **XBee® Coordinator radio chip** (enclosed in antistatic bag) |  |
| • **GPS unit** (with cable and modular jack)<br>• **Cable gland** for the GPS cable<br>• **GPS Magnetic Mount Kit** (with three attachment screws for the main unit) |  |
| a. **Cable gland** for the Ethernet cable<br>b. **Snap-on Ferrite**<br>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, SunPower recommends that you use a hole saw.

The DTMAC controller comes preassembled with the East and West motor wiring branches already attached.

To connect the wiring to the DTMAC controller:

1. Drill a hole of appropriate size for the input 480VAC power entry cable or conduit (as specified in the project drawings) approximately 4″ (10 cm) to the right of the west branch motor cable entry (Fig. 4)
2. If the controller you are installing is not the designated Coordinator DTMAC or GPS unit, proceed to Step 6.
3. If the controller is the Coordinator DTMAC or the designated GPS unit, drill another hole to the left of the east branch motor CAN cable entry (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. 5) contained in the DTMAC Coordinator Upgrade Kit.
   - If the controller has a string monitor board connection drill a hole 7/8″ (22 mm) in diameter 2” (5 cm) above and 2” (5 cm) to the right of the east branch motor CAN cable entry for the string monitor cord grip (Fig. 6)
   - If the controller is the Coordinator DTMAC:
     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. 5).

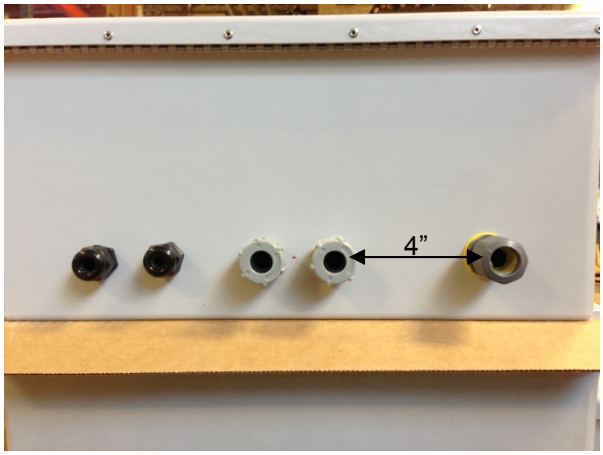



Fig. 4

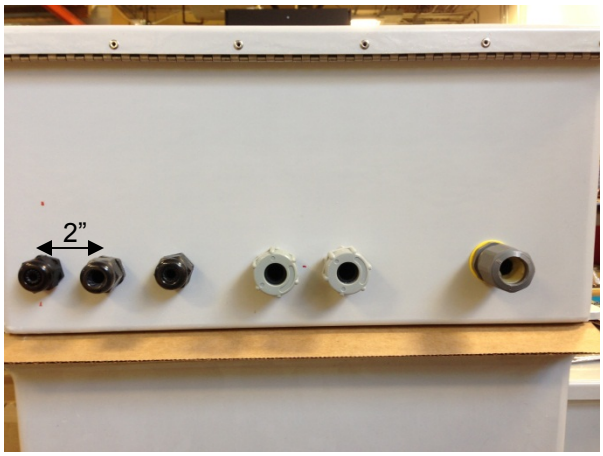



Fig. 5

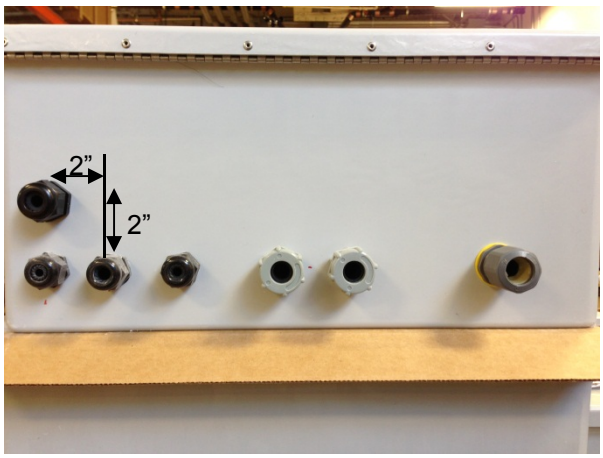



Fig. 6

4. 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, on the correct terminals of the circuit breaker (Fig. 7, Marked in a Red box). A black label under the circuit breaker identifies the terminal locations. The **GND** wire must be terminated with a 10-32 ring terminal and mounted at the grounding stud location. The grounding stud is marked with the appropriate label.

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

   **Note.** There should be ferrules installed on the power wires.

5. Apply 25 in-lbs (2.8 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.

Only perform Step 6 on the controller designated as the GPS unit.

6. 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. 8). Use the cable holders which come with the DTMAC packaging to secure the cable to the back panel and to route the cable.

   f. Insert the RJ45 plug into the modular jack labeled **RJ3-GPS** (Fig. 8).

Only perform Steps 7–8 on the controller designated as the Coordinator DTMAC.

7. To install the Ethernet cable:

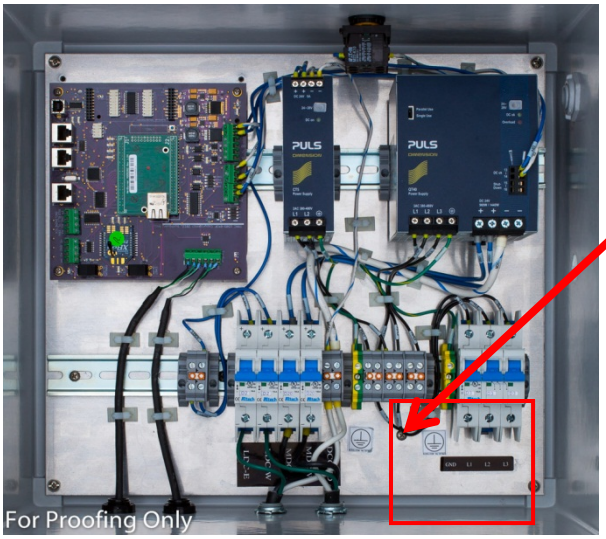



Fig. 7

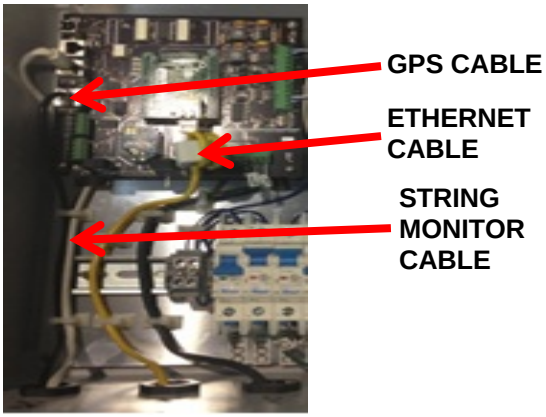



Fig. 8

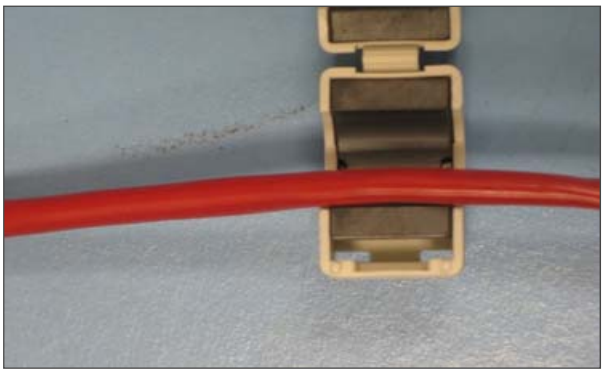


Fig. 9

Install the cord grip (if being used) into the hole to the right of the east branch motor CAN cable entry 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.

a. Feed the Ethernet cable through the SunPower 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. 8).

b. Coil any excess cable and restrain with the cable holder or zip tie to maintain isolation from the power circuits in the enclosure.

c. 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. 8).

d. Wrap the cable three times around the snap-on ferrite (Fig. 9, and Fig. 10) so that when finished less than one inch of cable protrudes between the ferrite and the plug end (Fig. 11).

e. Insert the cable end into the modular jack on the NetBurner® module (Fig. 12).

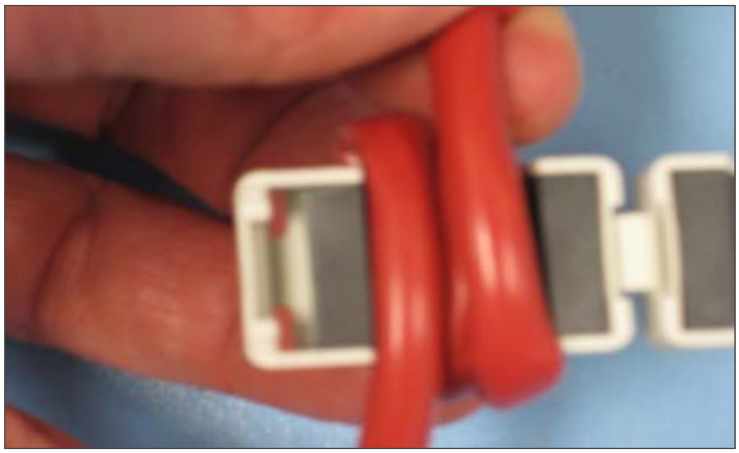


Fig. 10

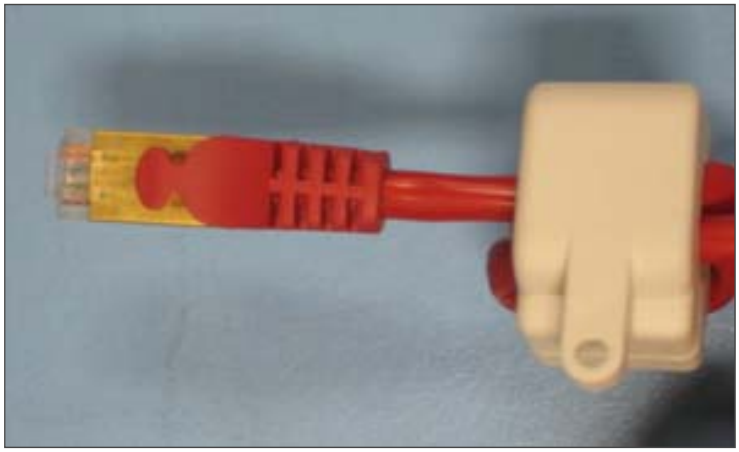


Fig. 11

Fig. 12

8. To install the Coordinator radio chip:

   a. Remove the factory-installed XBee® router module (Fig. 13).

      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. 14).

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

   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. 15), and *not* shifted over by one pin

   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. 15). The module's physical shape should directly coincide with the outline on the PCB silkscreen overlay. Tug on the wires gently to ensure that they are properly seated.

9. Check all installed cables before closing the enclosure

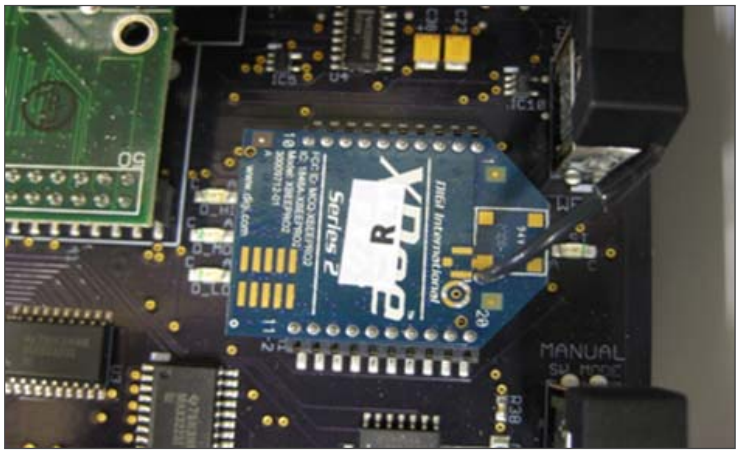



Fig. 13

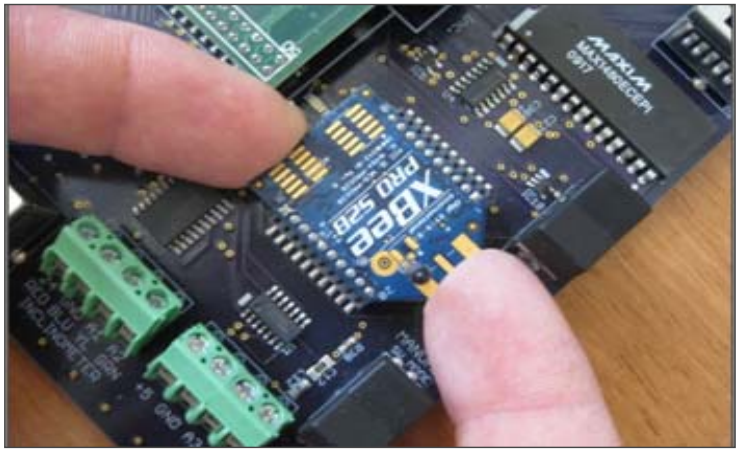



Fig. 14

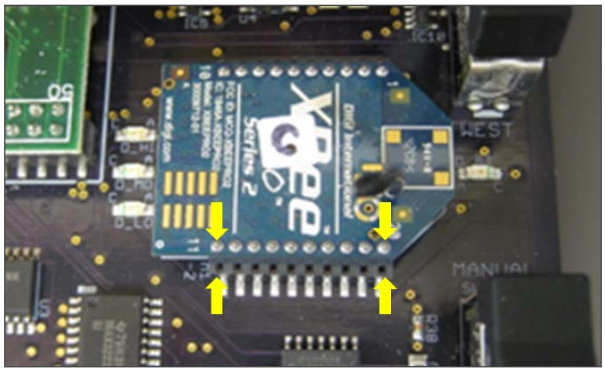



Fig. 15

## 2.3 Connecting the East and West Branch Motor Cables

There is 1 pair each of the East and West branch motor cables already attached to the DTMAC controller. These cables have connectors already installed at the external end and need to be connected to the East and West branch extension cables and to the DC smart motor as per the project drawings.

***Warning!*** The power should be turned OFF at the DTMAC controller by switching the respective circuit breakers (to which these cables are connected inside the DTMAC controller) to the OFF position, before connecting these cables to either the motor or the East and West branch extensions.

## 2.4 Smart Motor Configuration Procedure

The DC Smart motor needs to be pre-configured in order to communicate properly with the DTMAC system..

### 2.4.1 Overview

In order for the TMAC system to function properly each of the 16 motors must be leveled to a reference tracker surface datum, given a node ID based on the position in the array of 16 trackers, and have the full operational range verified. Because this does not require communication with the DTMAC it can be done independently at the tracker using a PC with a software tool (or skilled operator) that compares a temporary reference sensor to the motor sensor.

### 2.4.2 Motor Configuration

In order for the PC to command the motor, the CANbus Y-connector on the motor must be unplugged and the cable from the PC used in its place. If field power is active the motor power cable can remain in place – otherwise a mobile 24V supply is required to power up the motor during commissioning.

The PC is used to command the motor to drive to a position where the reference sensor is level (0°) and then a command is issued for the motor to reset the internal sensor to zero. Due to the use of a hysteresis value when tracking, the motor must be at least 0.15 deg away from a reference point in order for the motor to attempt a repositioning move. For this reason the motor is first commanded to drive to +1 deg.

When the motor resets the inclinometer, the setting is stored in non-volatile memory in the sensor and will not be lost if the power is cycled. A safety feature integrated in the motor firmware will prevent the reset from occurring if the angle of the internal sensor reads more than 2 degrees. If the reset is attempted beyond 2 degrees the motor will go into an error state and store the value -20005 in the motor error register (0x3001.0). Figure A shows a schematic of a potential automated system that an operator can start with a few clicks from an interface along with the sequence of commands to level the motor.  Table 1 lists the logic and communication steps required for an automated or manual process.

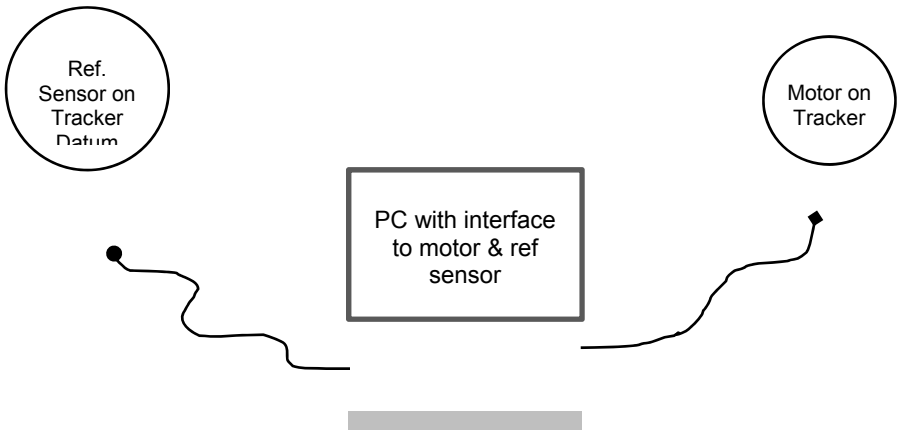



FIGURE A: Automated motor commissioning system tool.

TABLE 1: Motor commissioning steps.

| **Description** | **Motor Command or Operation** | **Step** |
|---|---|---|
| Operator clicks on “Commission Motor” | Interface button | 1 |
| Ask operator if motor is new (ID =127) or motor is being re-leveled (old ID must be given for re-leveling) | User interface input<br>OLDorNEW variable set<br>If OLD, Store motor ID as MOTOR_ID | 2 |
| Tracking command sent to motor | SDO-W, NodeID=127, 0x5101.1, 0x05 | 3 |
| Motor given setpoint (SP) of +1 deg | SDO-W, NodeID=127, 0x5105.1, 100 | 4 |
| Monitor motor register MY_STATUS to know when SP reached. | SDO-R NodeID=127, 0x5102.1<br>MY_STATUS register will go from 3 up to 6 or 8 then return to 3 when position reached | 5 |
| When SP reached,<br>Read ref sensor angle value | Reference sensor read by PC | 6 |
| Read motor sensor angle | SDO-R, NodeID=127, 0x5103.1 | 7 |
| Calculate: Motor - Ref = Reset SP | Operator or GUI calc… | 8 |
| Motor given a setpoint = Reset SP | SDO-W, NodeID=127, 0x5105.1, RSP | 9 |

| | | |
|---|---|---|
| Monitor MY_STATUS to confirm SP reached (Alternative monitor motor velocity for return to zero) | SDO-R NodeID=127, 0x5102.1<br>MY_STATUS register will go from 3 up to 6 or 8 then return to 3 when position reached | 10 |
| Read ref sensor value, check if abs value <0.05 deg, **ELSE** return to step 4 | Operator or GUI logic check… | 11 |
| If step 11 is true, issue motor inclinometer reset command | SDO-W, NodeID=127, 0x5101.1, 0x02 | 12 |
| Check motor error status **after 3 sec** **IF** error status = -20005, leveling was attempted beyond 2° range. Operator must check system, then click "Clear error" button to reattempt leveling starting at step 3. | SDO-R, NodeID=127, 0x3001.0 | 13 |
| Reset motor to clear system | Power cycle with cable or via the following SDO write sequence: | 14 |
| **IF** this was a new motor (See step 2),<br>Ask operator for block & tracker number in order to assign proper Node ID (1-16)<br>**ELSE**: Leveling complete, end routine | User interface input | 15 |
| Check if block and tracker number valid: between 1&16, no duplicates. If valid and different by more than 1 from previous tracker ask user to verify. | Software check | 16 |
| Command motor to reassign node ID | SDO-W NodeId_old, 0x2000.1, 0x6E657277<br>SDO-W NodeId_old, 0x2000.2, NodeId**_new**<br>Response may require 2 sec.<br>Reset device afterwards:<br>SDO-W NodeId**_old**, 0x2009, 1, 0x6E657277<br>SDO-W NodeId**_old**, 0x2009, 2, 0x9999 | 17 |
| Save Preset value, RSP, with tracker and block number to record file | Software operation | 18 |

After the motor is leveled and given a proper node ID, the full range of motion must be verified. If there is any blockage in the system (such as the hard stop in the slew drive) the motor will likely error out with -4000 (check error register 0x3001.0). The error must be cleared before the motor will move again. If a hard stop is hit at one of the maximum extents the motor maximum angle must be changed to prevent repeated errors. Resetting the max motor angle requires a motor MPU firmware update (see Dunker “Project description file”).

The full operational range test is best performed via the TMAC  jog switches as it takes a considerable amount of time for the motor to complete the 300 degree path while moving at a controlled speed of 4 deg/min (stow to +75 to -75 to stow). Both max positive and negative rotation positions should be verified using the jog switches. Trackers that hit the hard stop should be fine to rotate to the opposite max extent. Any hard stop hits will be clearly distinguishable by the orientation the tracker is stuck at when the DTMAC jog switch is cycled back to stow.

## 2.5 Setting Parameters and Verifying Functionality

After you install the DTMAC 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* DTMAC controller on the site. Once entered, the data is stored in the non-volatile memory of the DTMAC through an update command.

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

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

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

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

Here is a closer view of the DTMAC controller logic board (Fig. 16):

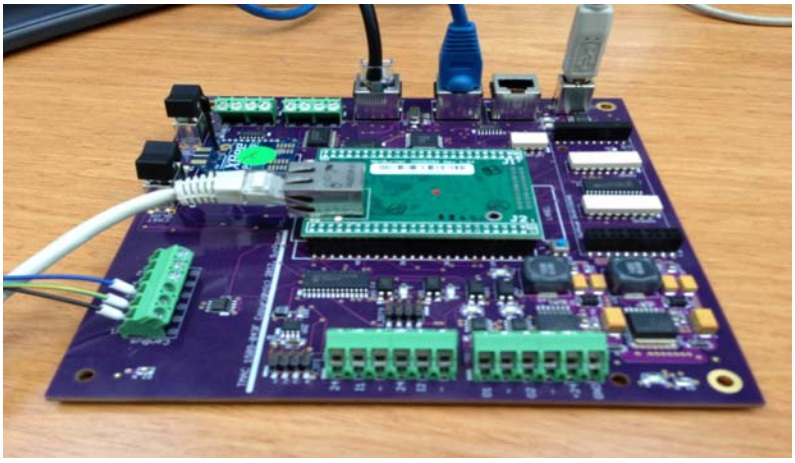


Fig. 16 DTMAC Tracker controller PCB

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

The DTMAC 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 DTMAC unit for the network you are configuring. The Coordinator DTMAC unit, located at the closest inverter station, is hardwired with Ethernet cable to the site access point (refer to Section 2.2, Step 7). Verify that the unit has the XBee® Coordinator radio chip (marked with a "C", Fig. 17) instead of the factory-installed XBee® router module (refer to Section 2.2, Step 8).


Fig. 17

## 2.5.1 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 DTMAC controller:

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

   ***Important!*** *NODEID 0* is always reserved for the Coordinator DTMAC unit.
3. Put the MODE Switch in the **MANUAL** position.
4. Referring to the Individual Tracker Information Table, perform the following steps on the DTMAC 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 |

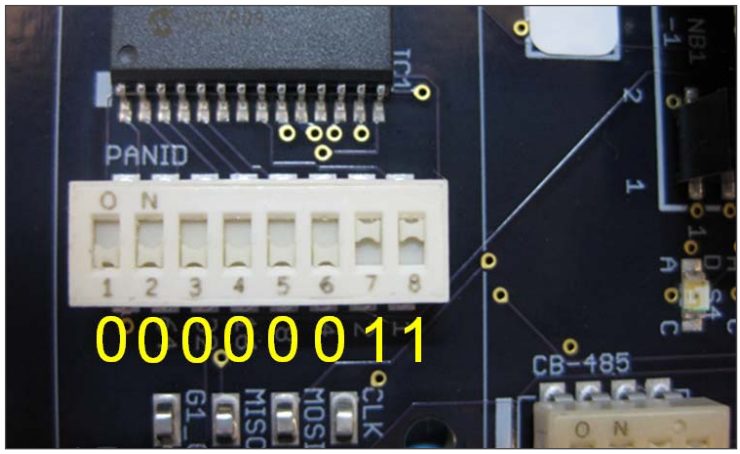



Fig. 18

| | |
|---|---|
| 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. 18).

For example, the **PANID Switch** is set to *00000011* on a controller that belongs to a network with *PANID 3* (Fig. 18).

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

b. Set the **NODEID** Switch:

- On the Coordinator DTMAC unit, set the **NODEID** binary switches to *00000000* (all switches down).
- For all of the remaining DTMAC 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. 19).

| NODEID Number (Decimal) | Binary Switch Position |
|---|---|
| 1 | 00000001 |
| 2 | 00000010 |
| 3 | 00000011 |
| 4 | 00000100 |


Fig. 19

| | |
|---|---|
| 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. 19).

5. Use the USB-A to USB-B cable assembly to connect the laptop to the controller through the **Programming Port.**
6. Start the DTMAC term application.

Note: For Windows 7 users, one need to have UAC disabled on their system in order for the virtual COM port drivers to be installed by the DTMAC.

7. The DTMAC term Select serial port screen opens (Fig. 20):

- Select the serial port number being used by your computer for DTMAC term 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 DTMAC term, perform Steps 8–10.

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

8. Navigate to Start, Settings, Control Panel, System.

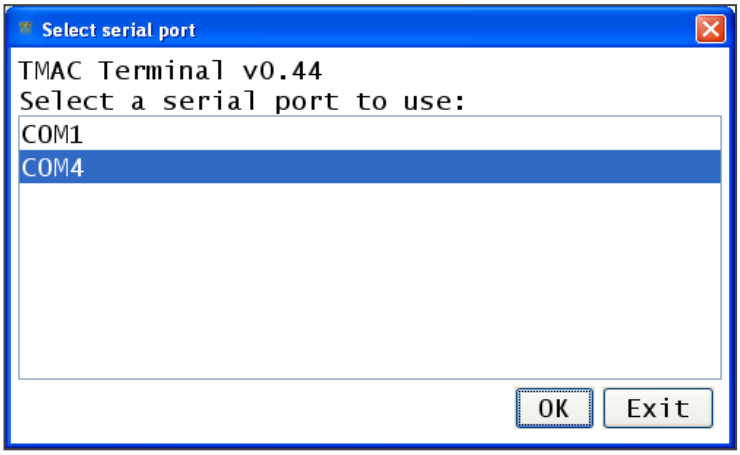



Fig. 20

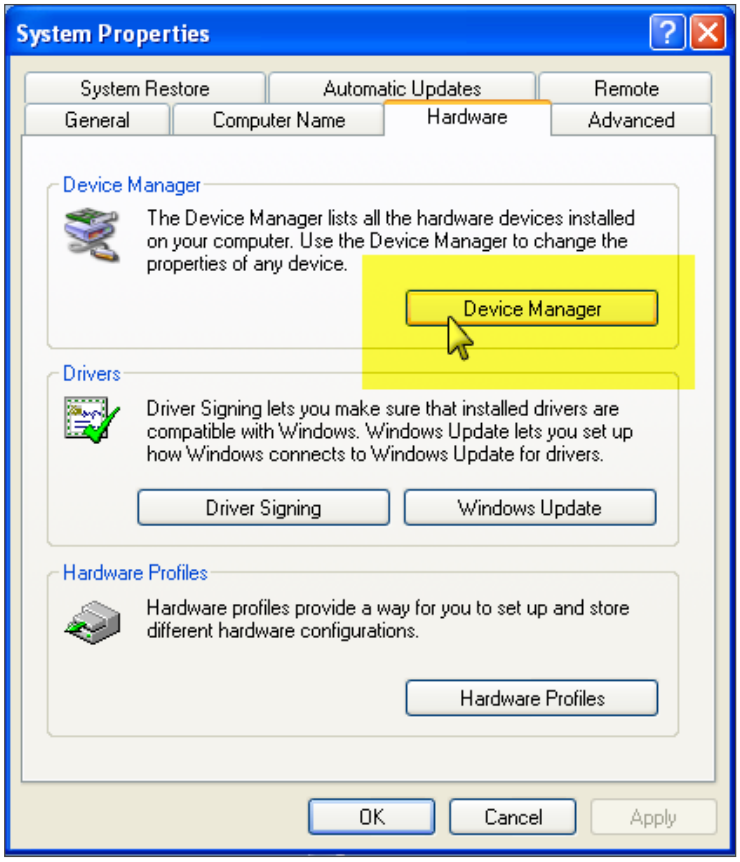



Fig. 21

9. In the System Properties window, click the Hardware tab and then the Device Manager button (Fig. 21).
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. 22). The *?* (question mark) is the port number being used by your computer for DTMAC term (in this case, *COM4*).
11. Return to the DTMAC term Select serial port screen and select the COM port identified. Click *OK*.
12. The DTMAC term main screen appears with a dialog box that says *'Unable to establish communication with DTMAC'*. 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. 23).
13. Turn on the DTMAC circuit breaker.

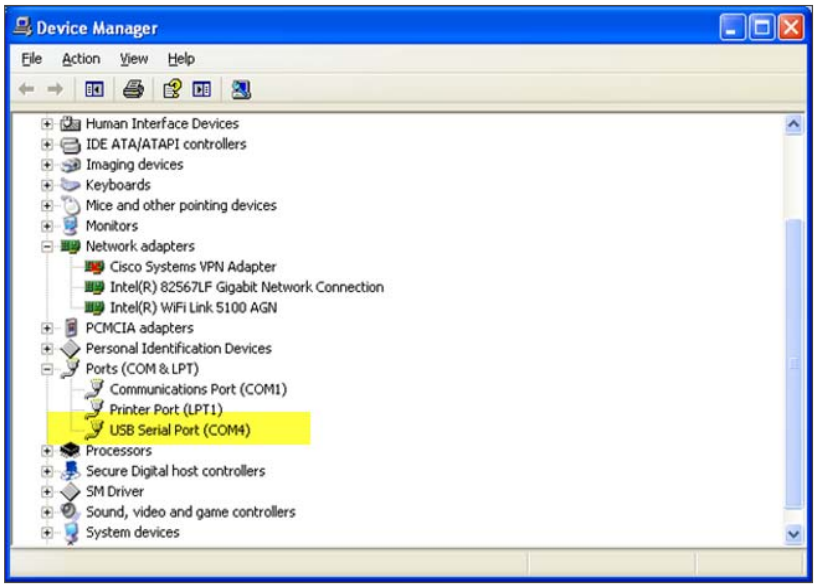



Fig. 22

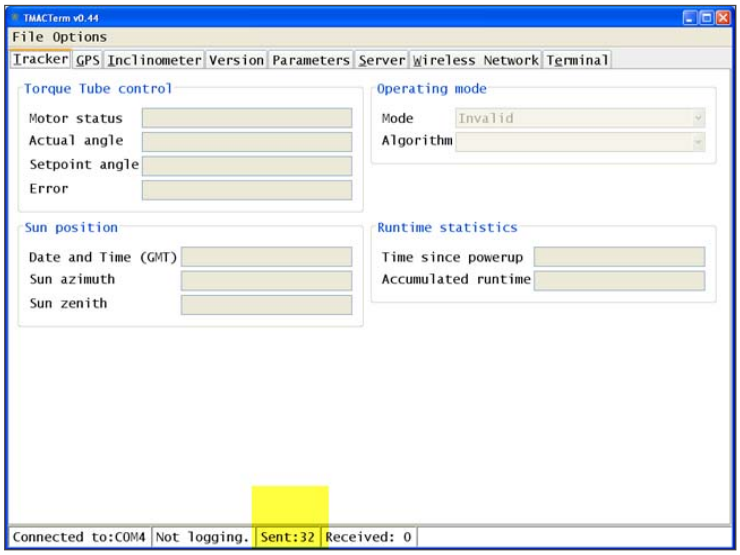



Fig. 23

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

After the DTMAC boots up it may not find time and date information yet. Note that the *Received* counter value indicates the number of messages that the DTMACterm has received from the DTMAC (Fig. 24).

Fields under **Operating mode** indicate when the DTMAC has fully booted in **Manual** mode (Jog) and the GPS has been read (Fig. 25). Other DTMAC units will get their time information wirelessly from either the GPS unit or from the Coordinator DTMAC which gets the time from an Internet clock. The **Motor status** error is normal when the DTMAC is in **Manual** mode (Fig. 25).

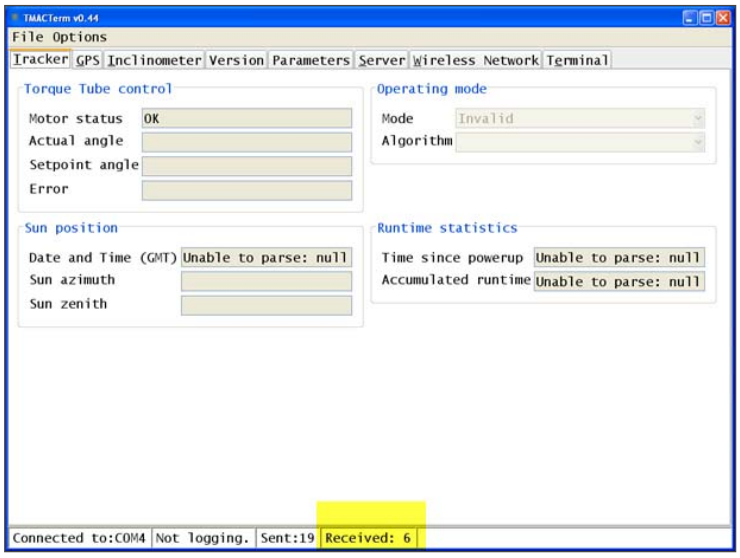



Fig. 24

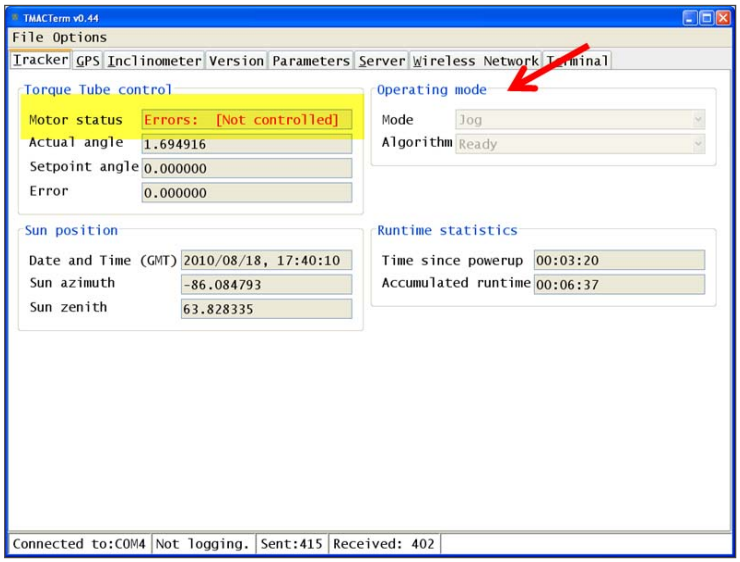



Fig. 25

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. 26).
16. Click the **Parameters** tab.
17. In the Parameters screen, enter (or select) and verify parameter values:
18. Enter (or select) the parameter values indicated in the project drawings in the **Position settings** and **Site parameters** fields (Fig. 27).

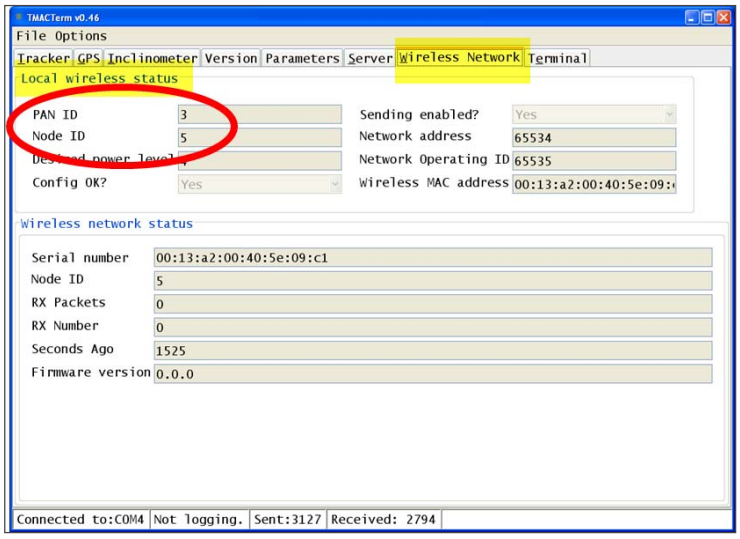



Fig. 26

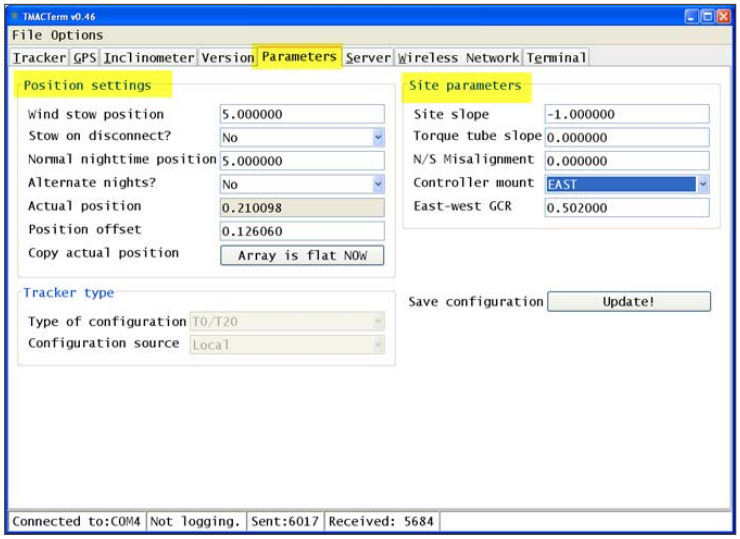



Fig. 27

To view the description or details of a field, position your cursor over the field title (Fig. 28).

19. 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 DTMAC Monitoring team.
20. When all the parameter values have been entered and verified, click the *Update!* button.
21. A confirmation dialog box appears. Click *OK* (Fig. 29).
22. To test the entered data:

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

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

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

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

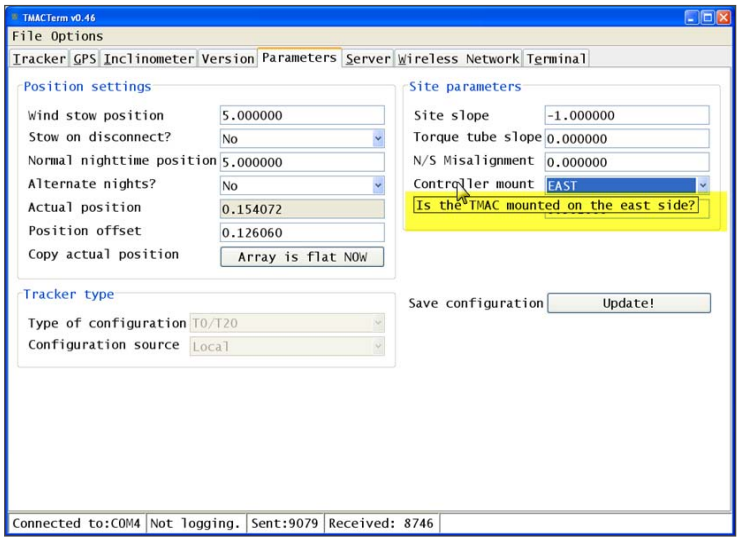



Fig. 28

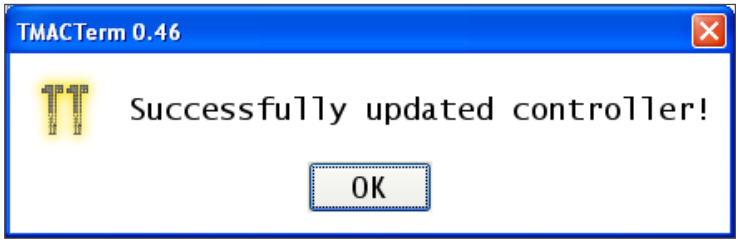



Fig. 29

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

When lit, the **D_S1** LED indicates that the controller is in **Stow** mode; if flashing at 1Hz, the DTMAC 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 DTMAC
- there is no valid feedback
- the temperature in the DTMAC 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 DTMAC PCB failed.

Refer to the *DTMAC Troubleshooting Guide* for more information.

24. Call or send an email to the DTMAC 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 DTMAC Monitoring team.

## 2.5.2 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 DTMAC 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 SunPower 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**).

## 2.5.3 Verifying Array Flatness

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

1. Turn the MODE Switch to **MANUAL.**
2. Turn the DIRECTION Switch to the **EAST** or **WEST** positions as necessary to move the modules to a visually horizontal (flat) position.
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°).
4. In the DTMAC term screen, click the **Parameters** tab. Click the *Array is flat NOW* button.
5. Click the *Update!* button and then click *OK* in the confirmation dialog box.

## 2.5.4 Verifying East and West Limits

***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 75° or if there is risk of damage.

1. Turn the MODE Switch to **MANUAL.**
2. Turn the DIRECTION Switch to **EAST.**
3. Verify that the modules begin rotating to the east.
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 75° ± 2°. If the angle of the module directly above the controller inclinometer is not 75° ± 2°, you must replace the controller inclinometer. Contact SunPower.
5. Turn the DIRECTION Switch to **WEST.**
6. Verify that the modules begin rotating to the west.
7. In approximately 45 minutes the modules will stop. Use a digital inclinometer to verify that the module directly above the inclinometer is at 75° ± 2°. If the angle of the module directly above the controller inclinometer is not 75° ± 2°, you must replace the controller inclinometer. Contact SunPower.
8. Return the DIRECTION Switch to OFF (middle position, neither **EAST** nor **WEST**).
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.

   The Tracker is now operational.

# 2.6 Configuring a Computer for DTMAC Programming

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

## 2.6.1 Overview

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

| Software Requirement | Hardware Requirements |
|---|---|
| DTMAC term application | • Laptop with USB connection capabilities<br>• USB male A plug to male B mini plug cable |

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

If you have DTMAC term installed on your computer but the application fails to run, uninstall the application using the FTClean - Driver Removal Utility and then re-launch the DTMAC term 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.

## 2.6.2 Installing the DTMACterm Application

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

1. Enter http://devDTMAC02/setup.msi in your web browser.
2. Click *Run* in the File Download - Security Warning dialog box (Fig. 30).

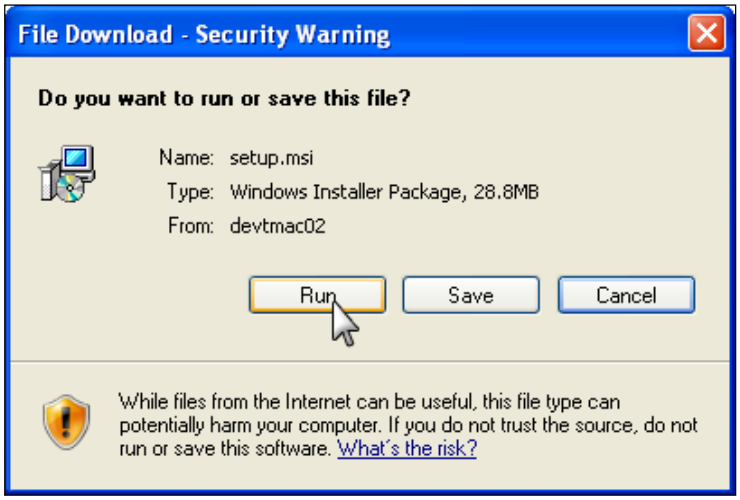



Fig. 30

3. The DTMAC term Setup Wizard launches. Click *Next* (Fig. 31).

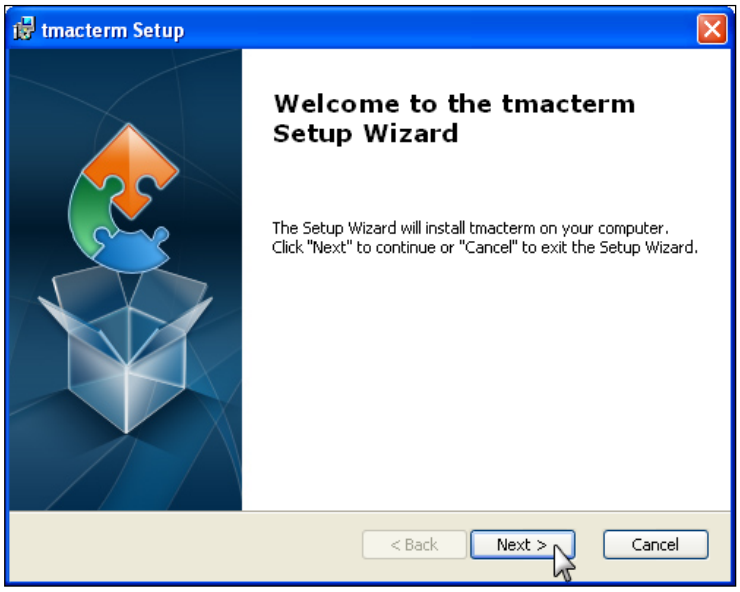



Fig. 31

4. Select the folder where you want DTMAC term installed and click *Next* (Fig. 32).

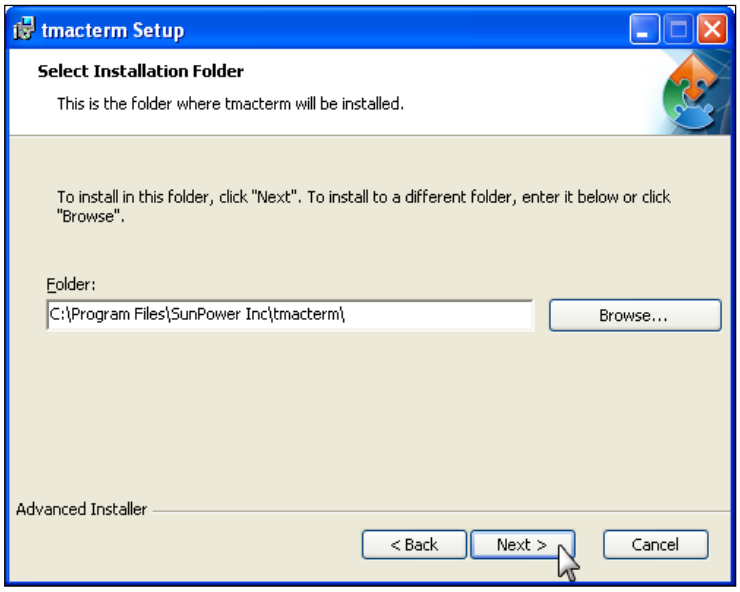



Fig. 32

5. Click *Install* to begin the DTMAC term installation (Fig. 33).

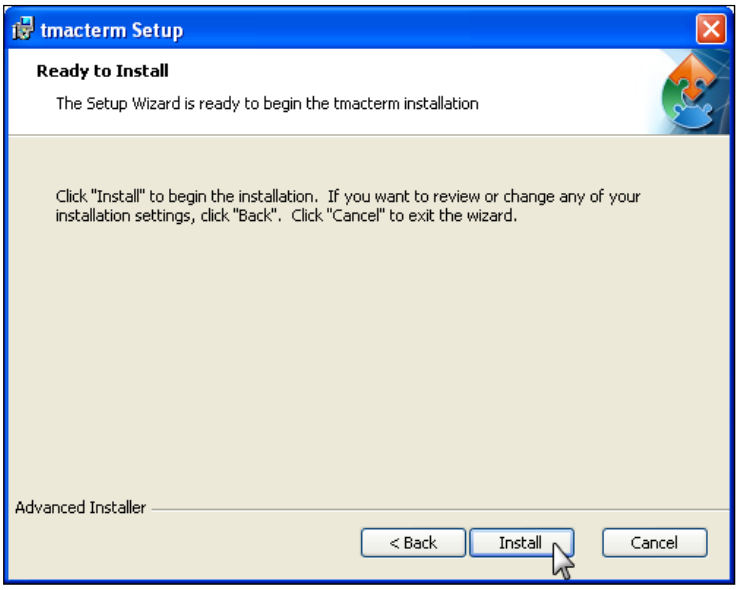



Fig. 33

6. The Device Driver Installation Wizard launches (Fig. 34). Click *Next.*

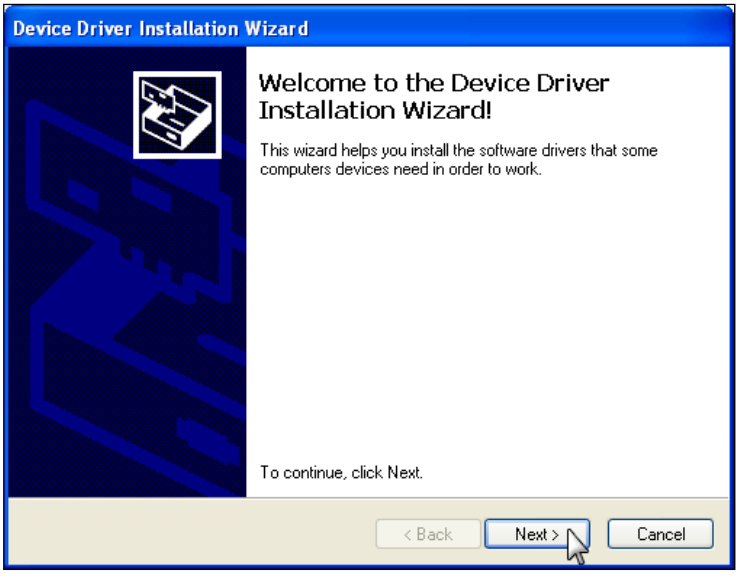



Fig. 34

7. Click *Finish* to complete the Device Driver Installation (Fig. 35).

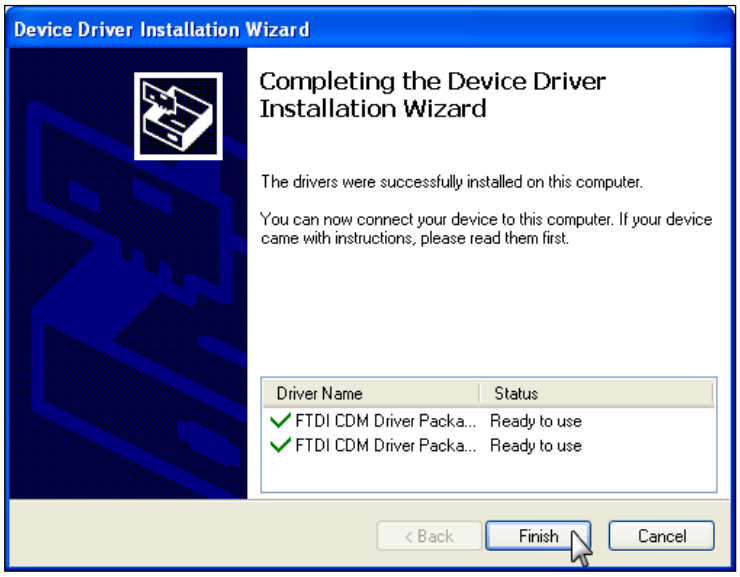



Fig. 35

8. Click *Finish* to exit the DTMAC term Setup Wizard (Fig. 36).
9. Check that the DTMAC term software icon appears on your desktop.

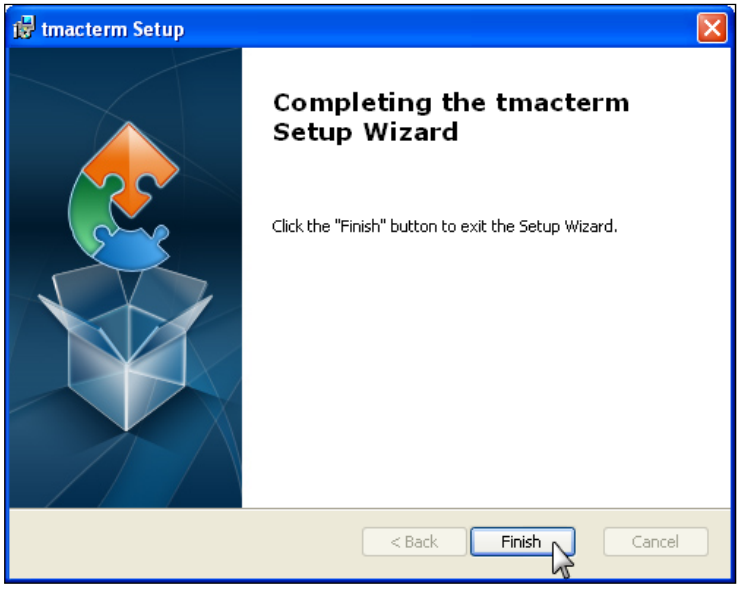



Fig. 36

# 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 DTMAC controller enables better control of the entire network. By accessing the SunPower DTMAC 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 DTMAC 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 DTMAC Monitoring Team assigns user roles to specific employees and third party representatives in order to execute DTMAC control functions, and perform equipment monitoring and system optimization.

The following user types can access the DTMAC server:

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

| | |
|---|---|
| | • Full remote operation<br>• Minimal remote operation<br>• Locating a DTMAC<br>• Editing customer, site, network, and DTMAC information<br>• Accessing detailed views of all objects using admin tabs<br>• Creating and managing user accounts |
| **Operator** | A SunPower 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 SunPower 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 SunPower Operations and Maintenance Department. Only an administrator user can enable this option for another user.

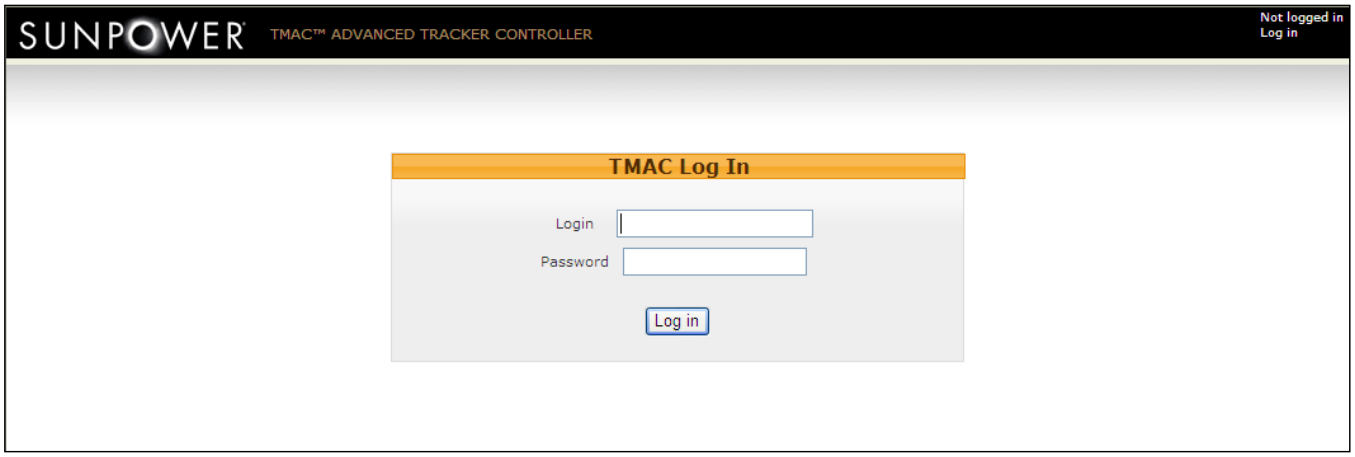
# B.3 Accessing the SunPower DTMAC Controller Monitoring Application

***Important!*** To access the SunPower DTMAC Advanced Tracker Controller monitoring application, you need login credentials. Contact the SunPower 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 SunPower DTMAC Advanced Tracker Controller monitoring website http://dtmac.sunpowermonitor.com
2. On the DTMAC Log In page, enter your username and password in the **Login** and **Password** fields, respectively and click *Log in.*




DTMAC Log In page

**Note.** Passwords are case sensitive.

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

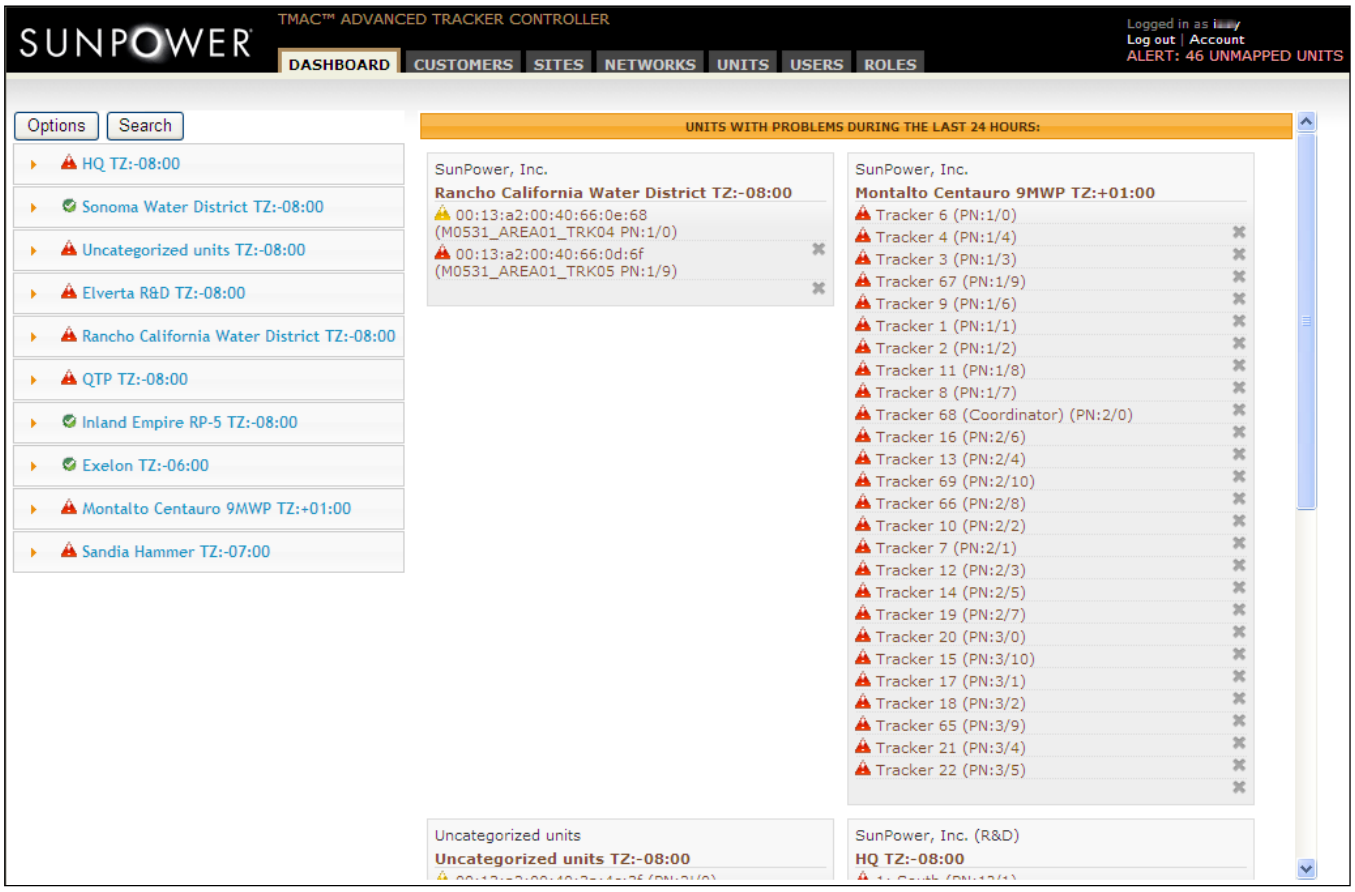



Fig. B1

***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 DTMAC application, the main page elements are described in the following table.

| Page Element | Description |
|---|---|
| SunPower 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.<br>• The **DASHBOARD** tab page is the main page and contains the *Options* and *Search* buttons, the site list, and the lists of DTMACs per site that have alerts. This page enables you to open the site-, network-, and DTMAC unit-level views through links on the page.<br>• The **CUSTOMERS** tab page is the Customer page and contains the list of customers whose tracker systems are monitored through the DTMAC application. Links on this page enable you to perform the following: |

| | |
|---|---|
| | o Create new customer profiles<br>o View, edit, or delete customer information<br>o 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<br>• 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:<br>o Create new site profiles<br>o View, edit, or delete site information<br>o Open the **Update [Customer name]** window to set options for automatic email reporting for the customer<br>o Open the **Network for [Site name]** window to view the network list for the selected site, and to view, edit, or delete network information<br>o Open the **Update DTMAC:locked, Wireless:locked** window to enter or select DTMAC and wireless lock settings<br>o Send a command to stow the entire site<br>• 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:<br>o Create new network profiles<br>o View, edit, or delete network information<br>o Open the **Update [Site name]** window to update site information<br>o Open the **Unit for [Network name]** to view the list of DTMACs in the network; view, edit, or delete DTMAC unit information; view messages and updates for a DTMAC in the network; and map or connect a DTMAC unit to a Maximo ID<br>• The **UNITS** tab page is the Unit page and contains the list of all monitored DTMACs. Links on this page enable you to perform the following:<br>o Create new DTMAC unit profiles<br>o View, edit, or delete DTMAC unit information<br>o View messages and updates for a DTMAC<br>o Map or connect a DTMAC unit to a Maximo ID<br>o Open the **Update [Network name]** window to update network information<br>o Open the window that contains the **REMOTE UPDATE FOR [DTMAC UNIT]** and **COMMISSIONING** forms to set or change the controller's configuration parameters<br>• The **USERS** tab page is the User page and contains the list of all the authorized users of the DTMAC application. Links on this page enable you to perform the following:<br>o Create new user accounts |

| | |
|---|---|
| | o View, edit, or delete user information<br>o 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<br>o Change another user's password<br>• 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 DTMAC 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<br>**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.<br>Click the site name to expand the pane. The expanded pane contains links to the site-, network-, and DTMAC unit-level views on the main or **DASHBOARD** tab page. |
| **UNITS WITH PROBLEMS DURING THE LAST 24 HOURS:** | Lists sites with DTMAC units that have alerts, both occurring and persistent.<br>Click the site name to open the site-level view; click the DTMAC 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).

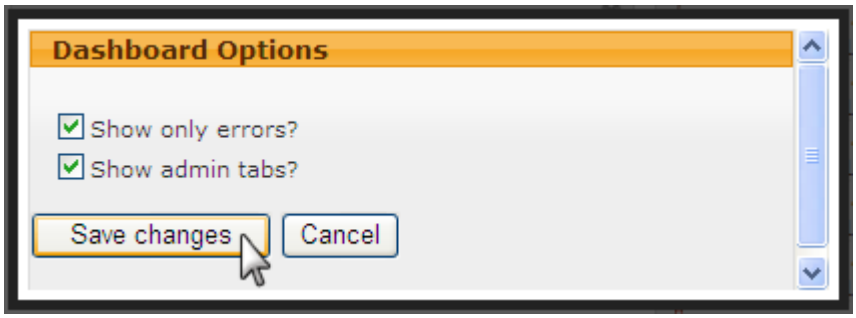



Fig. B2

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

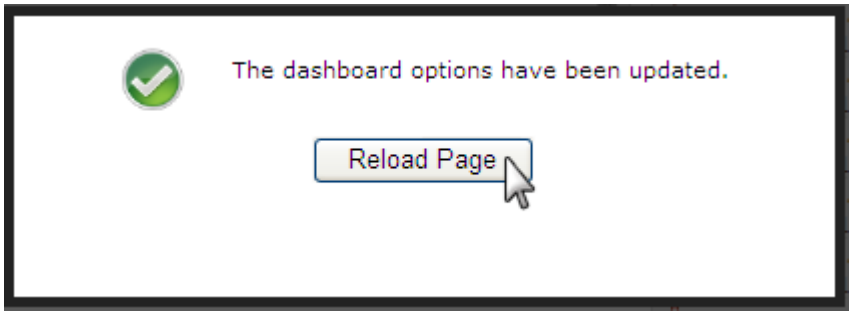



Fig. B3

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

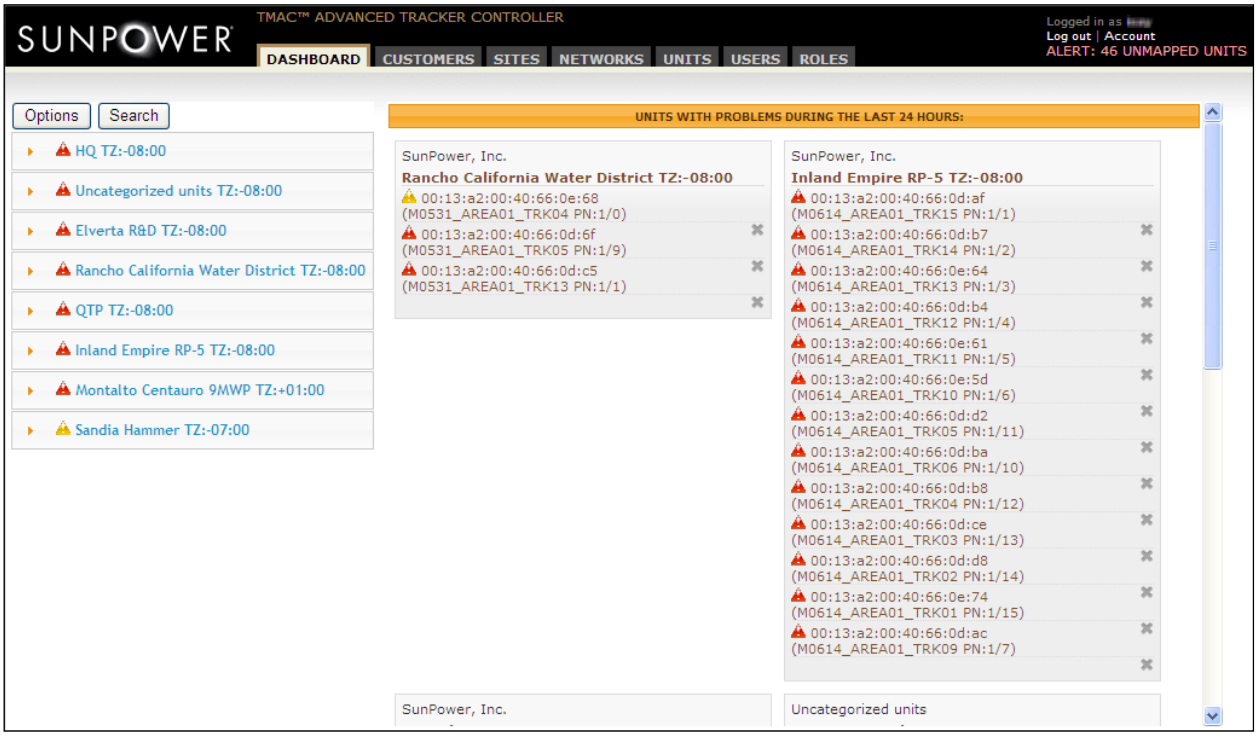



Fig. B4

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).

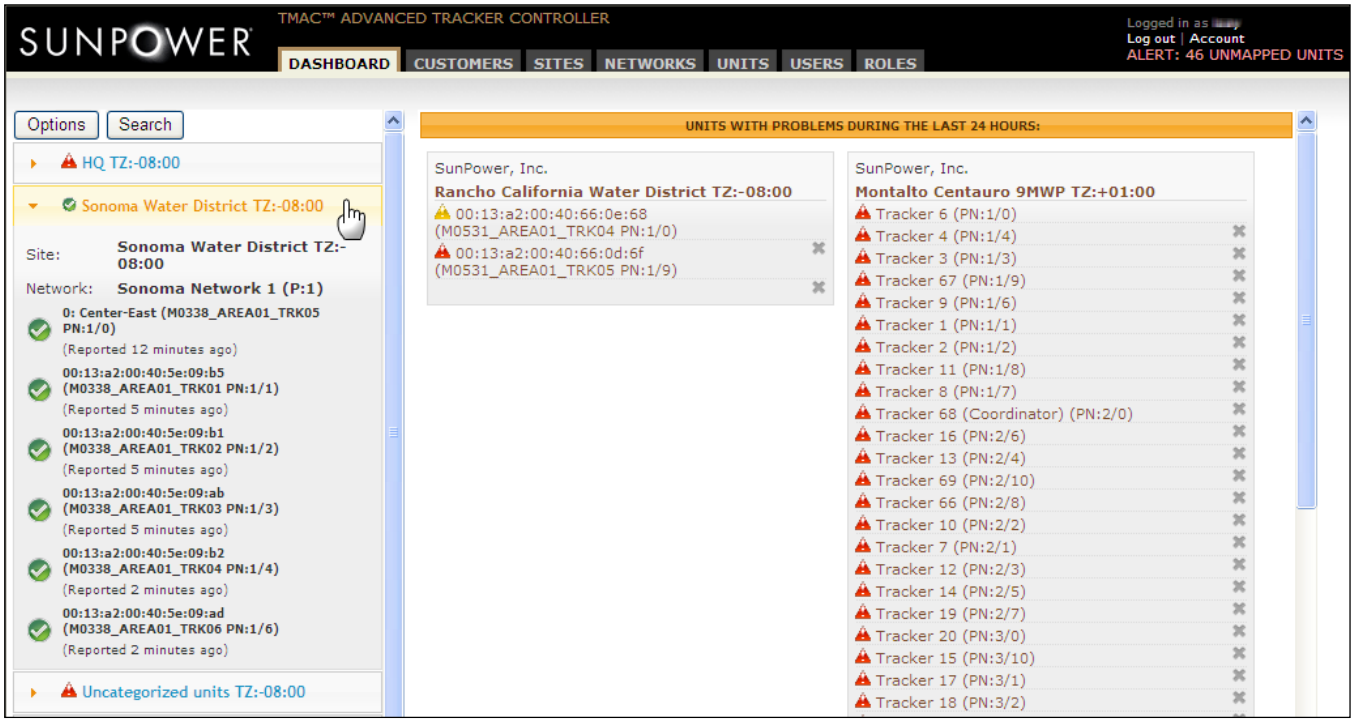



Fig. B5

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).

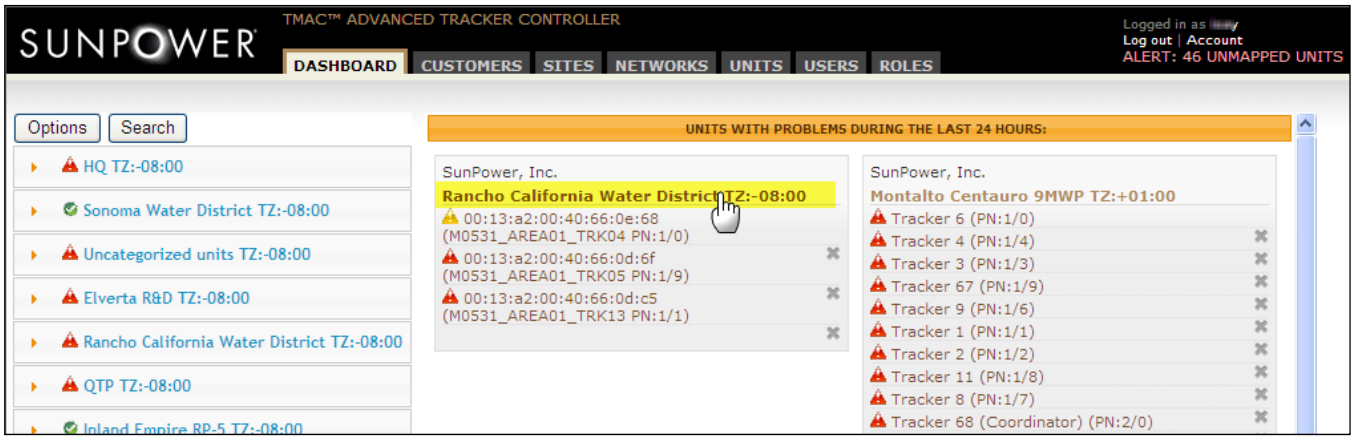



Fig. B6

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).

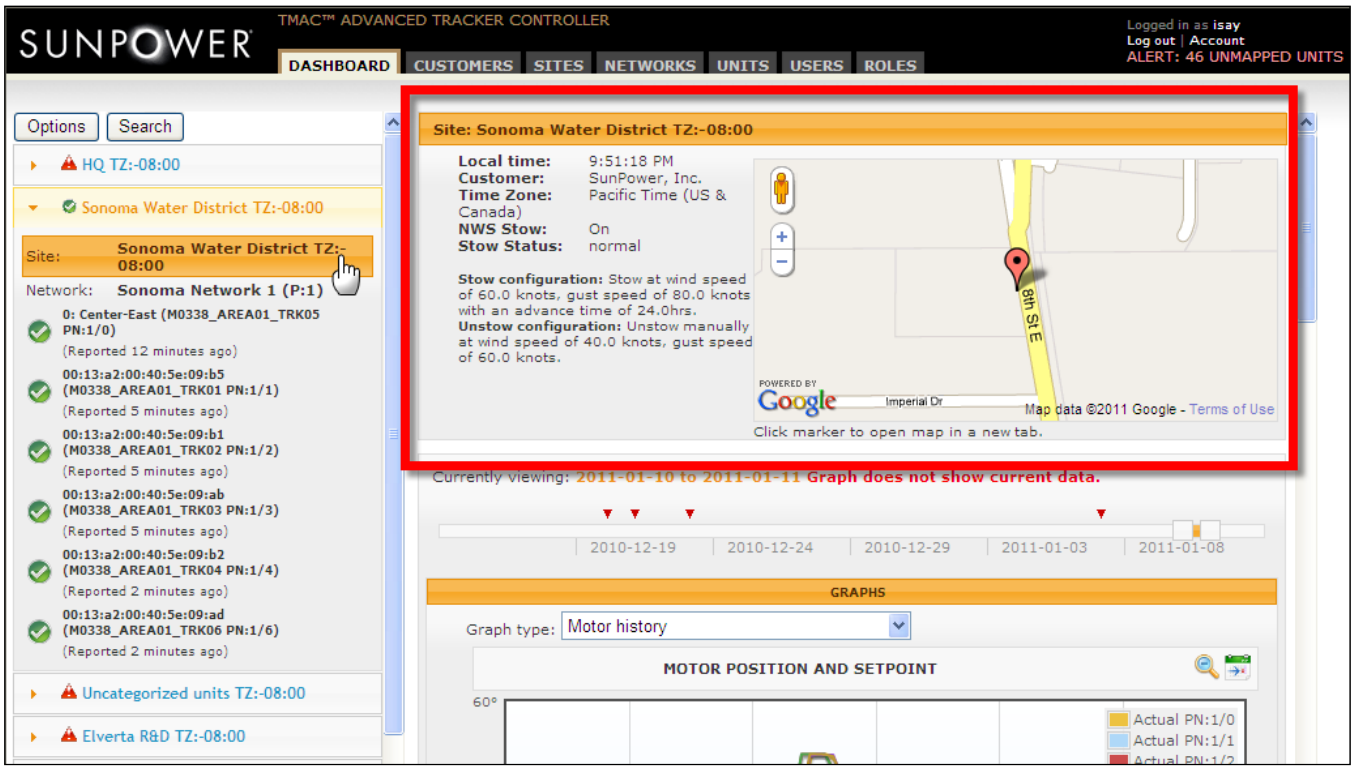



Fig. B7

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.<br>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 |

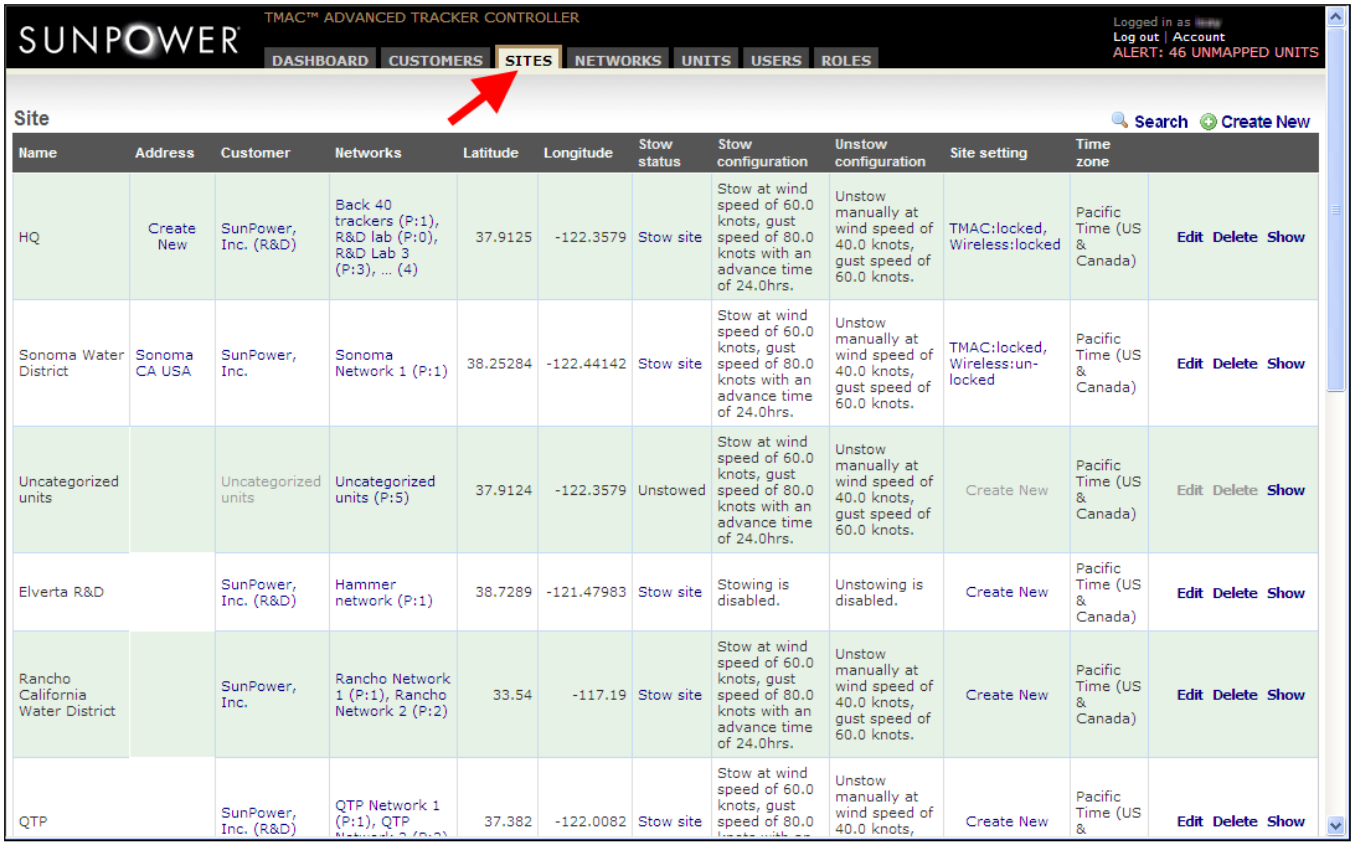
4. Use the sections in the site-level view to perform remote monitoring and control functions:

| 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<br>Refer to Section B.3.10. |
| **COMPARE UNIT CONFIGURATIONS** | Enables you to view parameter settings for each DTMAC 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).




| Name | Address | Customer | Networks | Latitude | Longitude | Stow status | Stow configuration | Unstow configuration | Site setting | Time zone | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HQ | Create New | SunPower, Inc. (R&D) | Back 40 trackers (P:1), R&D lab (P:0), R&D Lab 3 (P:3), ... (4) | 37.9125 | -122.3579 | Stow site | Stow at wind speed of 60.0 knots, gust speed of 80.0 knots with an advance time of 24.0hrs. | Unstow manually at wind speed of 40.0 knots, gust speed of 60.0 knots. | TMAC:locked, Wireless:locked | Pacific Time (US & Canada) | Edit Delete Show |
| Sonoma Water District | Sonoma CA USA | SunPower, Inc. | Sonoma Network 1 (P:1) | 38.25284 | -122.44142 | Stow site | Stow at wind speed of 60.0 knots, gust speed of 80.0 knots with an advance time of 24.0hrs. | Unstow manually at wind speed of 40.0 knots, gust speed of 60.0 knots. | TMAC:locked, Wireless:un-locked | Pacific Time (US & Canada) | Edit Delete Show |
| Uncategorized units | | Uncategorized units | Uncategorized units (P:5) | 37.9124 | -122.3579 | Unstowed | Stow at wind speed of 60.0 knots, gust speed of 80.0 knots with an advance time of 24.0hrs. | Unstow manually at wind speed of 40.0 knots, gust speed of 60.0 knots. | Create New | Pacific Time (US & Canada) | Edit Delete Show |
| Elverta R&D | | SunPower, Inc. (R&D) | Hammer network (P:1) | 38.7289 | -121.47983 | Stow site | Stowing is disabled. | Unstowing is disabled. | Create New | Pacific Time (US & Canada) | Edit Delete Show |
| Rancho California Water District | | SunPower, Inc. | Rancho Network 1 (P:1), Rancho Network 2 (P:2) | 33.54 | -117.19 | Stow site | Stow at wind speed of 60.0 knots, gust speed of 80.0 knots with an advance time of 24.0hrs. | Unstow manually at wind speed of 40.0 knots, gust speed of 60.0 knots. | Create New | Pacific Time (US & Canada) | Edit Delete Show |
| QTP | | SunPower, Inc. (R&D) | QTP Network 1 (P:1), QTP | 37.382 | -122.0082 | Stow site | Stow at wind speed of 60.0 knots, gust speed of 80.0 | Unstow manually at wind speed of 40.0 knots, | Create New | Pacific Time (US & | Edit Delete Show |

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.

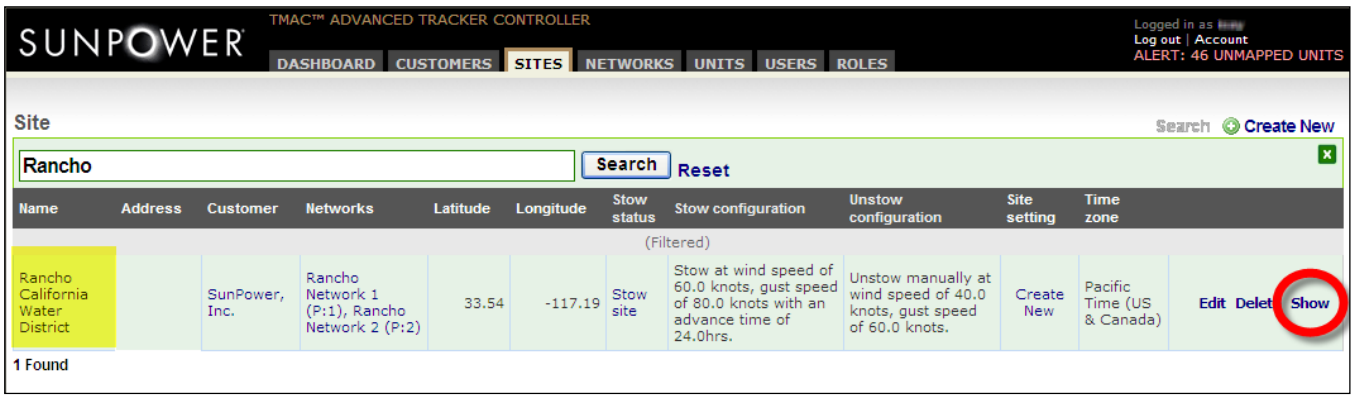



Fig. B10

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

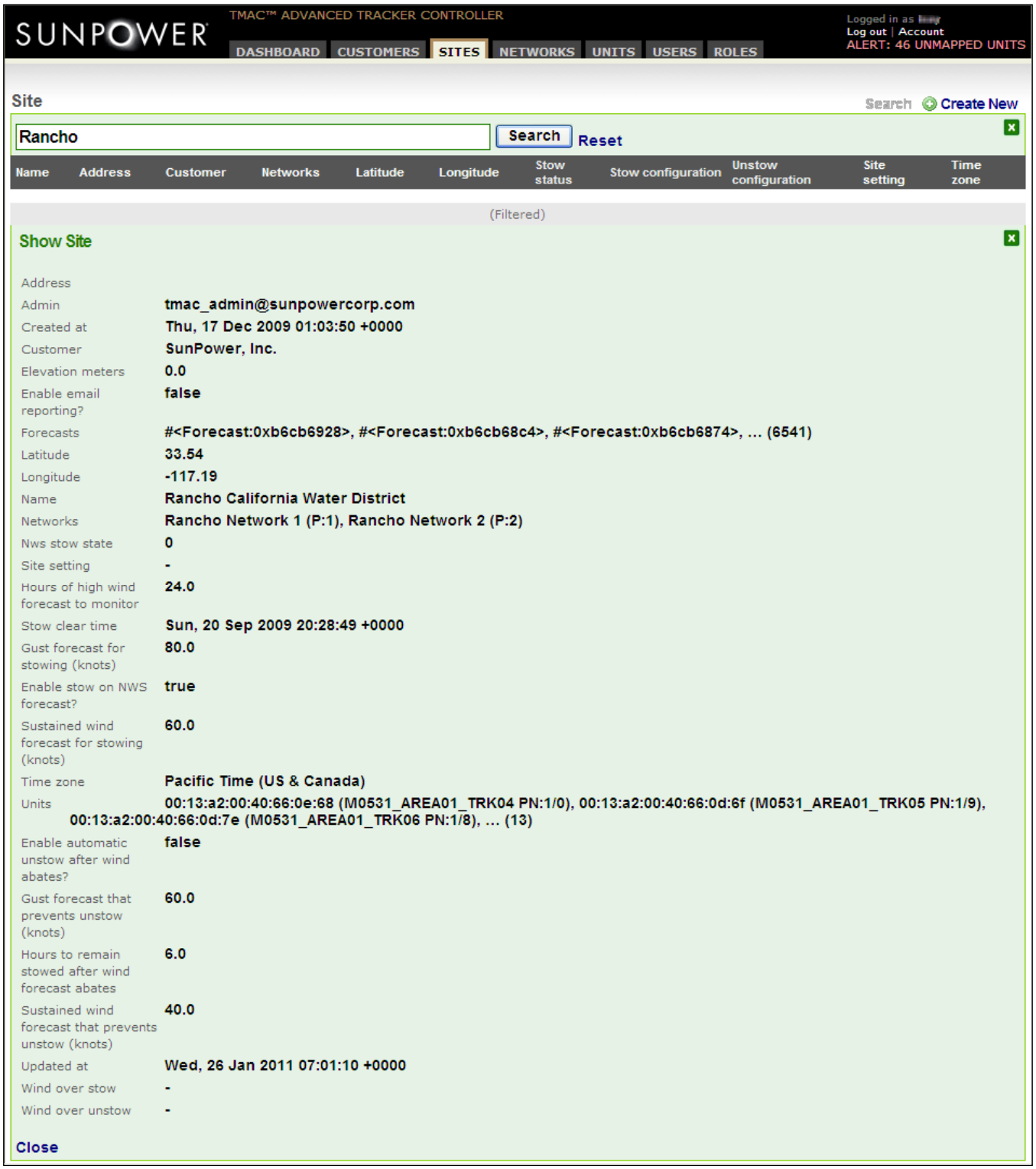



Fig. B11

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).

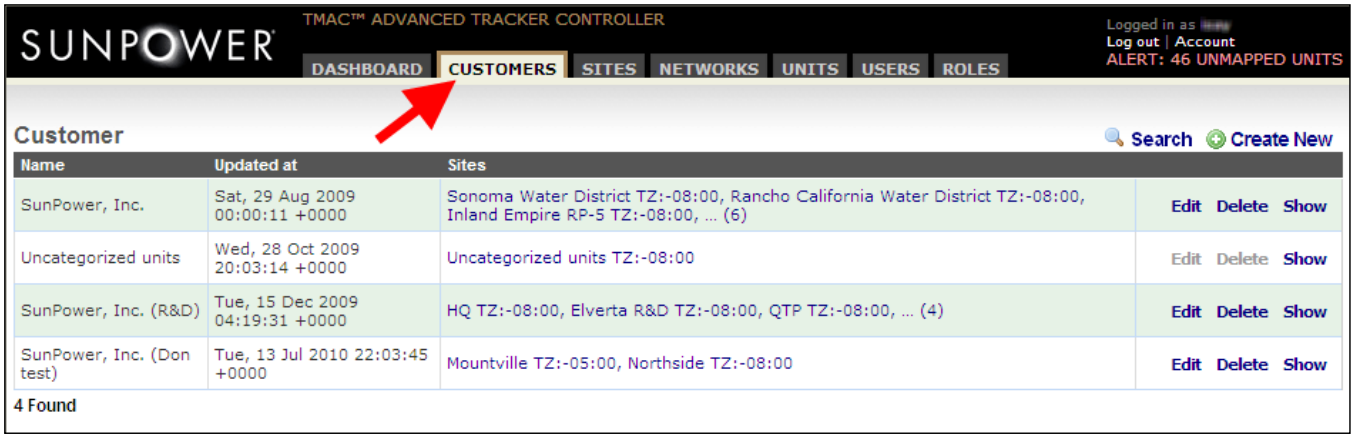



Fig. B12

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).

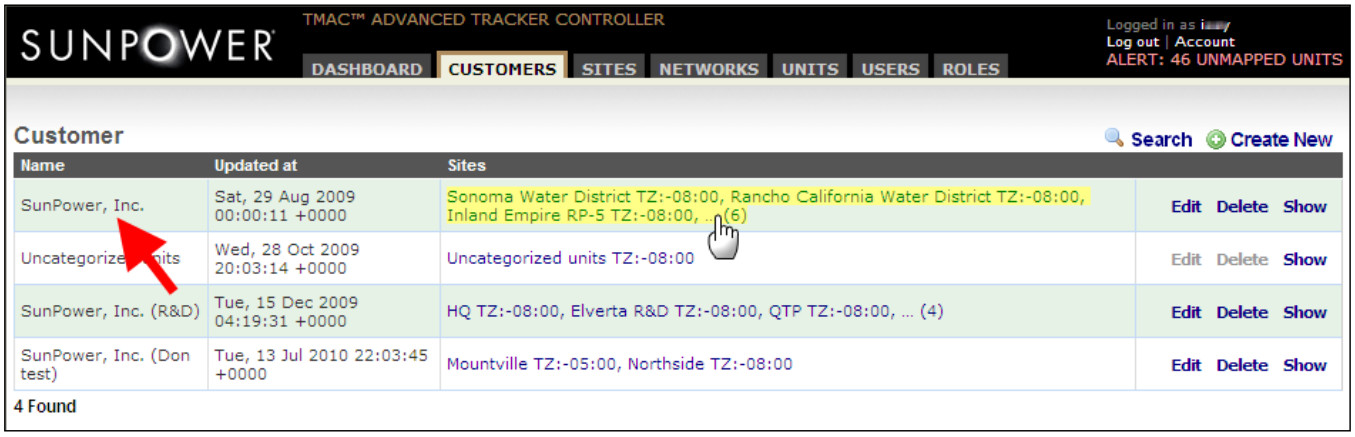



Fig. B13

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).

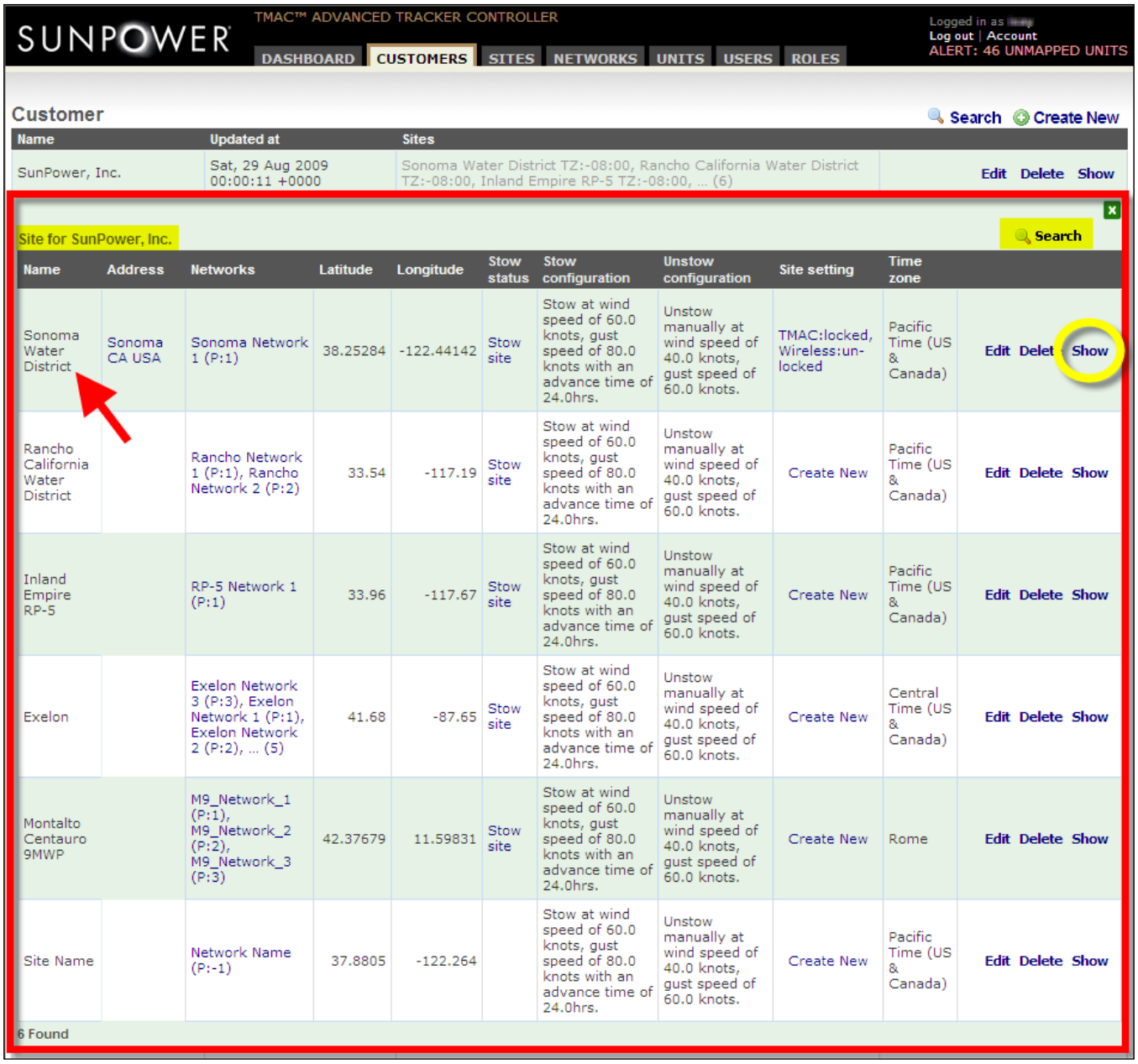



Fig. B14

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

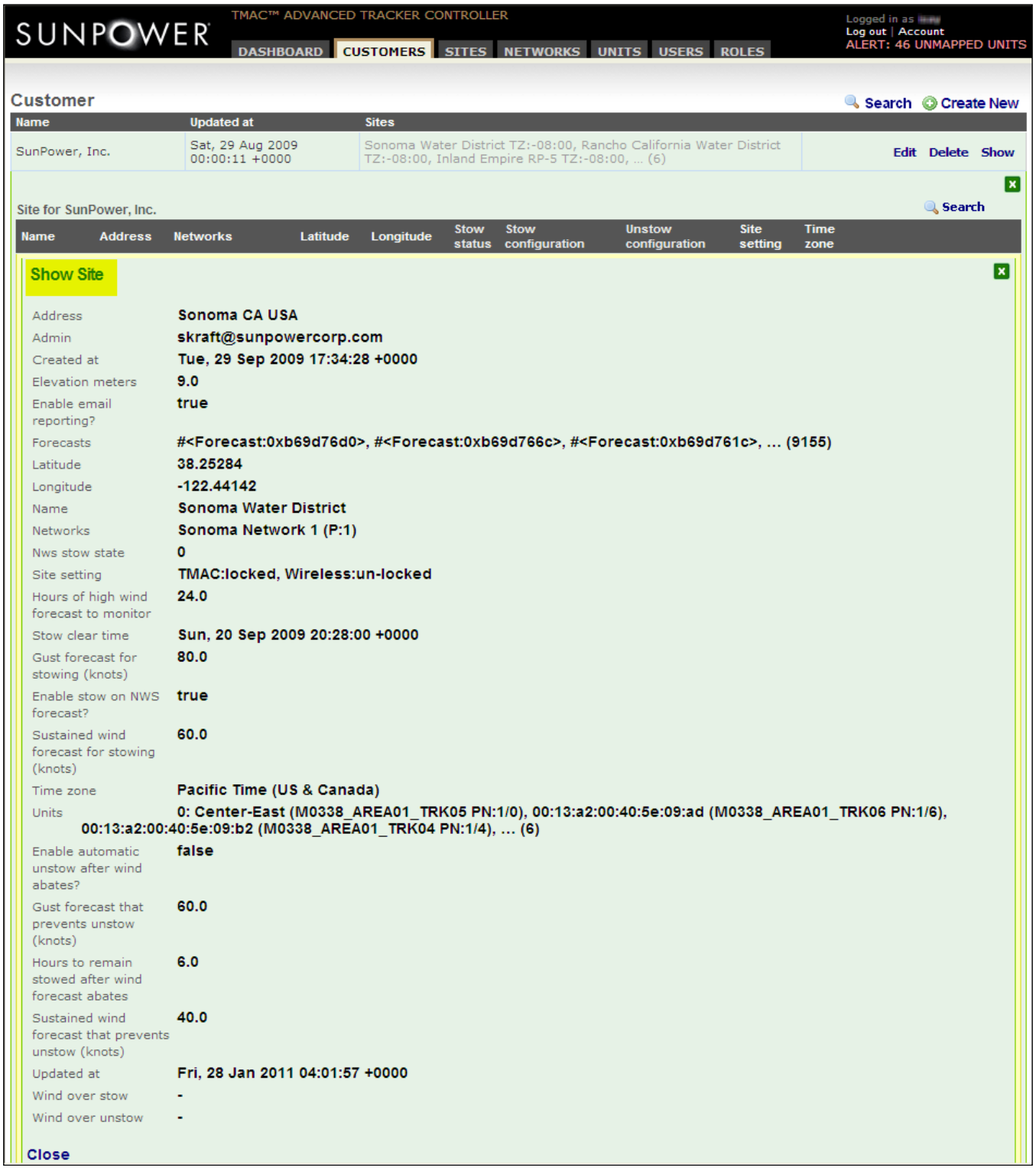



Fig. B15

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).

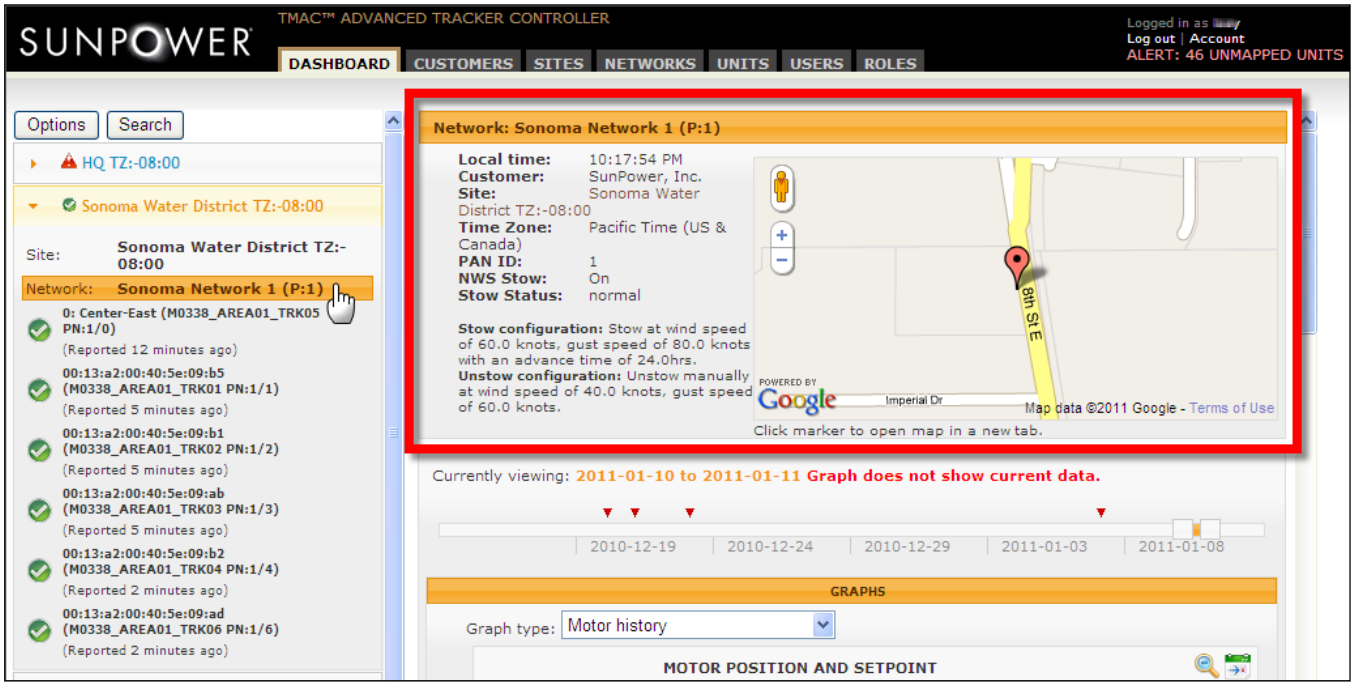



Fig. B16

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<br>**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.<br>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 |

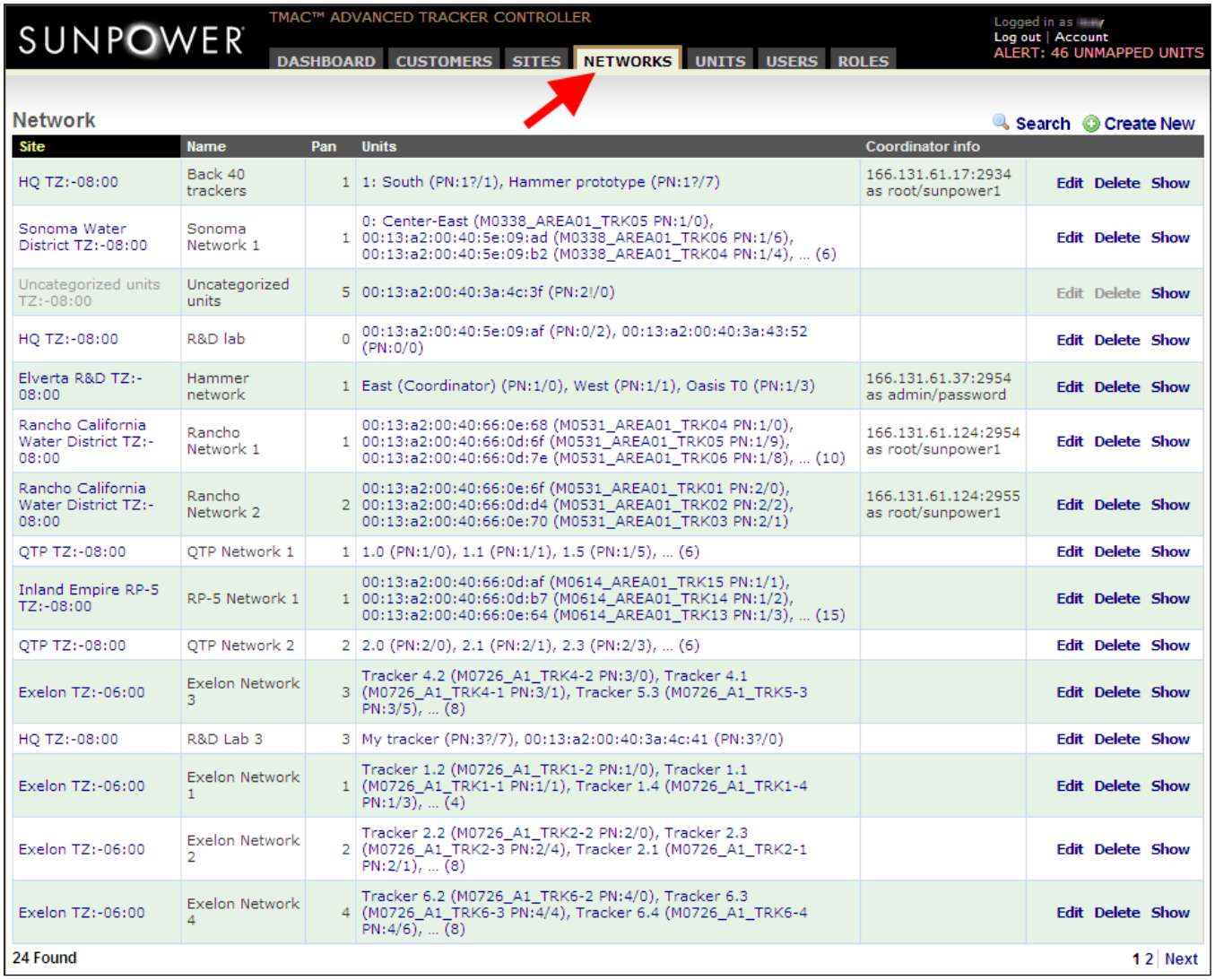
4. Use the sections in the network-level view to perform monitoring functions:

| 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 DTMAC 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).

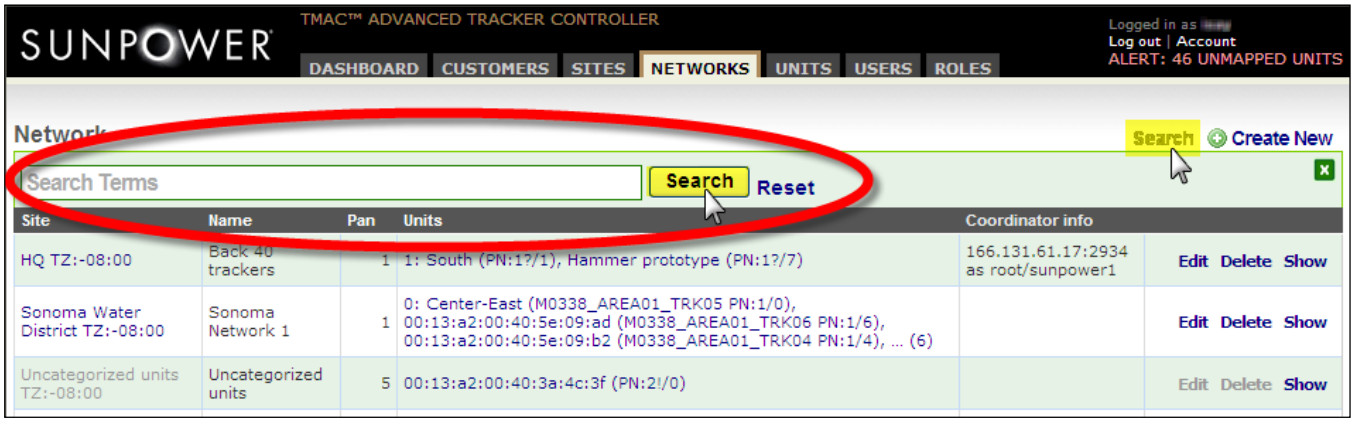



Fig. B18

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.

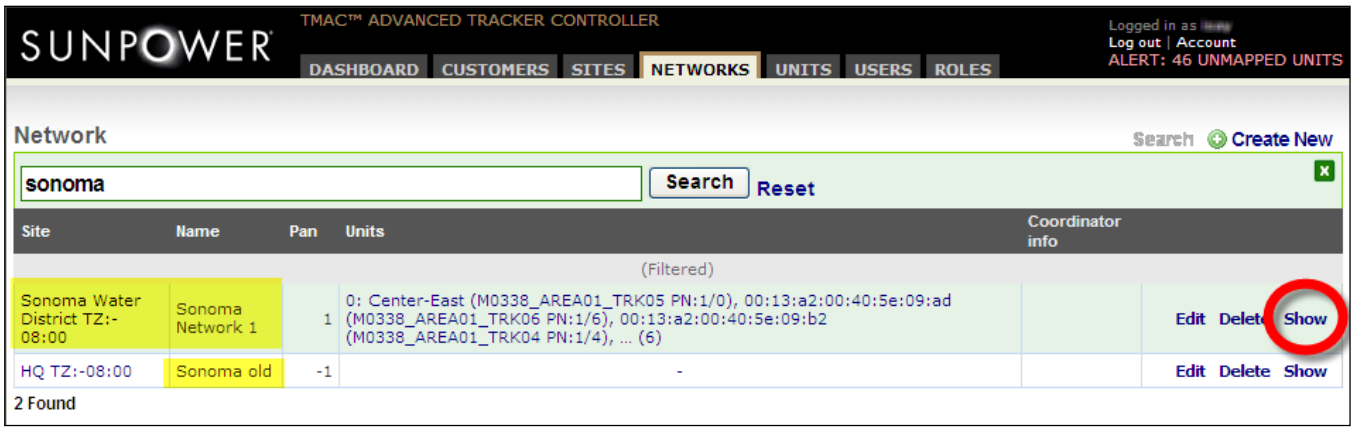



Fig. B19

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).

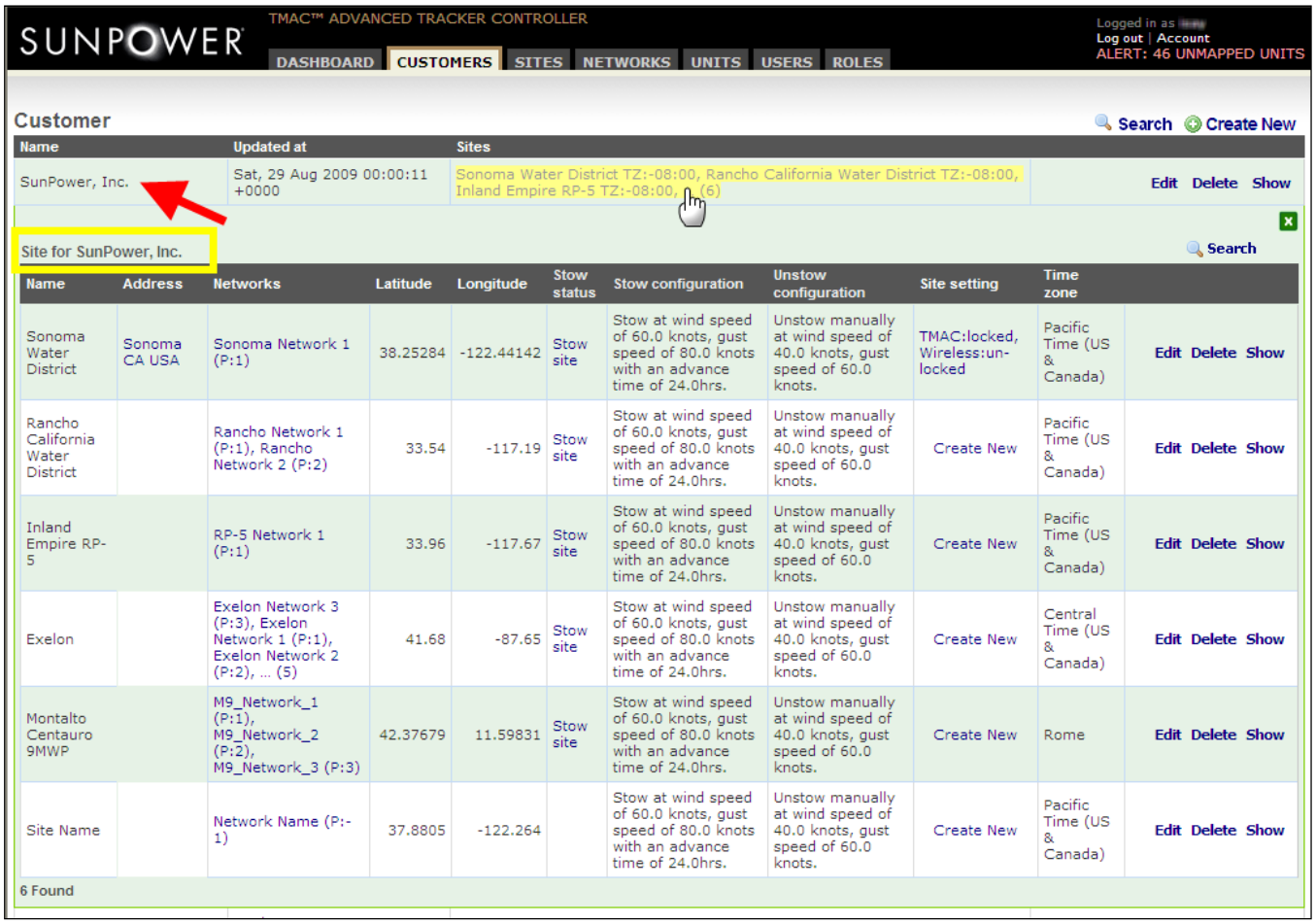



Fig. B21

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).

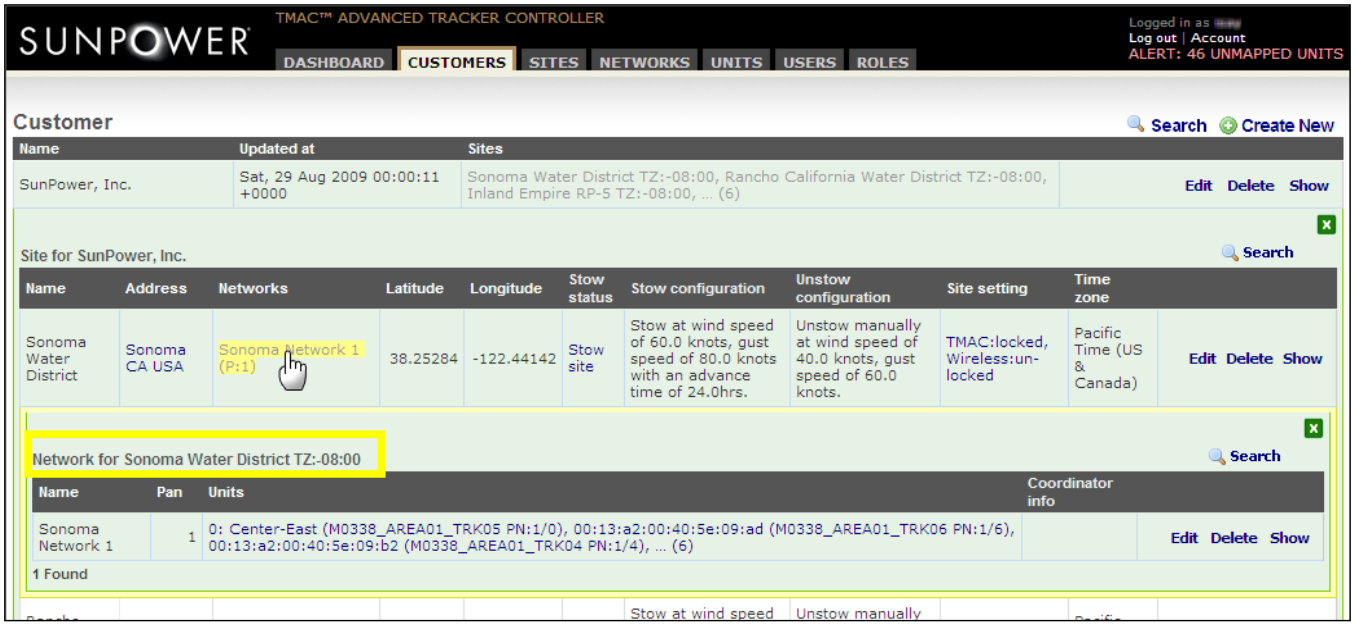



Fig. B22

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

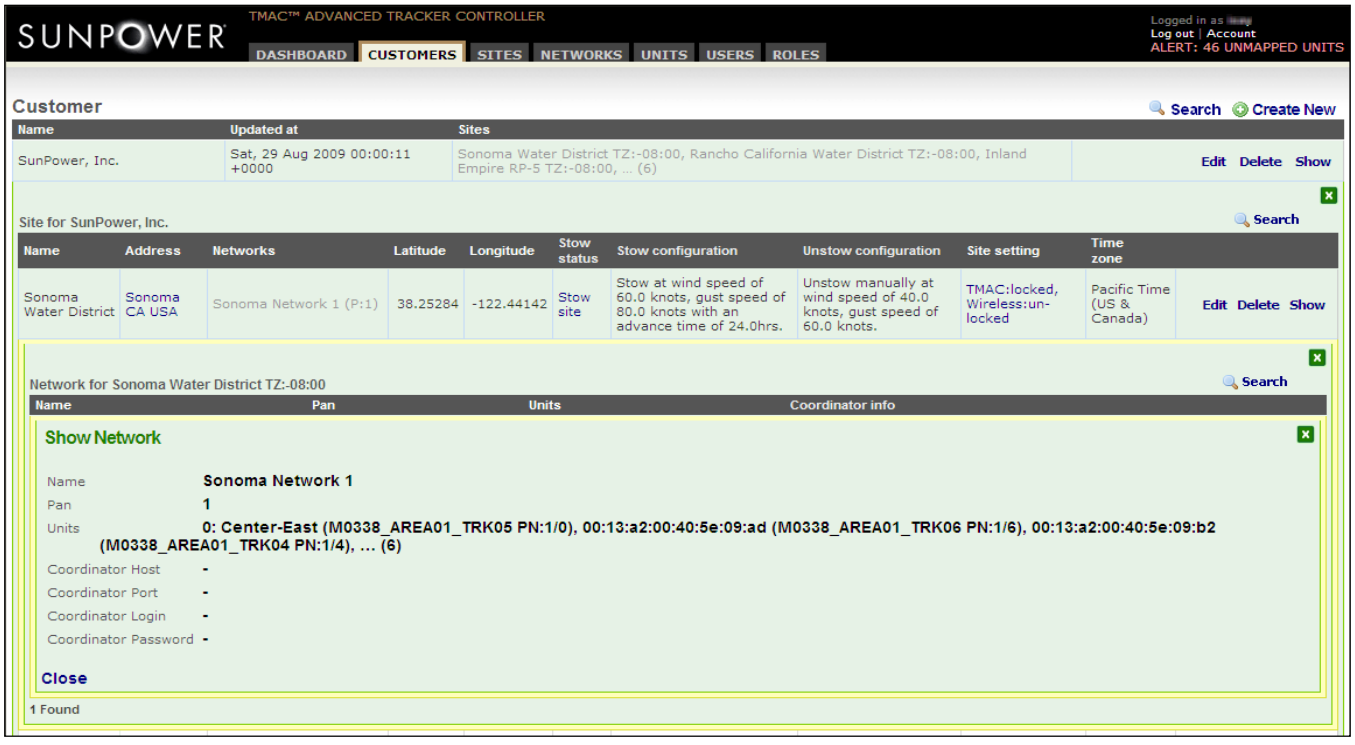



Fig. B23

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).

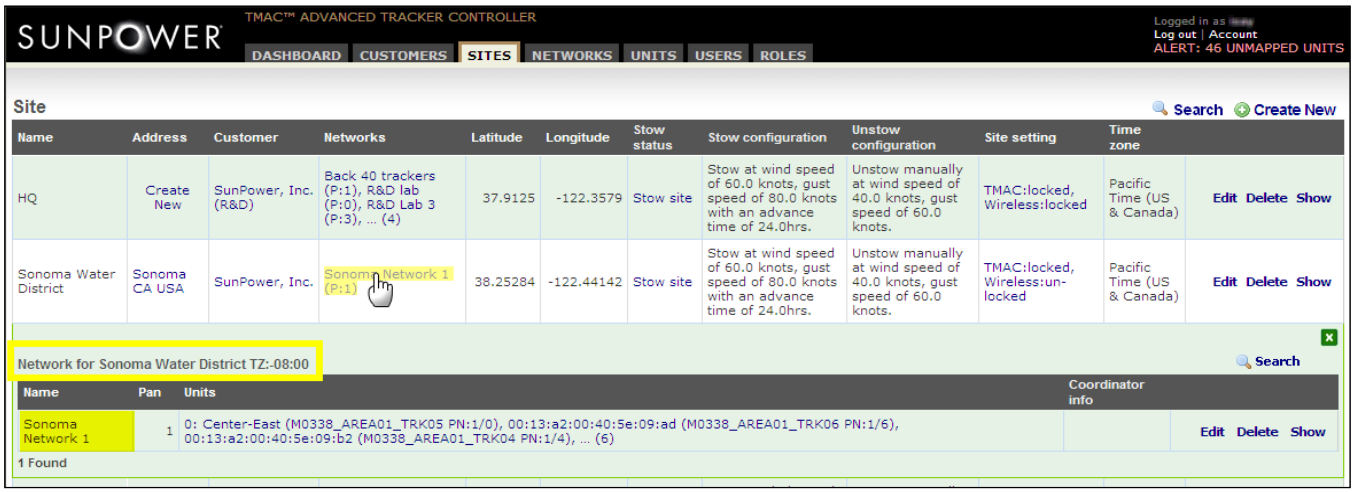



Fig. B24

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

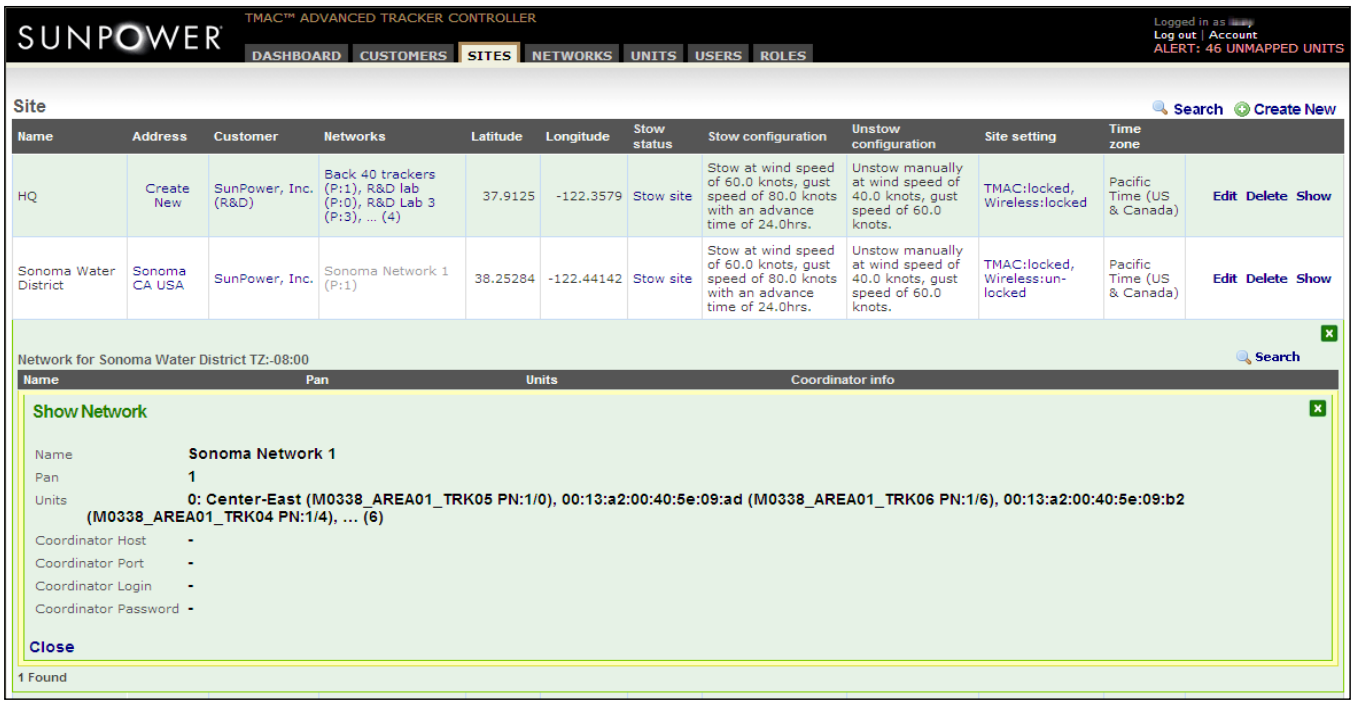



Fig. B25

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

## B.3.4 Viewing DTMAC Unit Information

You can view DTMAC 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 DTMAC 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 DTMAC unit link to display the unit-level view. The information about the selected DTMAC unit is at the topmost section of the page (Fig. B26).

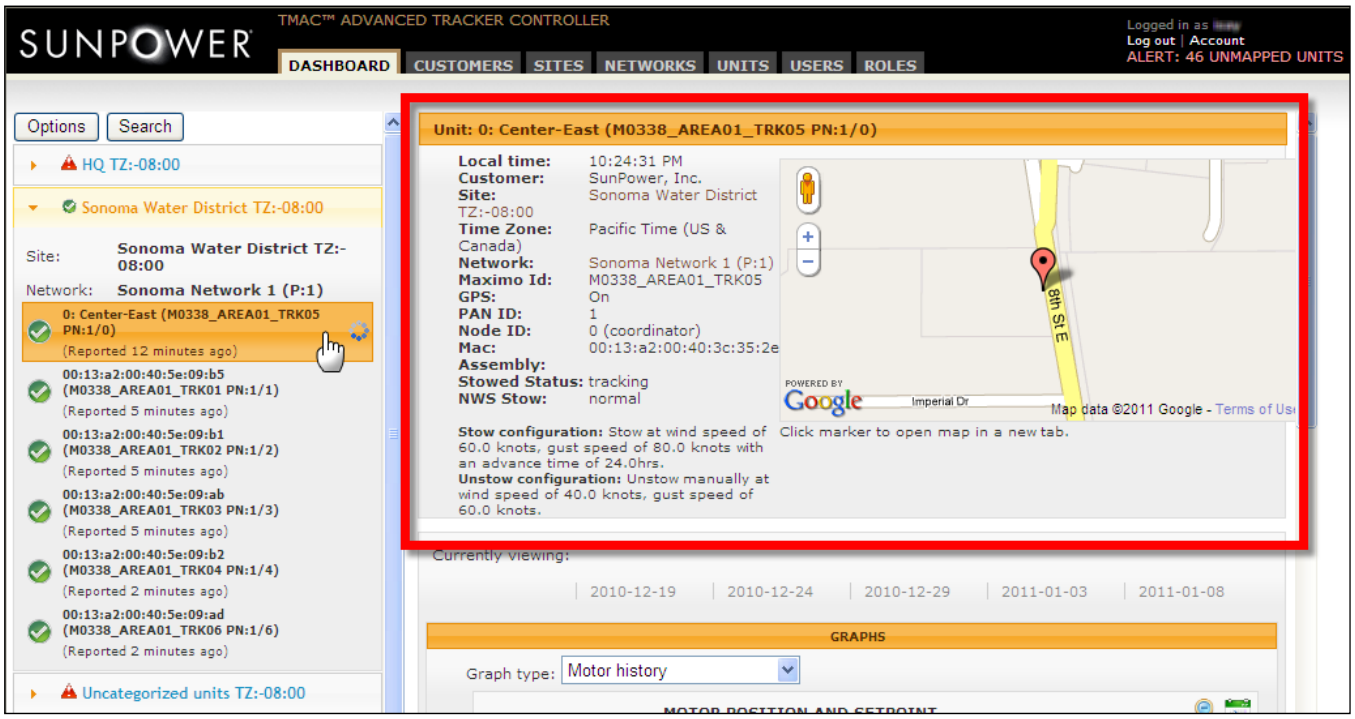



Fig. B26

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

3. View the DTMAC 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<br>**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 DTMAC unit belongs<br>**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 DTMAC used as identifier for reporting in Maximo |
| **GPS** | GPS is enabled (or *On*) when a GPS receiver and antenna is installed into the DTMAC 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.<br>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:<br>• Set or modify controller parameters<br>• Send commands to the controller to either stow or move the tracker to the nighttime position<br>• Set the nighttime angle for all units at the site<br>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<br>Refer to Section B.3.11. |

### B.3.4.2 Using the Units Tab Page

To view DTMAC 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 DTMAC 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 DTMAC unit information.

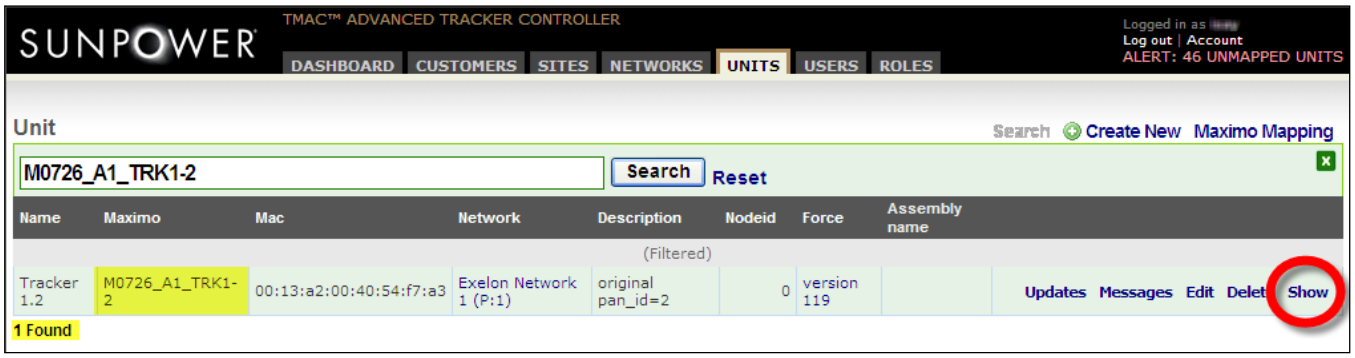



Fig. B29

4. View the DTMAC 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 DTMAC 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 DTMAC unit link under the **Units** column to open the **Unit for [Network name]** window (Fig. B31).

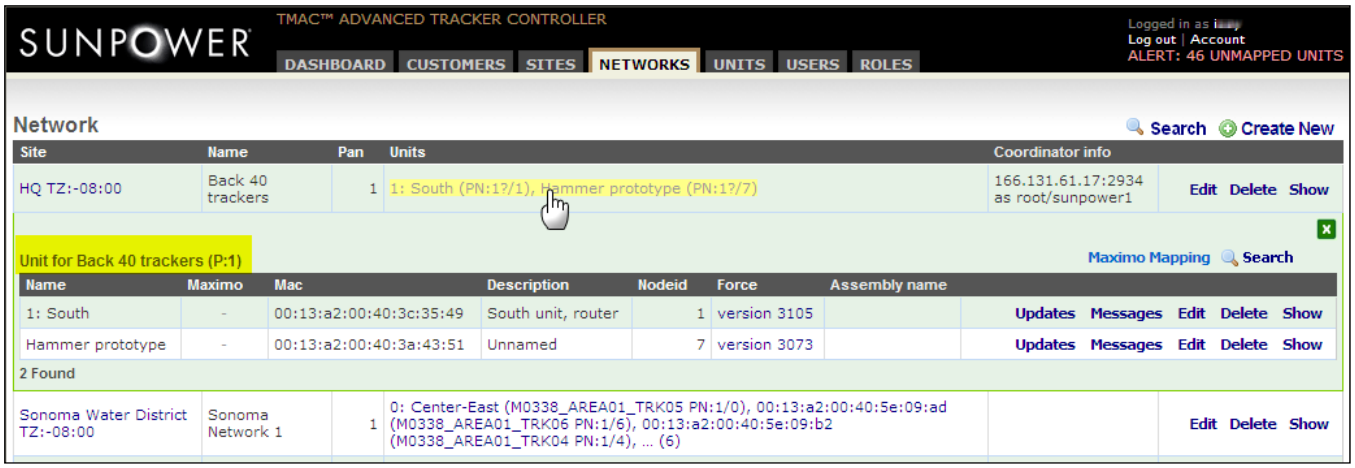



Fig. B31

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

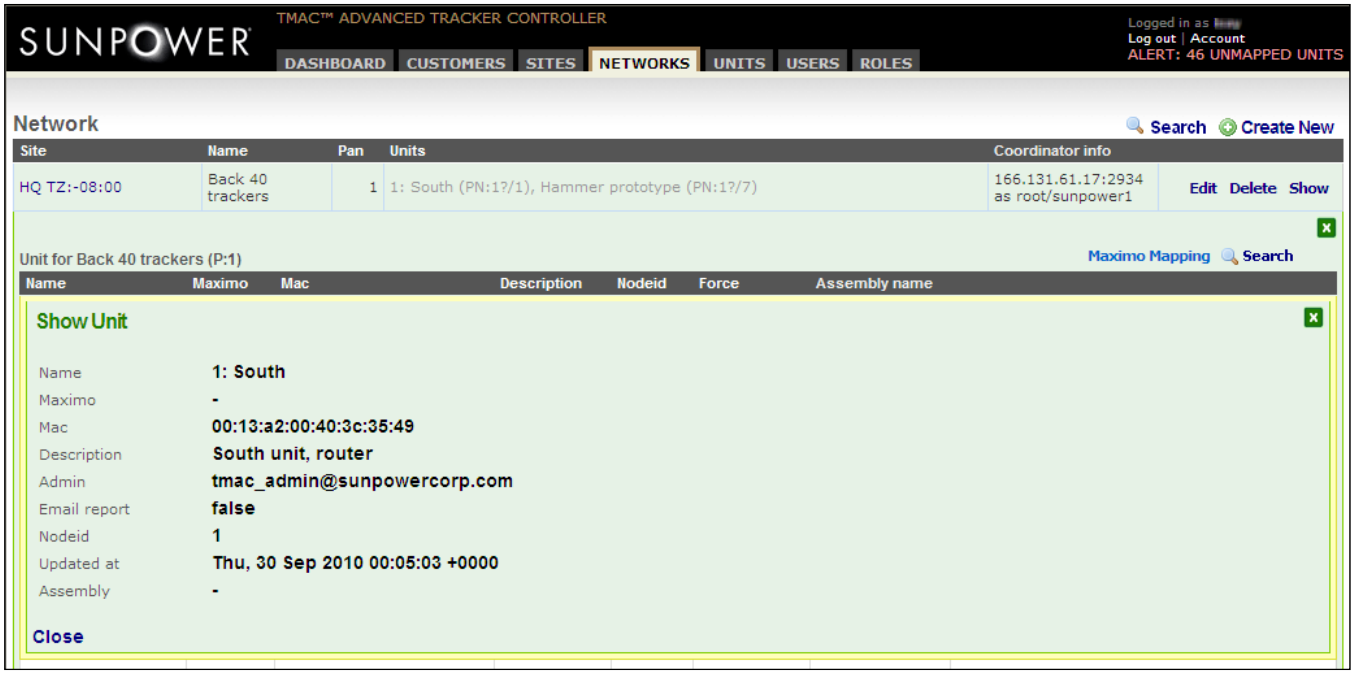



Fig. B32

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 DTMAC 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 DTMAC 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 DTMAC 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 |
| DTMAC 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 DTMAC 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 DTMAC 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 DTMAC 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: [DTMAC Unit]** section. Use the scroll bar on the right side of the page.

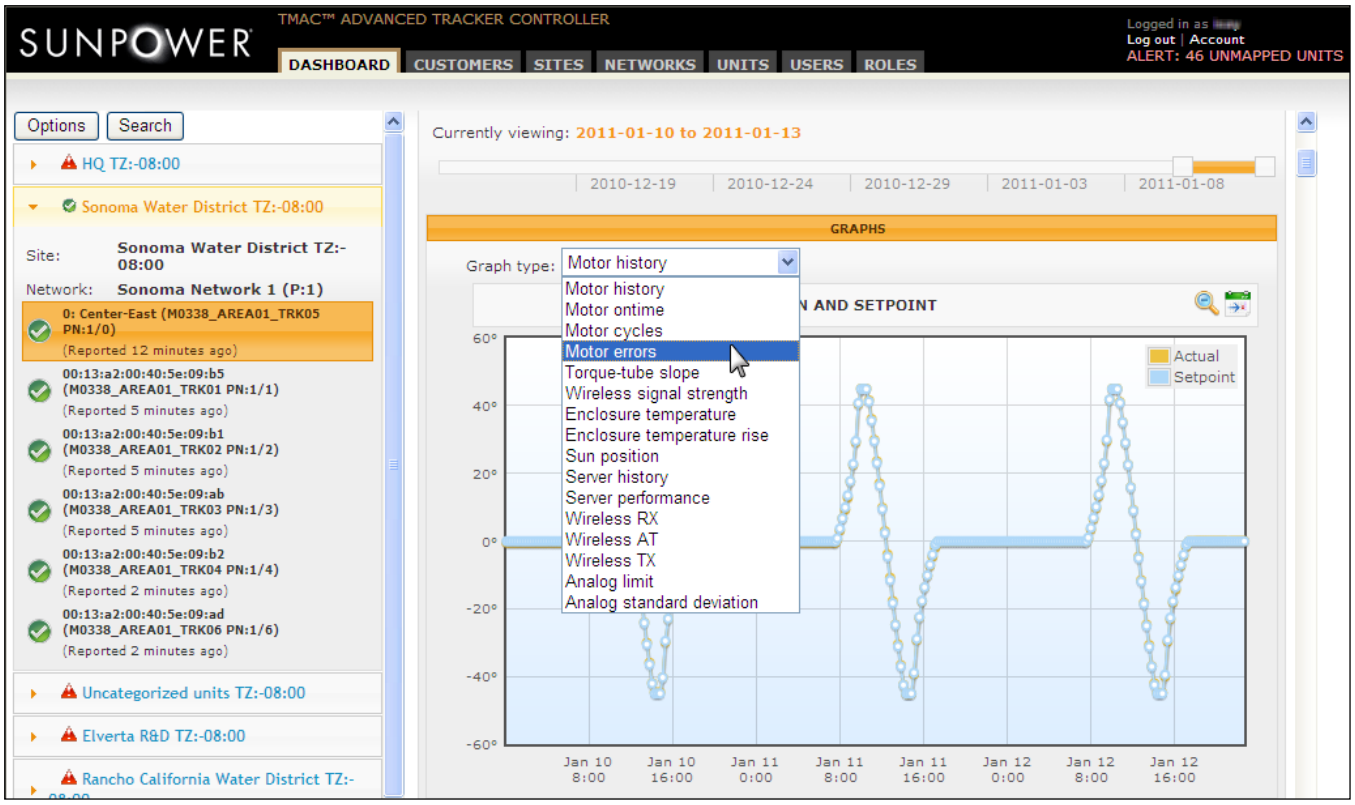



Fig. B33

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.

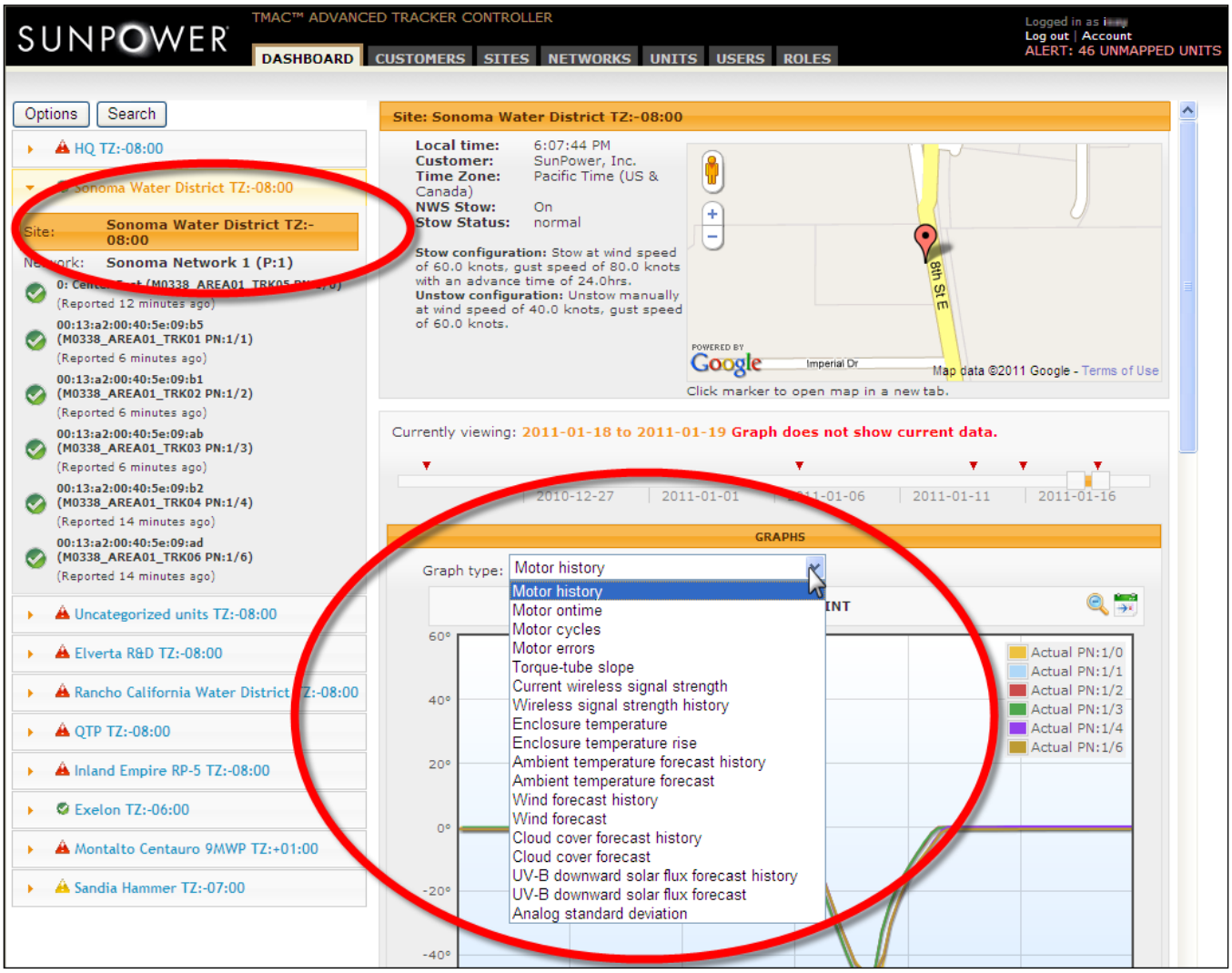



Fig. B36

## B.3.6 Viewing System Status

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

1. In the site list, click the site name and then the DTMAC 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).

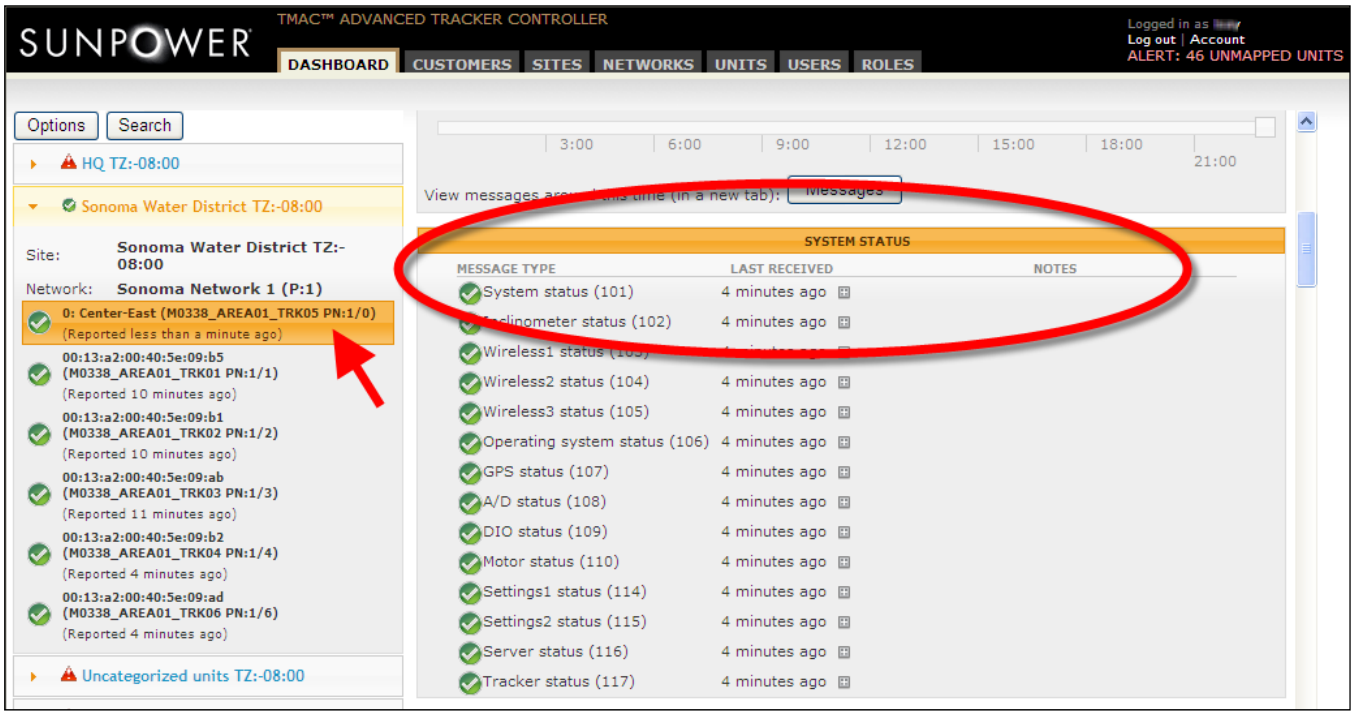



Fig. B37

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).

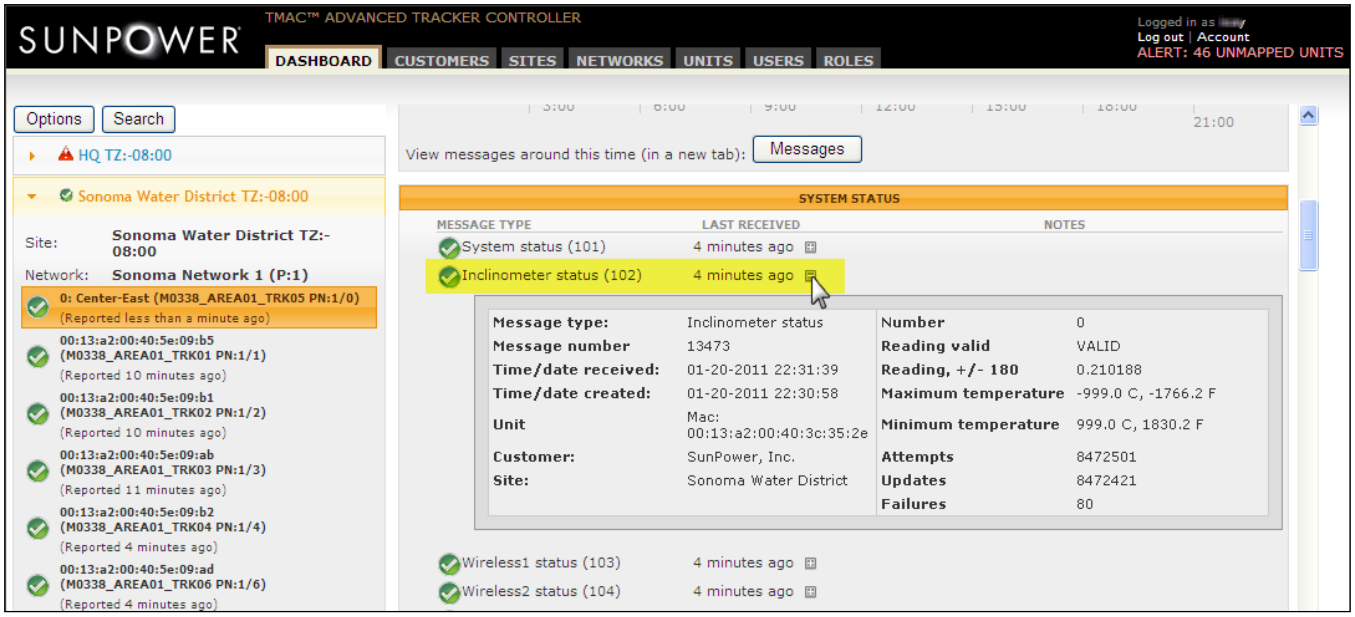



Fig. B38

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 DTMAC unit.

### B.3.7.1 Viewing Controller Events

1. In the site list, click the site name and then the DTMAC 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).

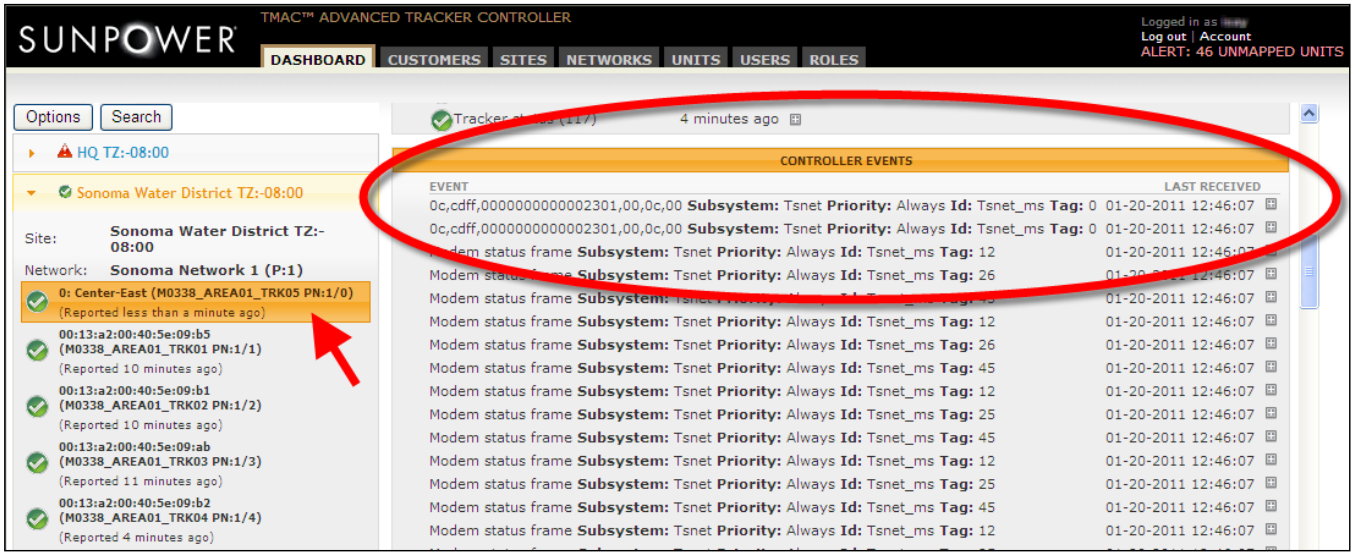



Fig. B39

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).

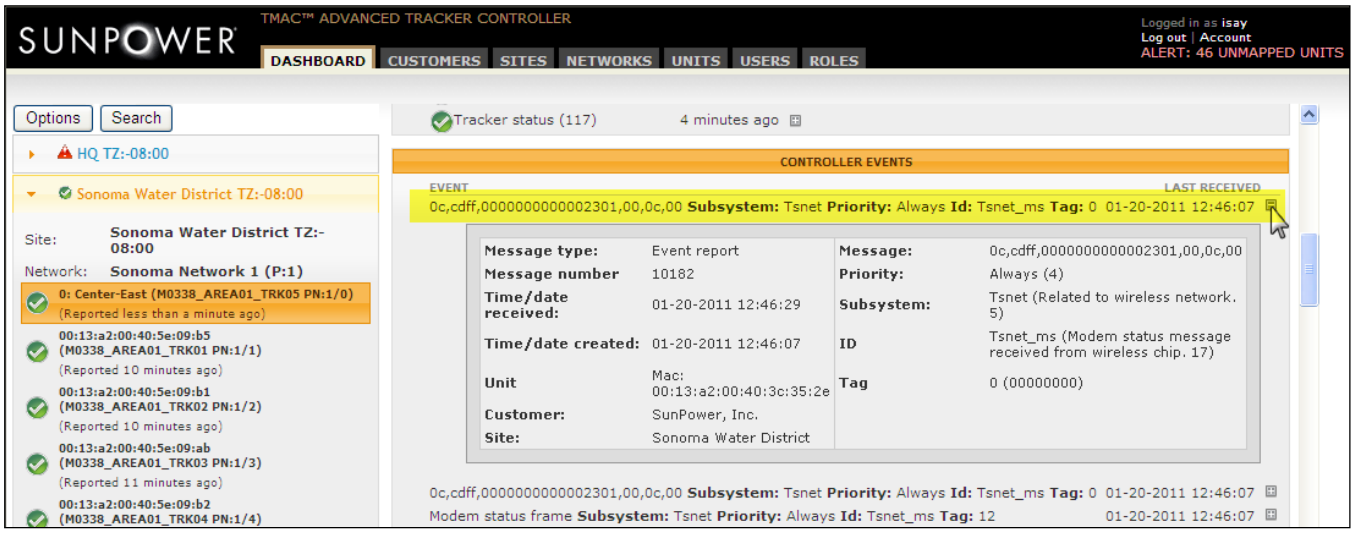



Fig. B40

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).

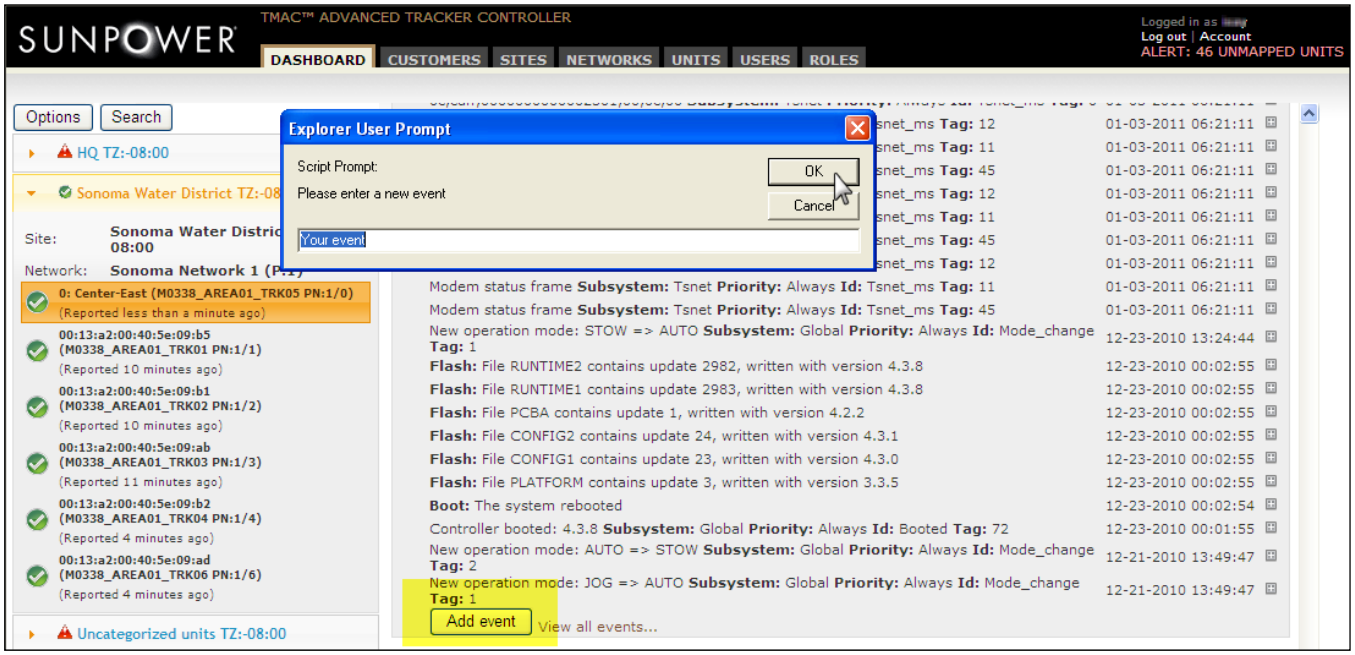



Fig. B41

## B.3.8 Setting or Modifying Configuration Parameters

***Important!*** Each controller is programmed to check the DTMAC 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 [DTMAC 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 DTMAC unit link to display the unit-level view.
2. Scroll down to the **REMOTE UPDATES** section.
3. Click *Remote update* (Fig. B42).

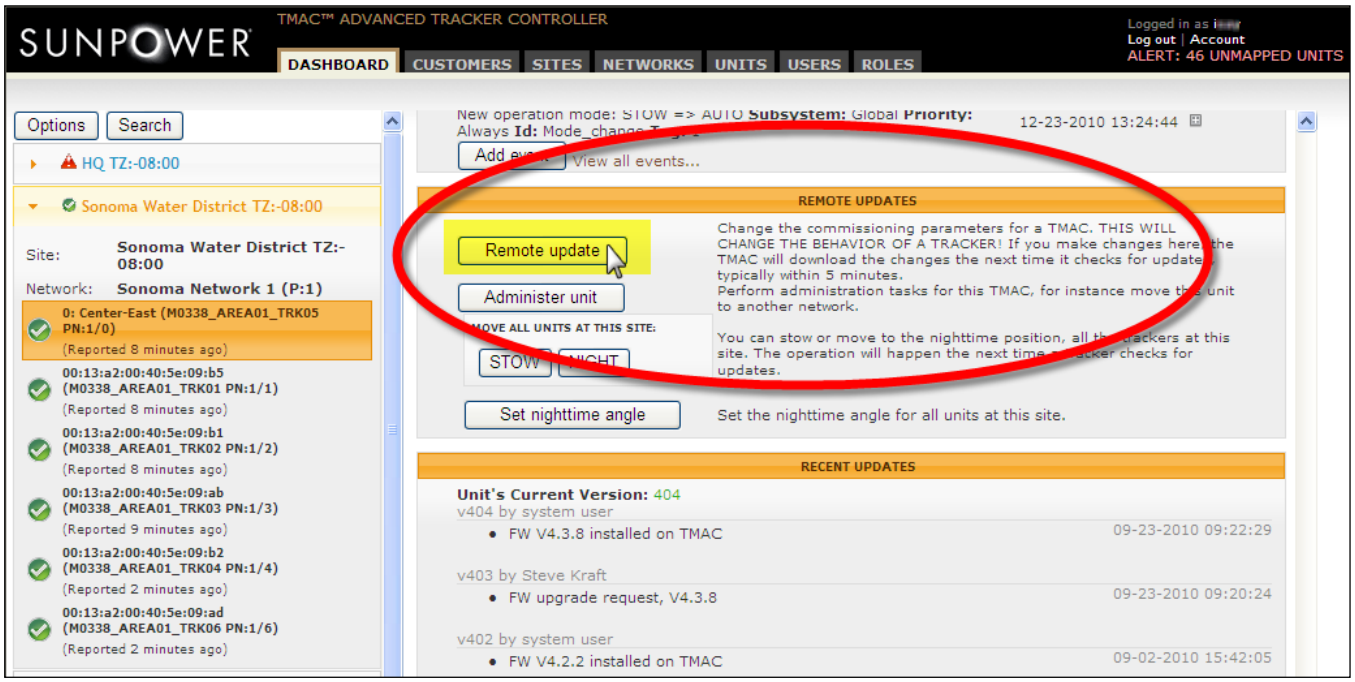



Fig. B42

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

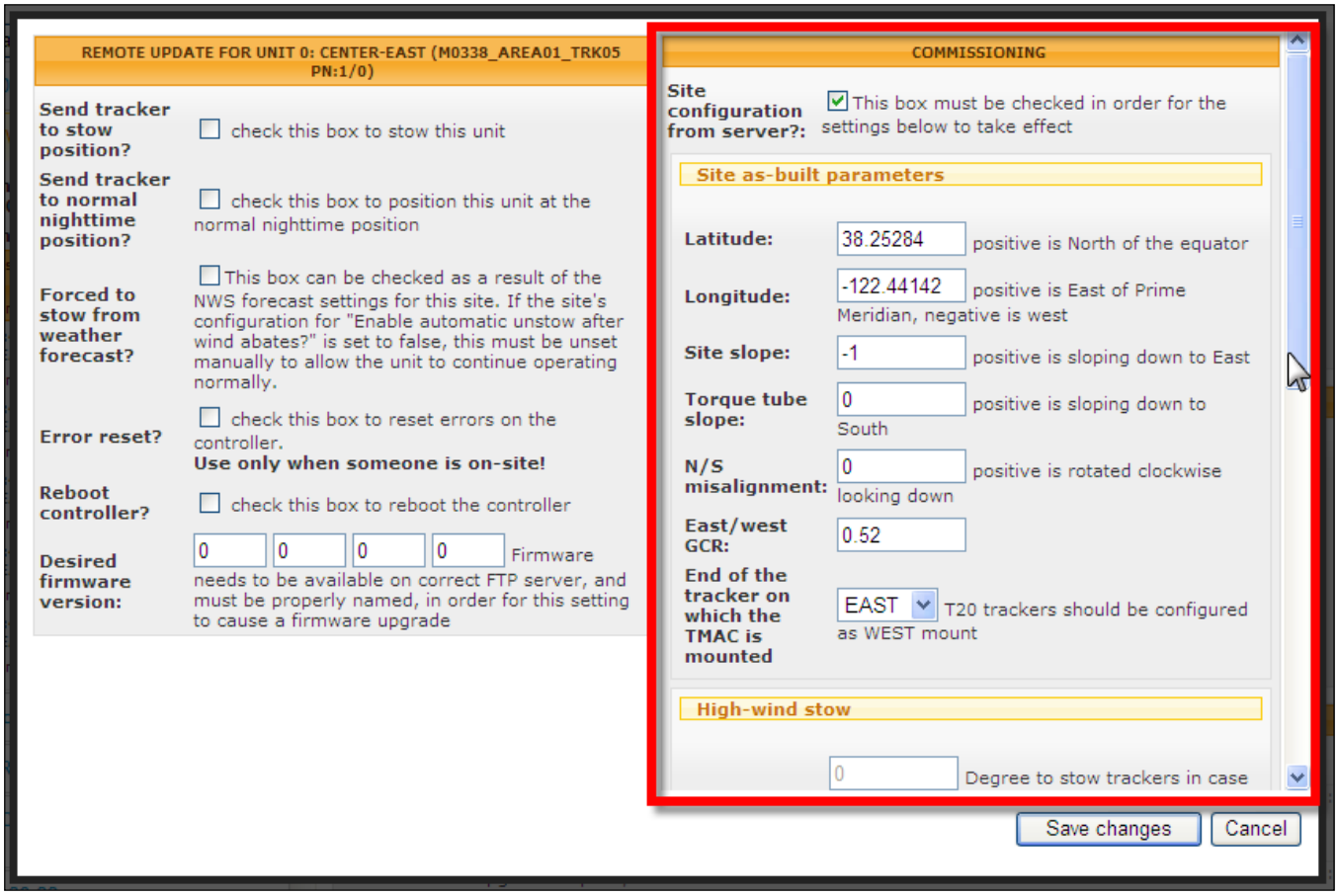



Fig. B43

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 DTMAC is mounted** | Select the side of the array on which the drive unit is installed.<br>***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 DTMAC 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 [DTMAC 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 DTMAC 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 [DTMAC 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 DTMAC 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 [DTMAC UNIT]** form in the screen (Fig. B45). Click *Save changes* to commit the information and send the command.

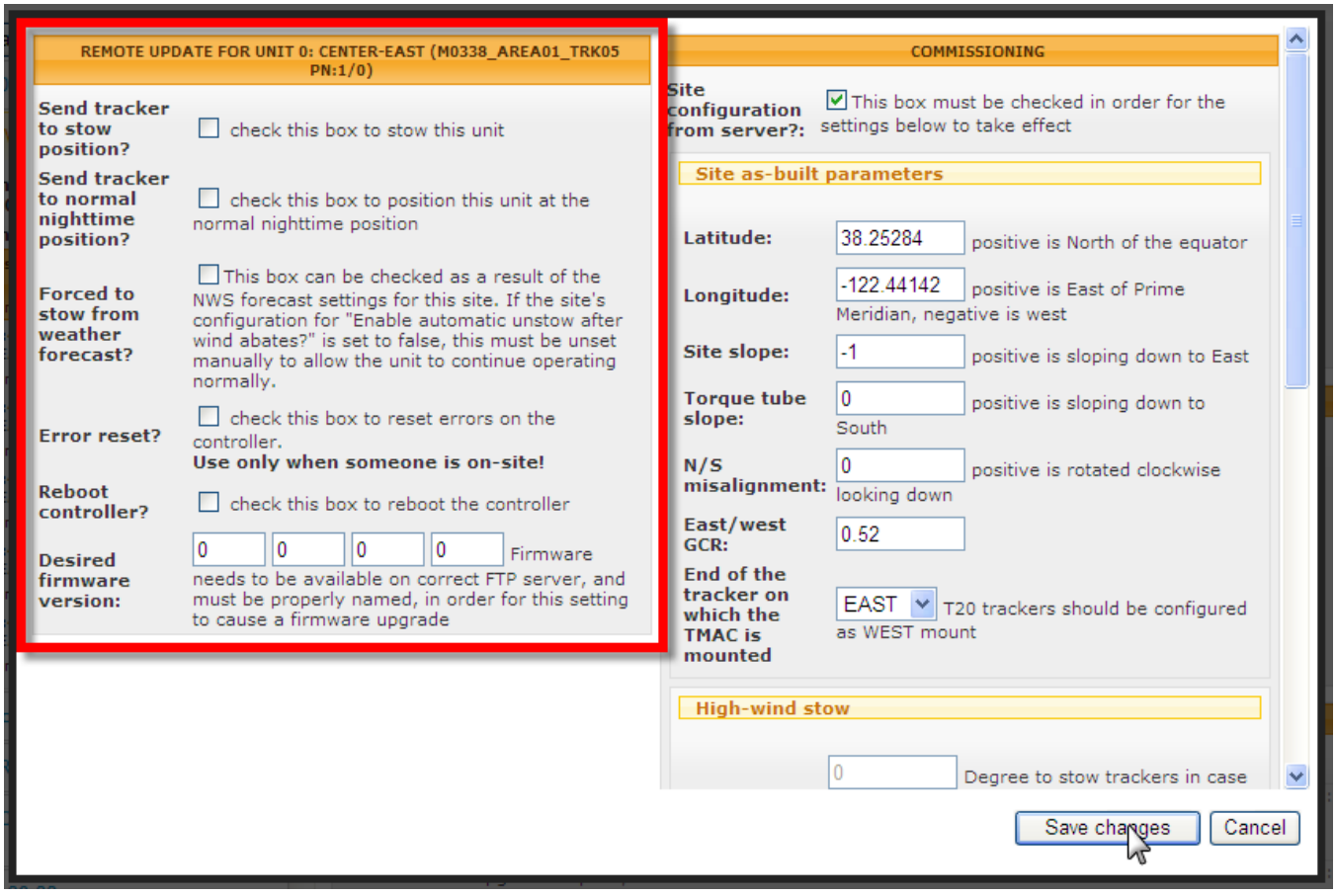



Fig. B45

| | |
|---|---|
| **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.**<br>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.<br>***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 DTMAC 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 [DTMAC UNIT]** and **COMMISSIONING** forms.
3. Enter or select values in the **REMOTE UPDATE FOR [DTMAC 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 DTMAC 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).

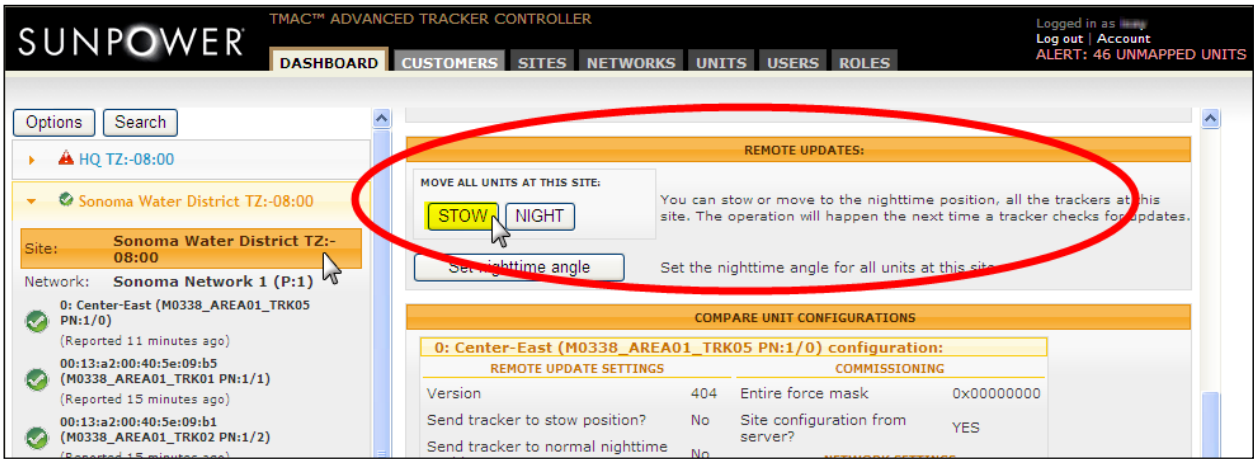



Fig. B46

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

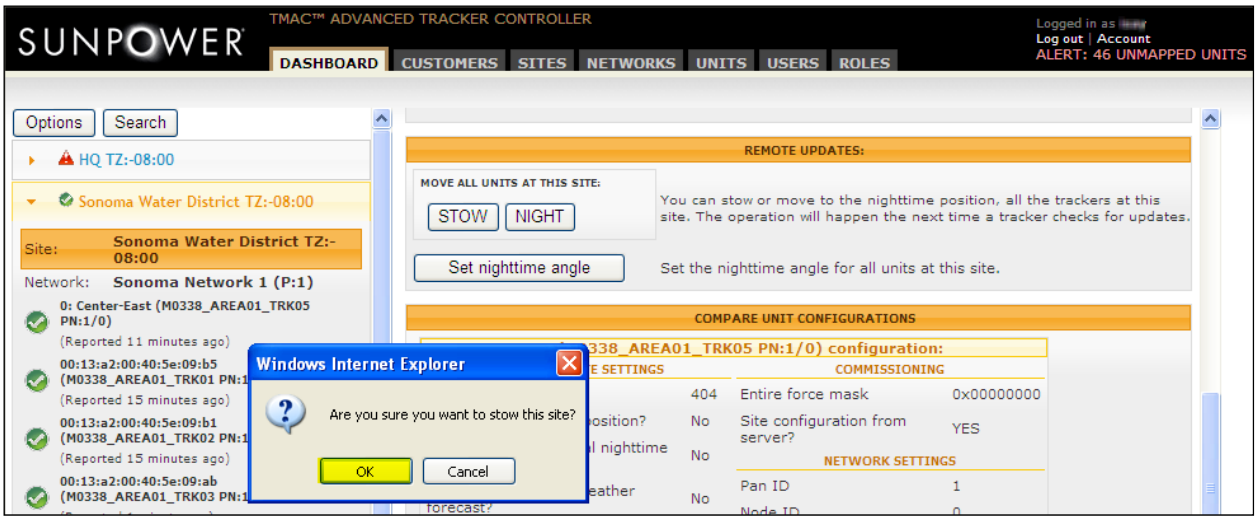



Fig. B47

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

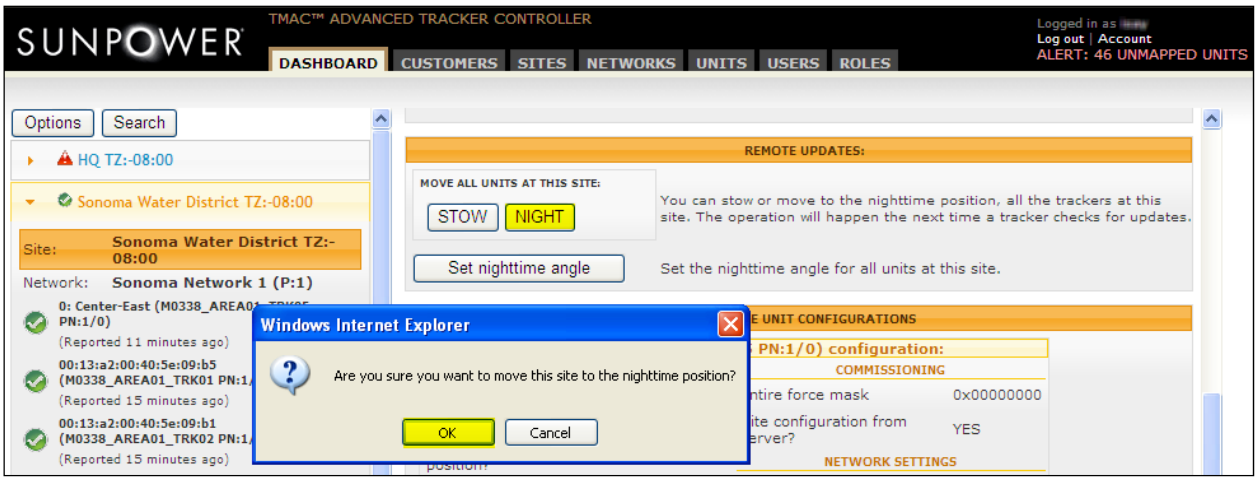



Fig. B48

- 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).

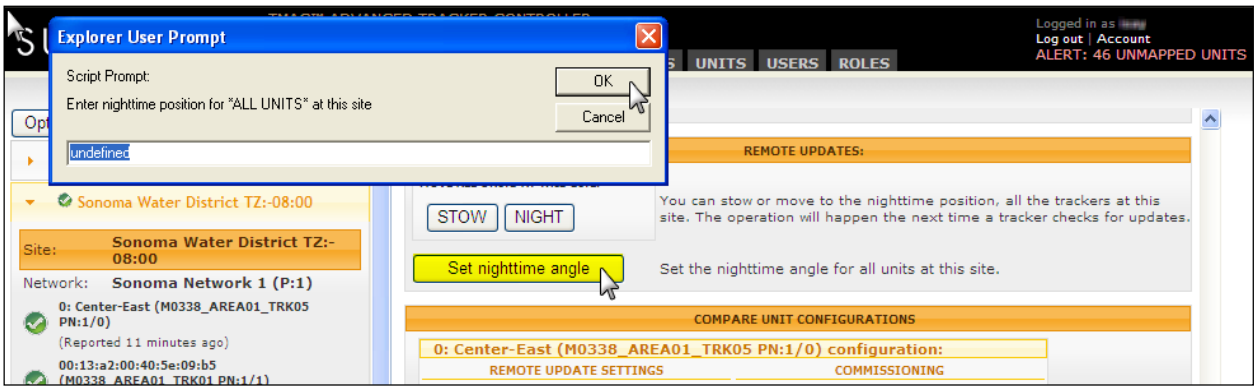



Fig. B49

***Important!*** You can also send these commands using the **REMOTE UPDATES** section in the unit-level view for any DTMAC 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 DTMAC include records of changes in the controller configuration parameters, and both the requested and executed operational commands. You can view recent updates for a DTMAC 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 DTMAC unit link to open the unit-level view.
2. Scroll down to the **RECENT UPDATES** section (Fig. B50).

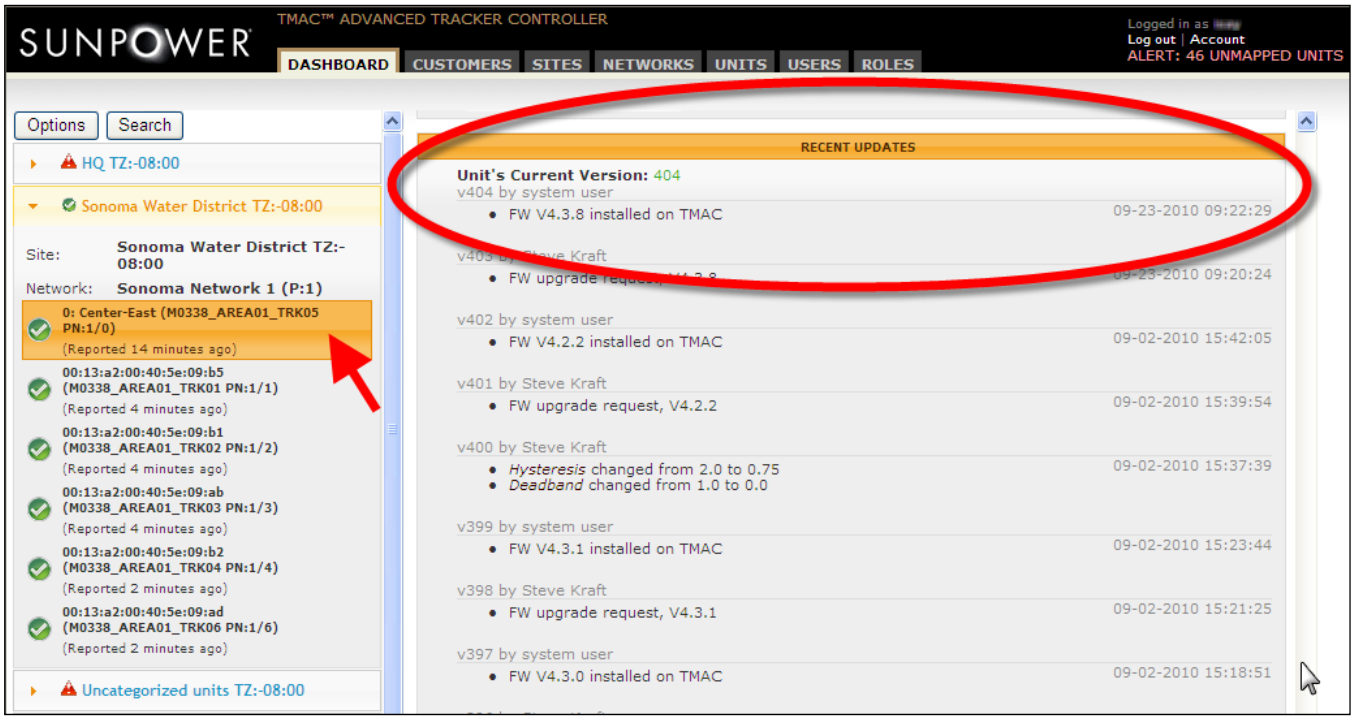



Fig. B50

### B.3.11.2 Using the Units Tab Page

1. Click the **UNITS** tab to open the Unit page.
2. Locate the DTMAC 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 [DTMAC unit]** window (Fig. B51).

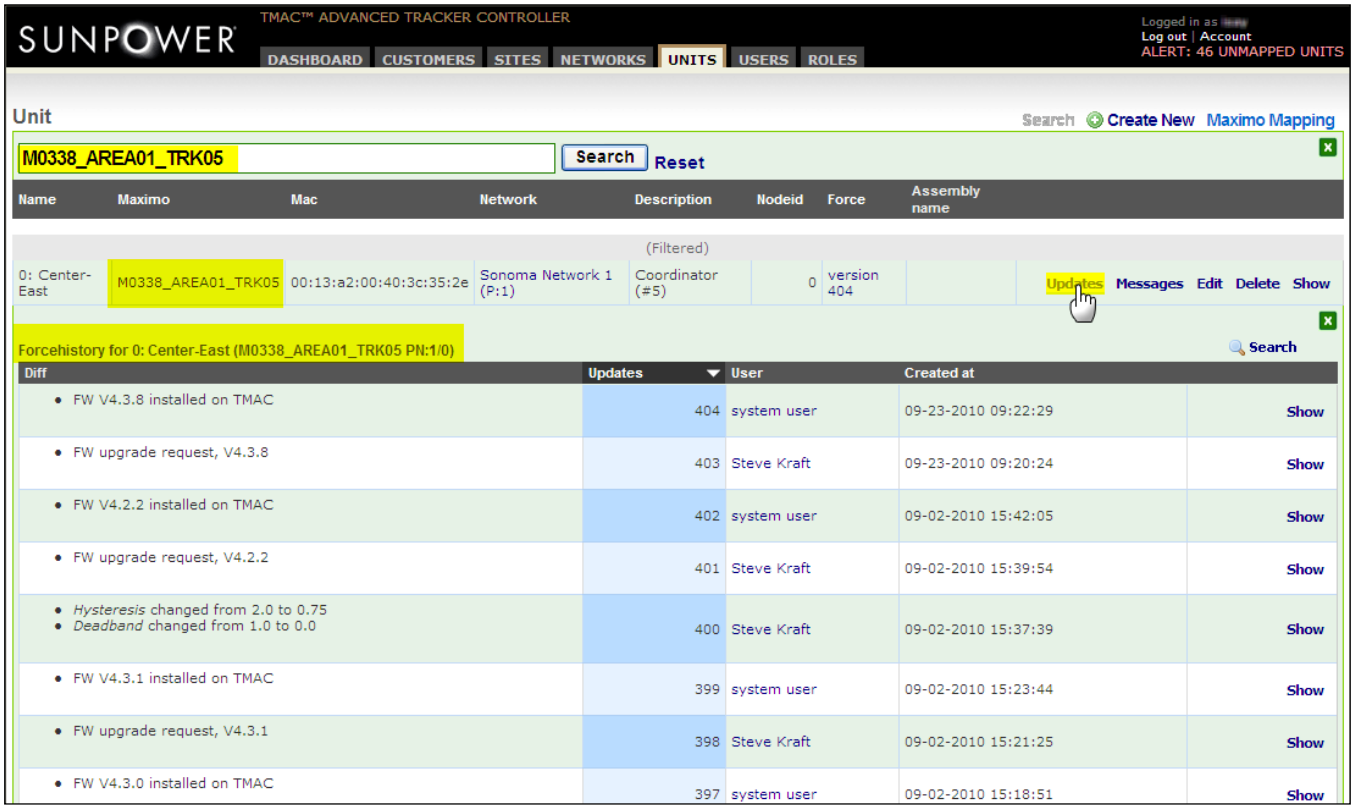



Fig. B51

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

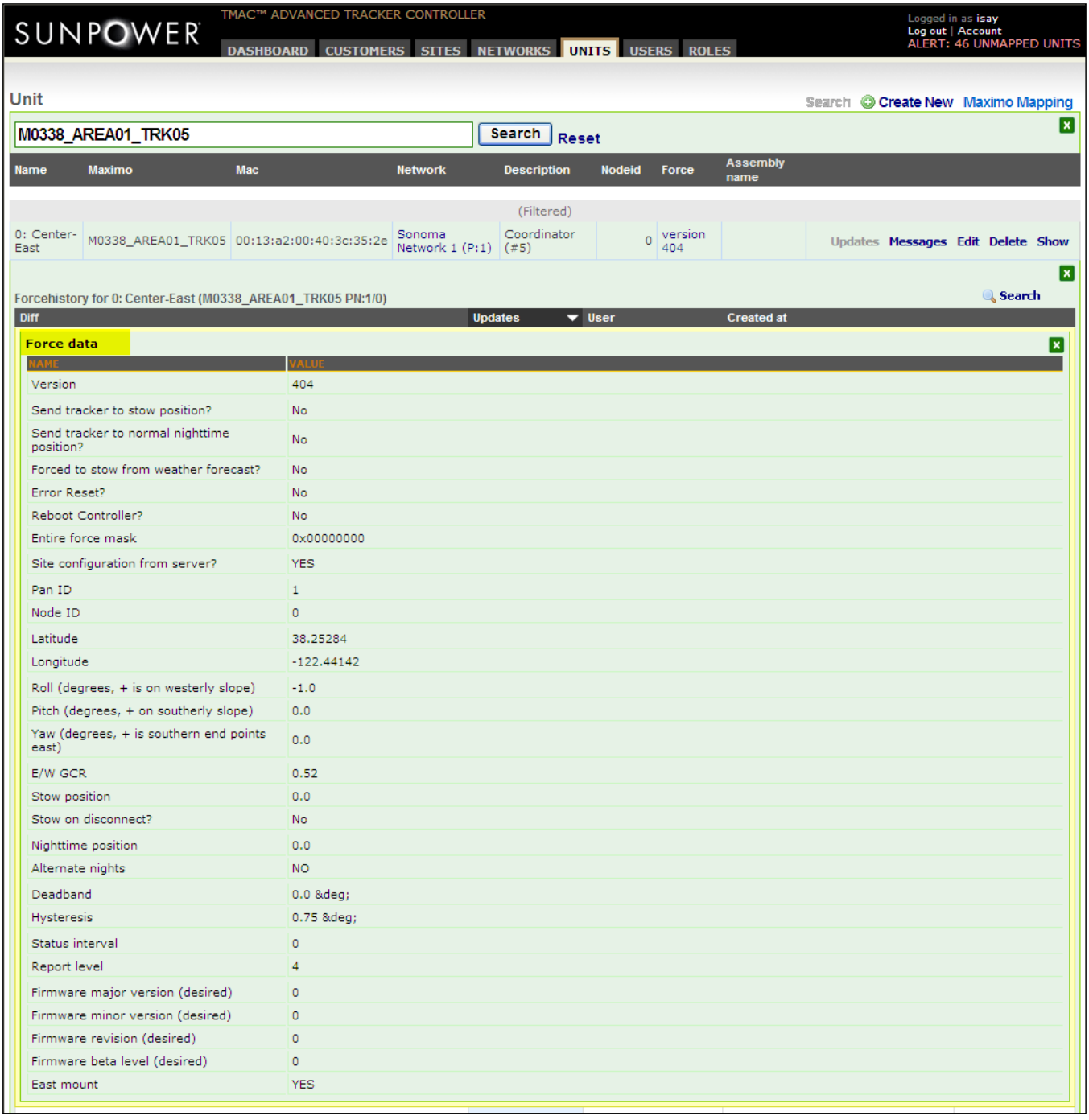



Fig. B52

## B.3.12 Viewing Messages

Messages for a DTMAC 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 DTMAC 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).

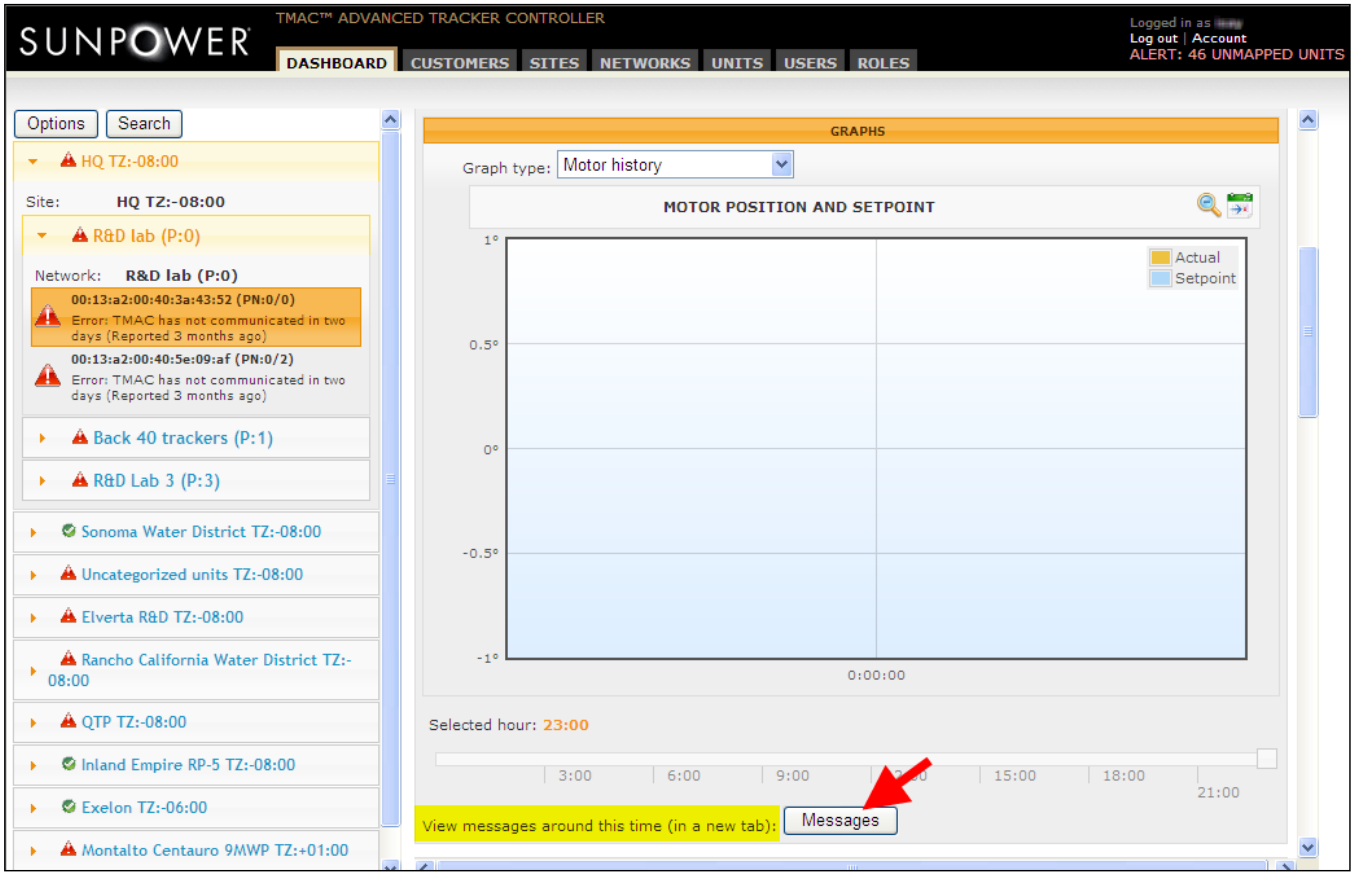



Fig. B53

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

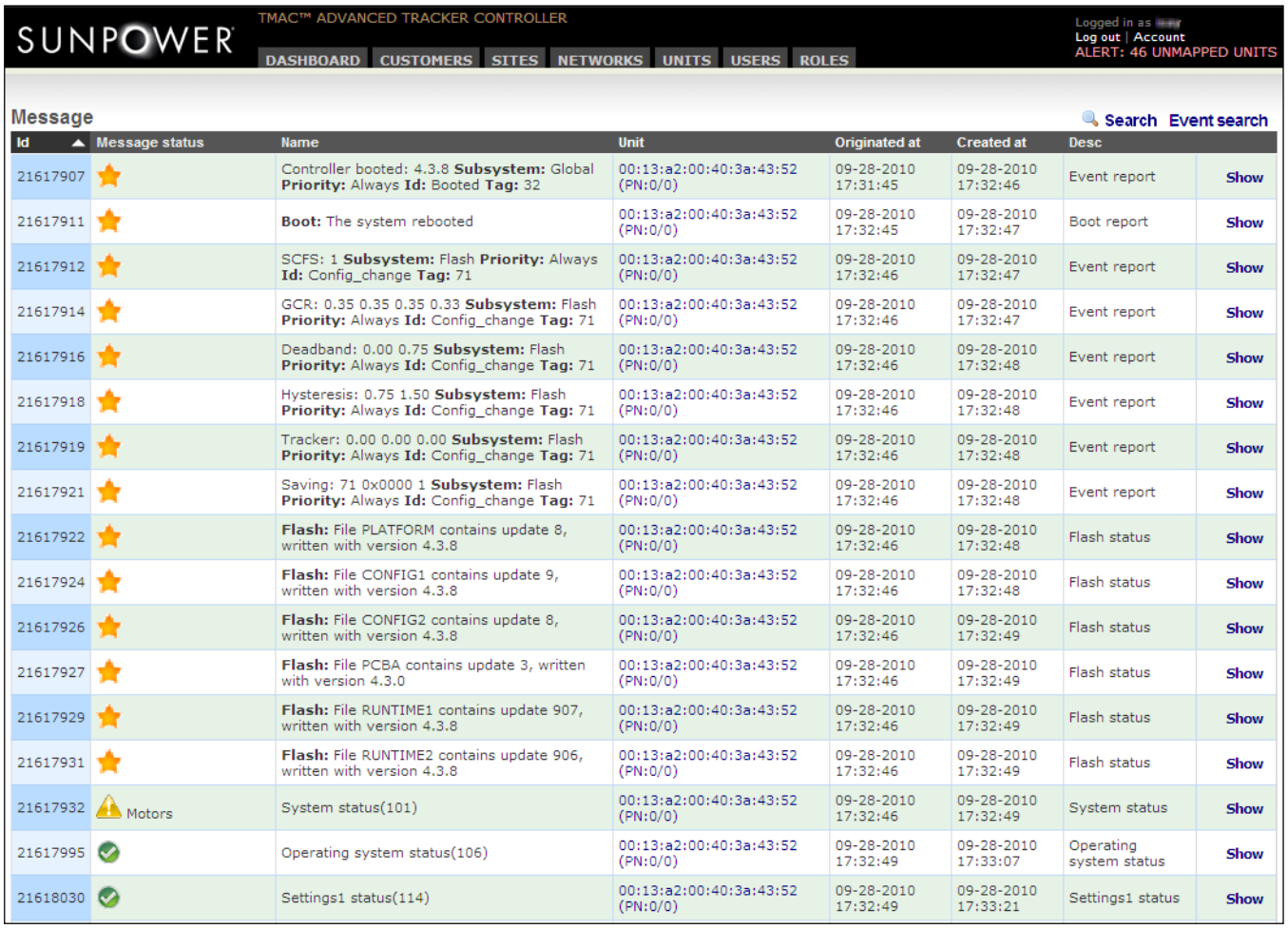



Fig. B54

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

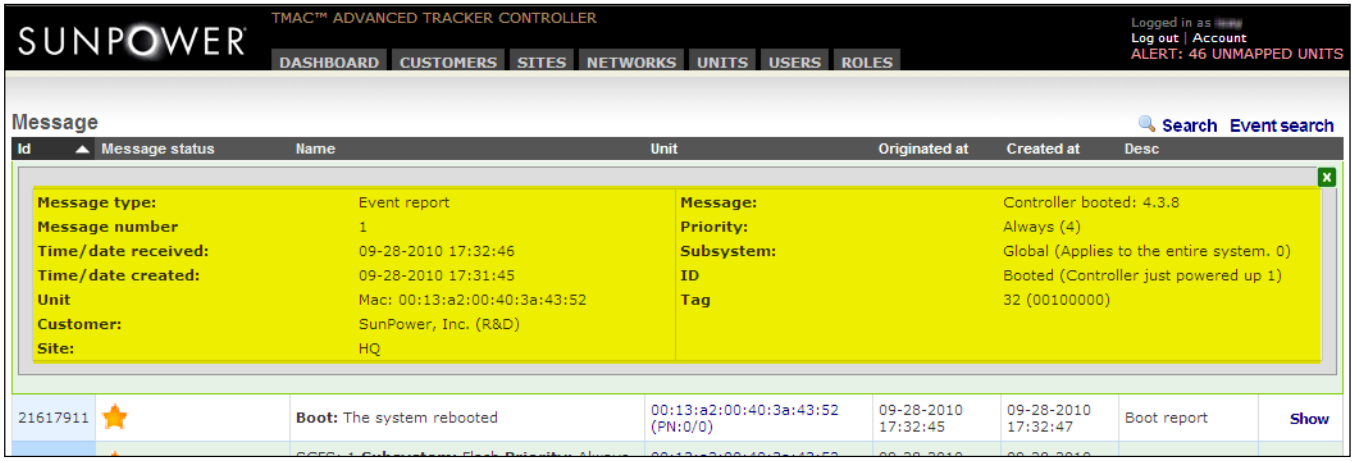



Fig. B55

### B.3.12.2 Using the Units Tab Page

1. Click the **UNITS** tab to open the Unit page.
2. Locate the DTMAC 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 [DTMAC unit]** window (Fig. B56).

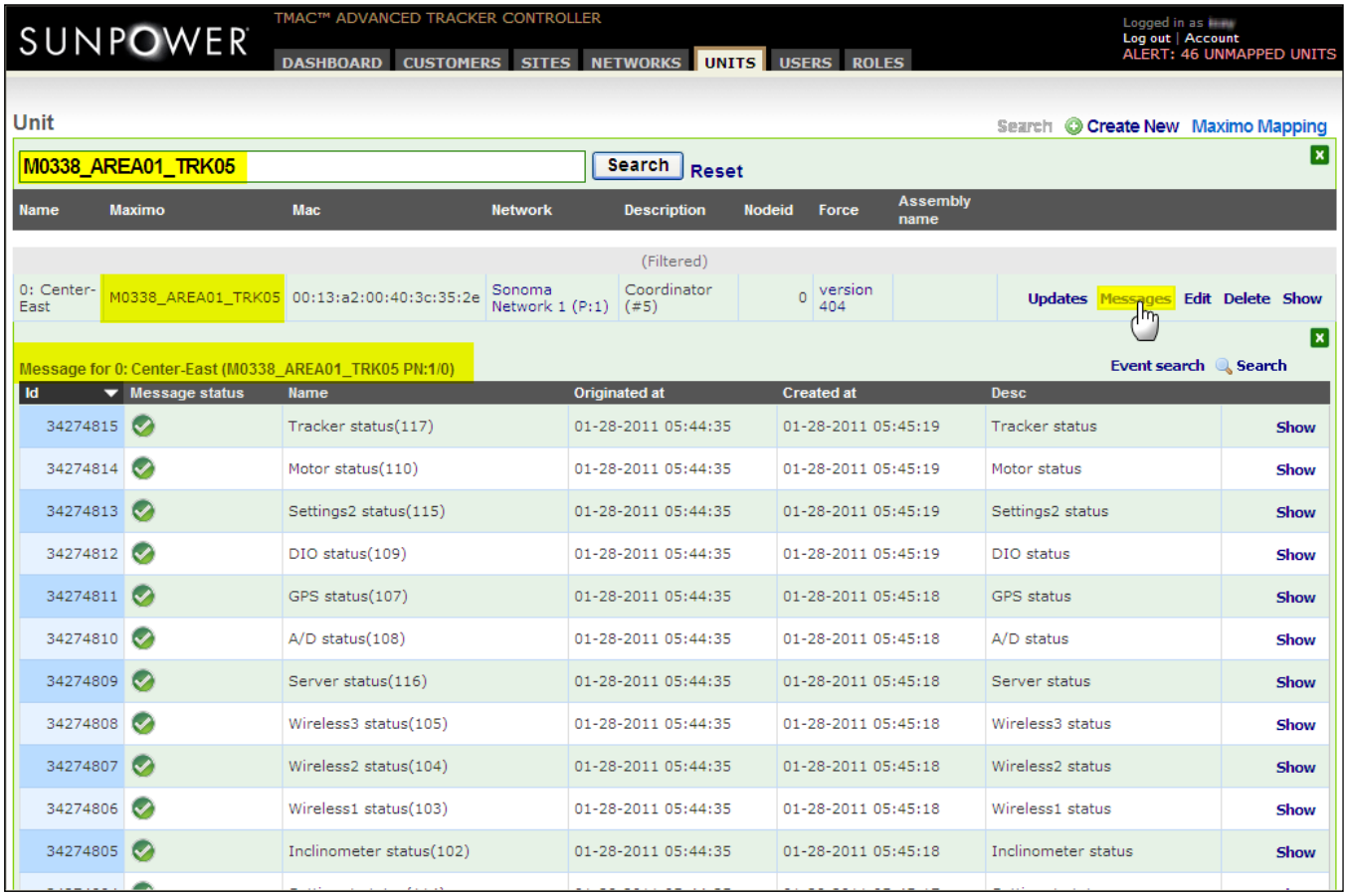



Fig. B56

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 DTMACs 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).

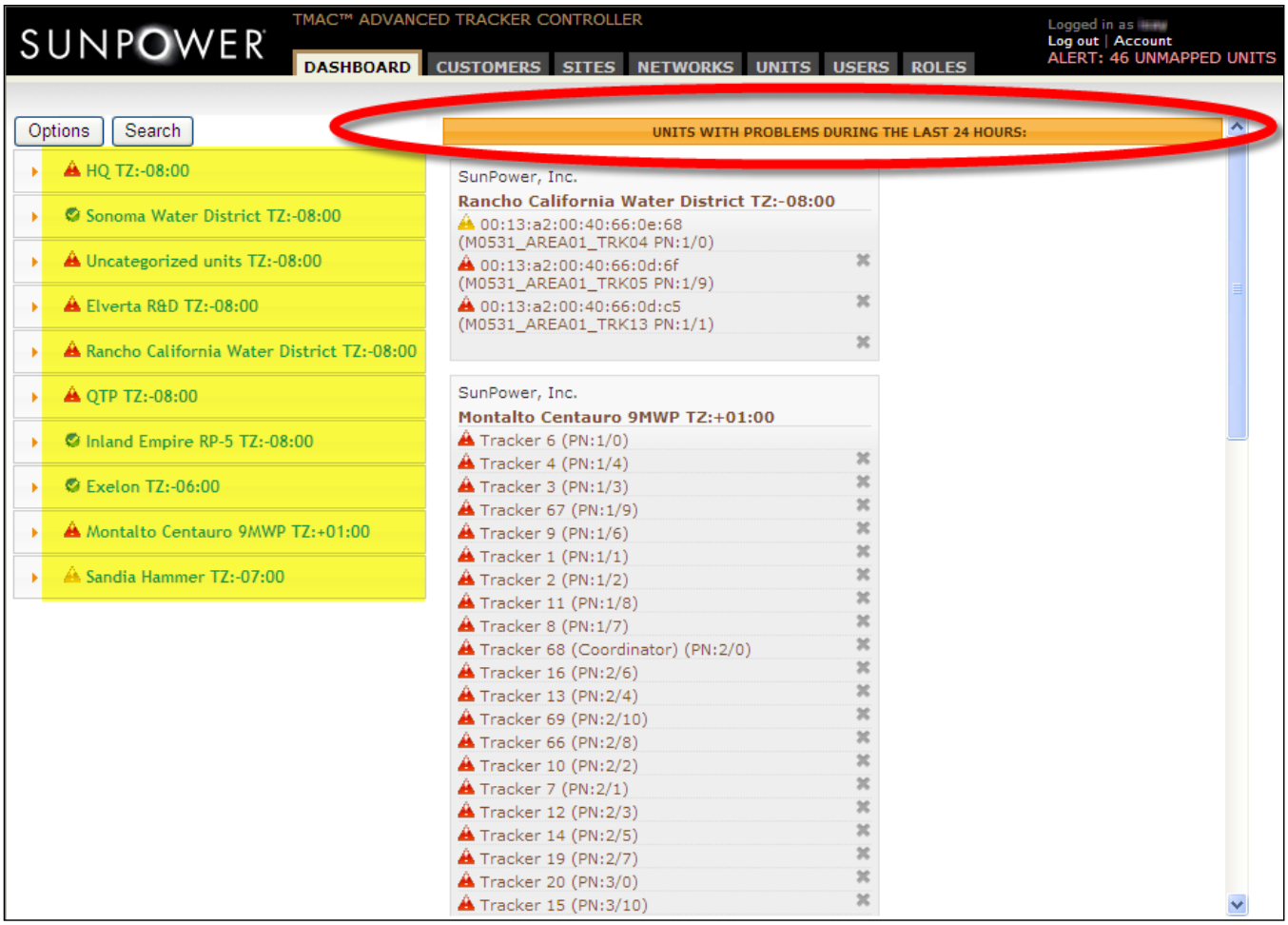



Fig. B57

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

-  (check mark enclosed in green circle) indicates that all DTMACs 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 DTMAC unit name (Fig. B58).

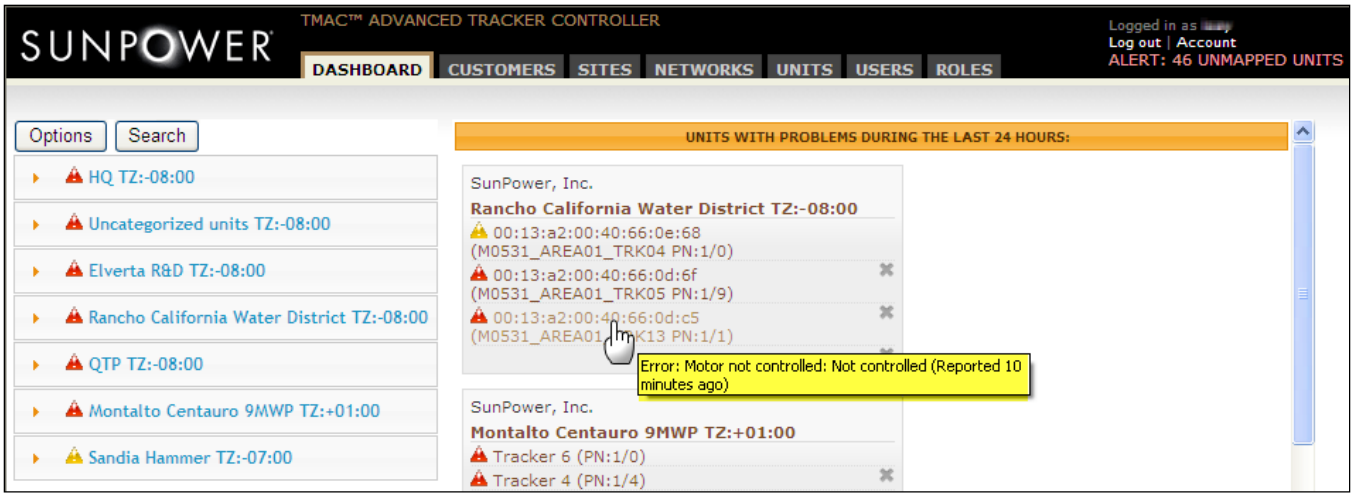



Fig. B58

To gather more information about the occurring (or persistent) alert, click the DTMAC 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.

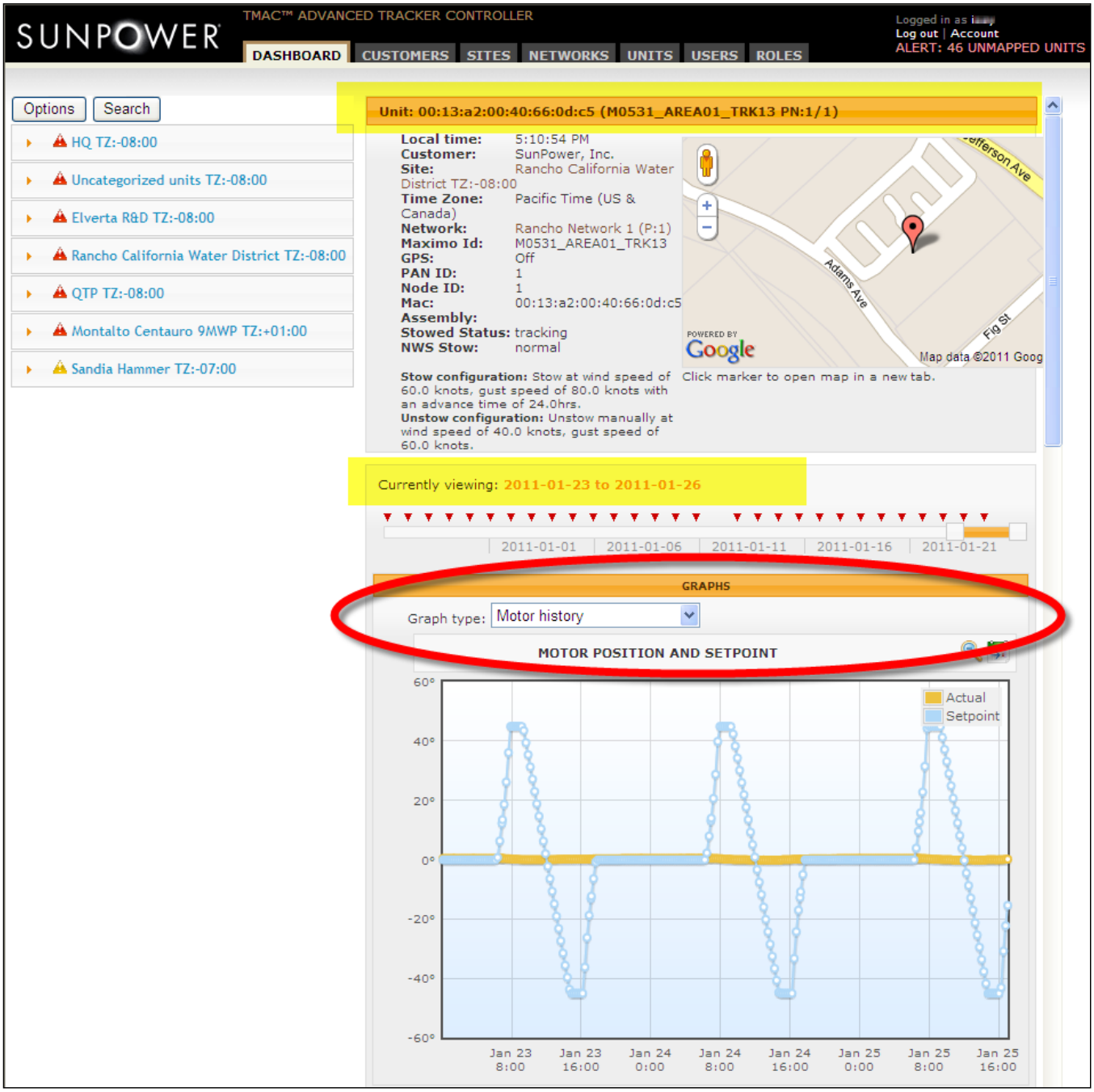



Fig. B59

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.

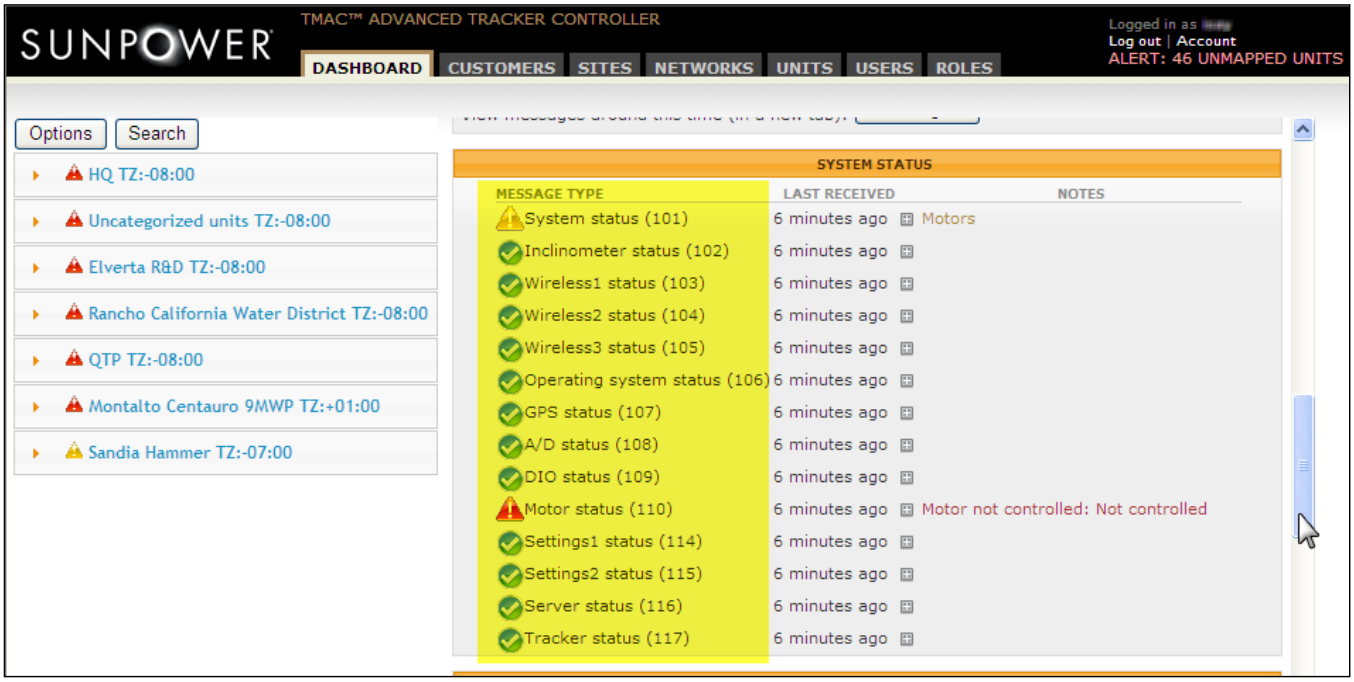



Fig. B60

To view, verify, or add records of events for the DTMAC 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.

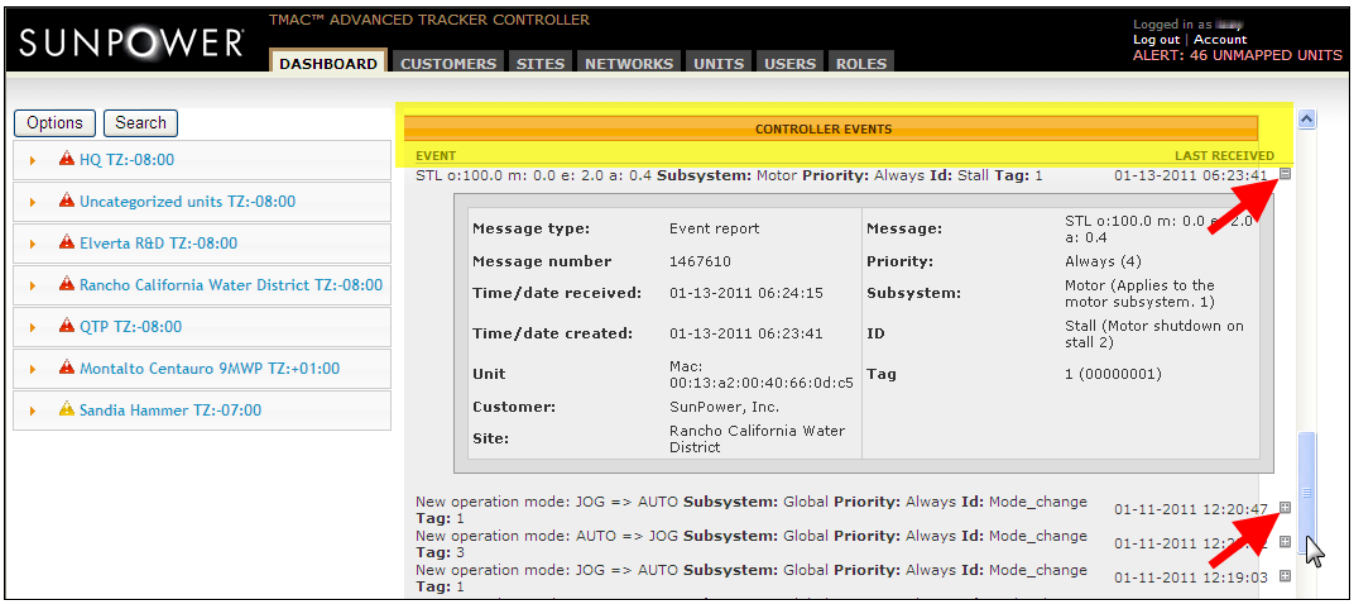



Fig. B61

## 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).

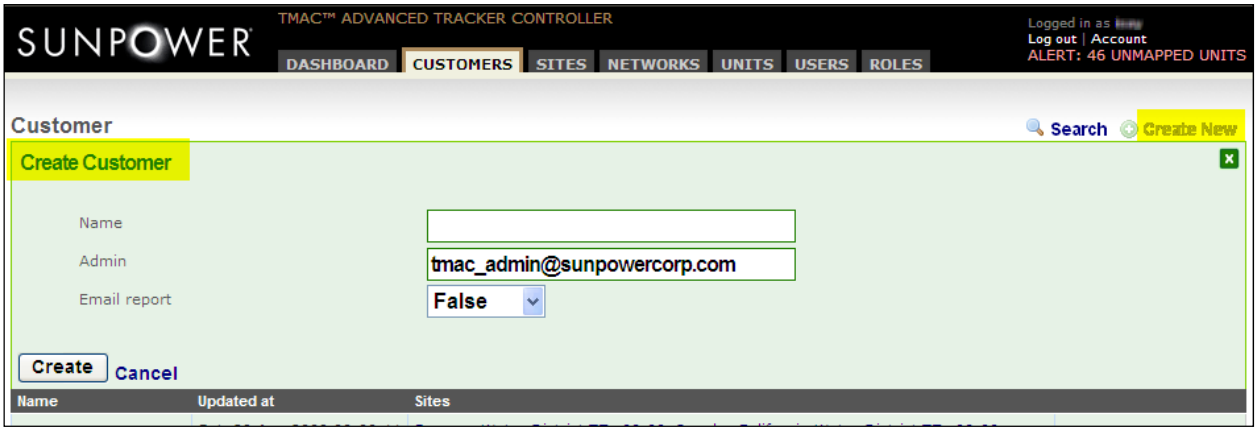



Fig. B62

     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).

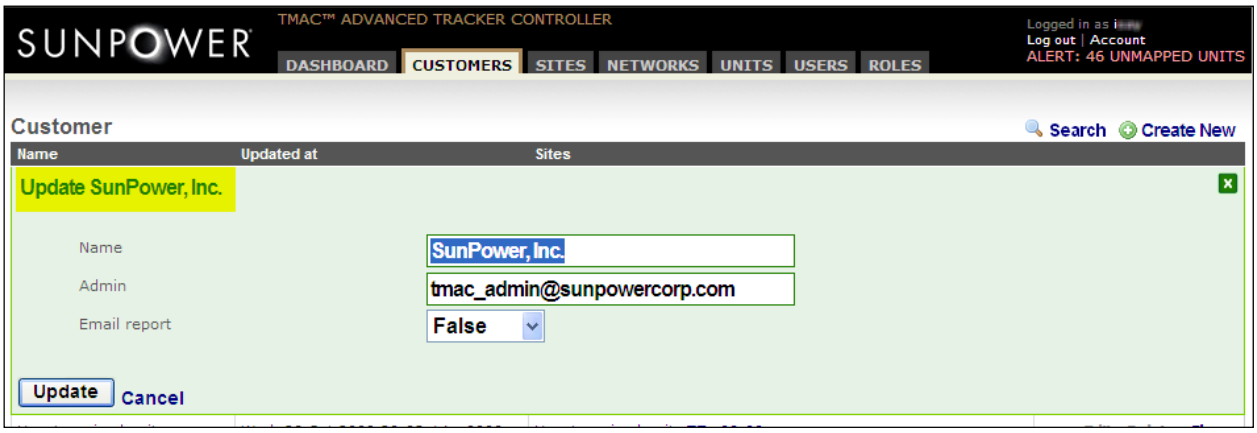



Fig. B63

  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).

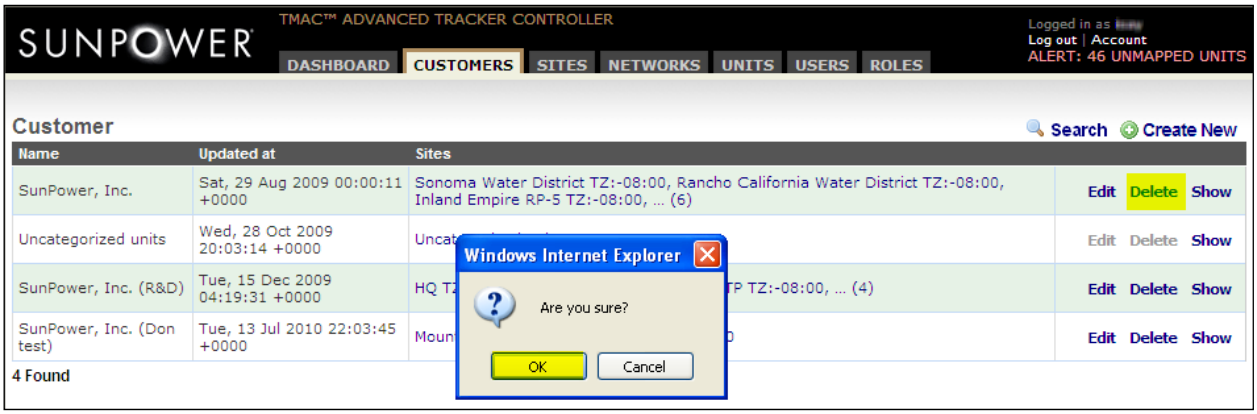



Fig. B64

## 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).

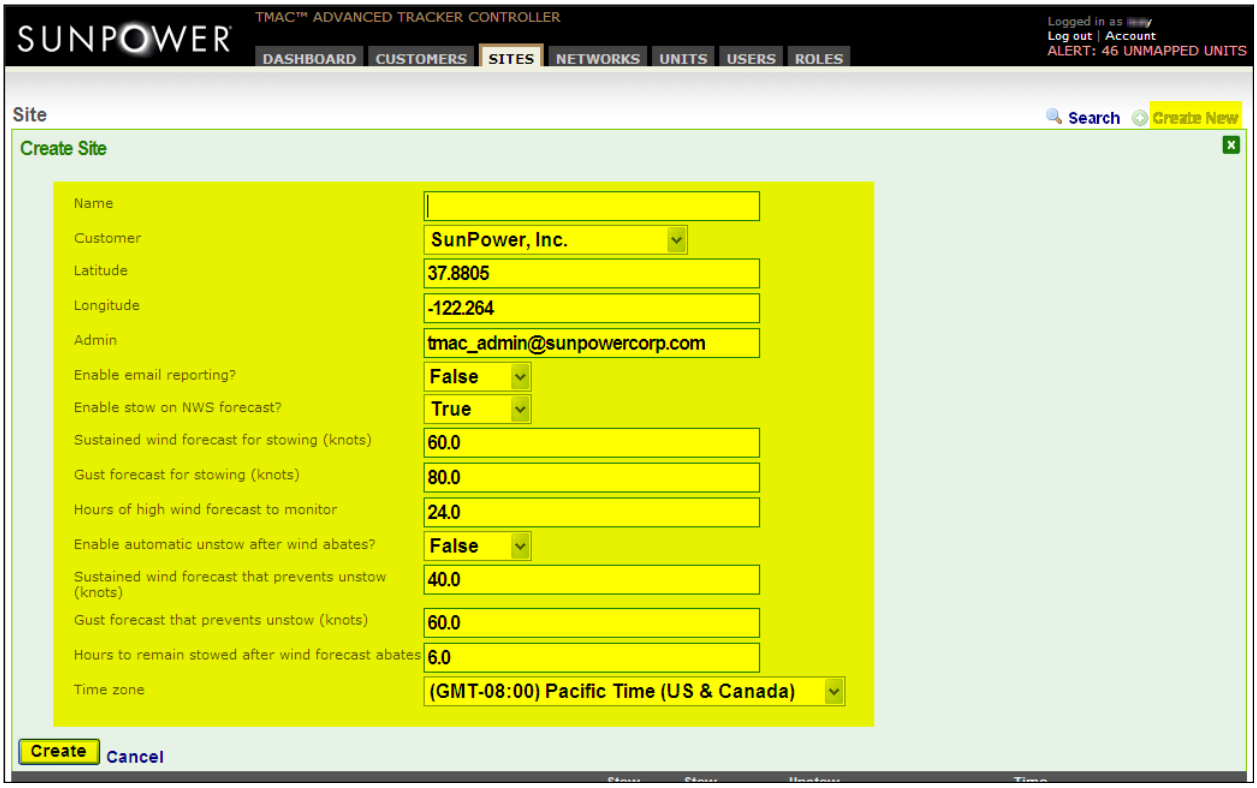



Fig. B65

***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).

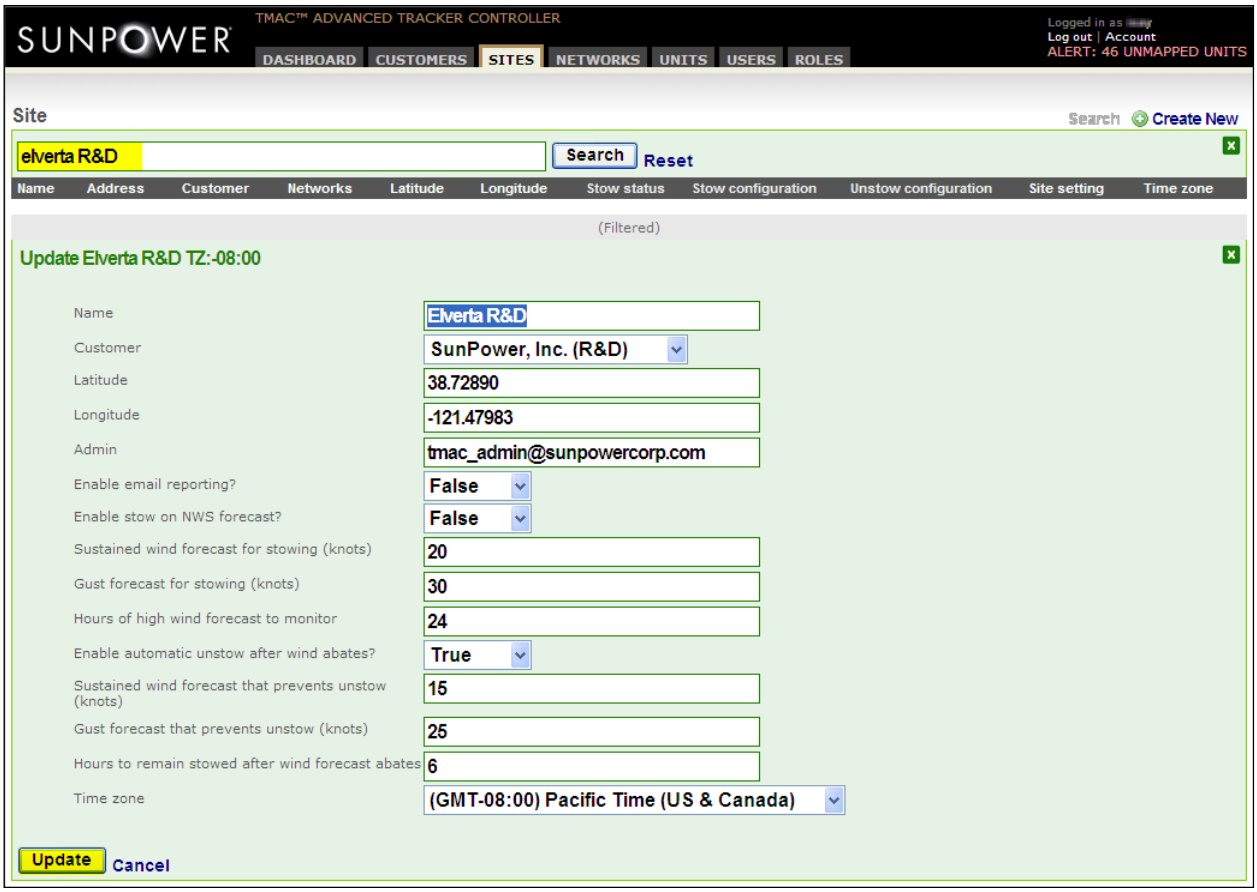



Fig. B66

  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).

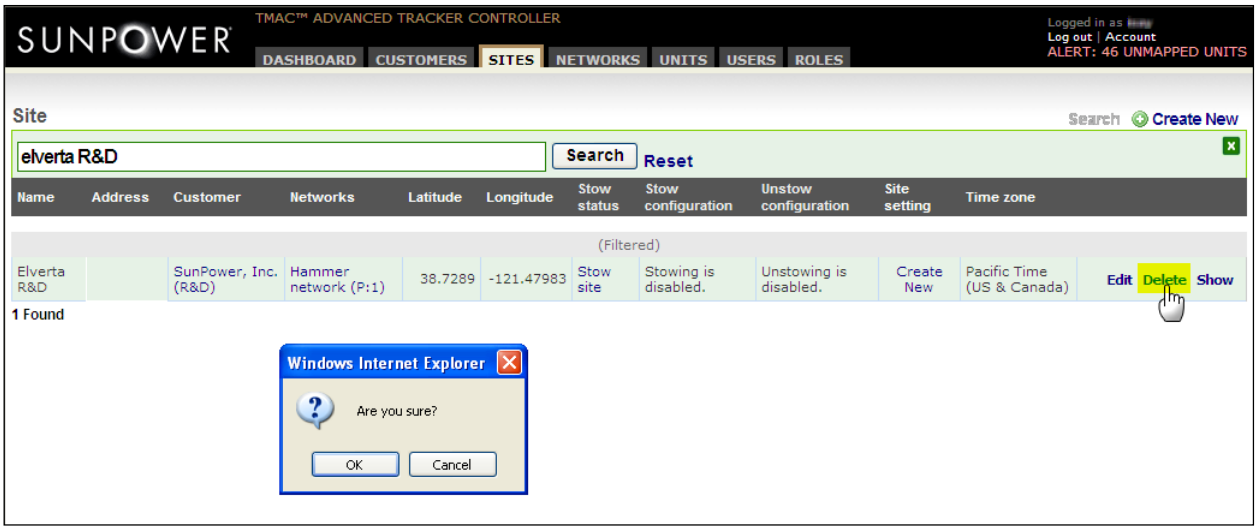



Fig. B67

## 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).

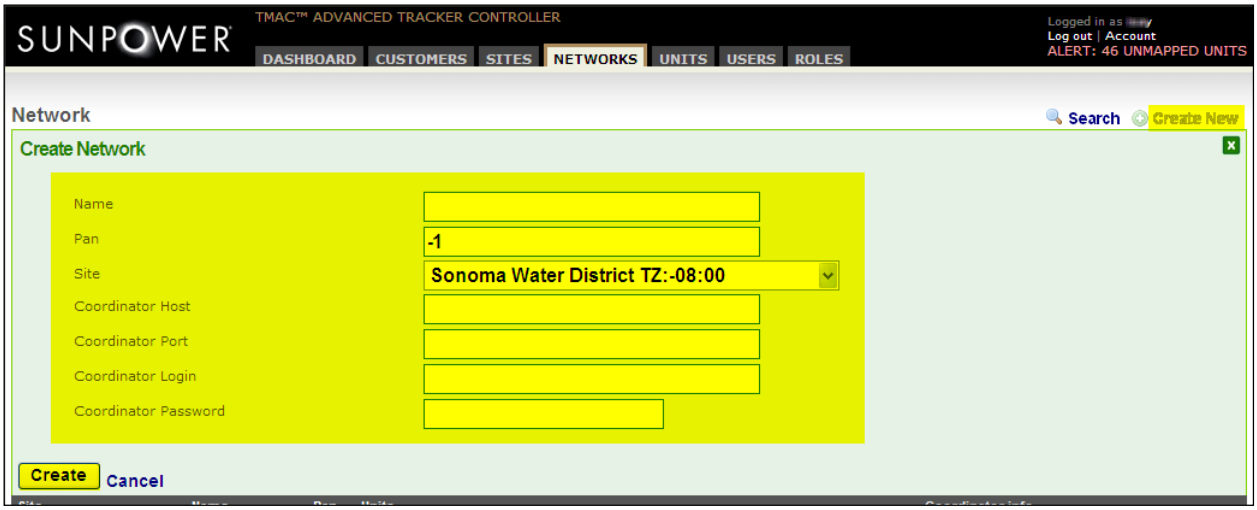



Fig. B68

***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).

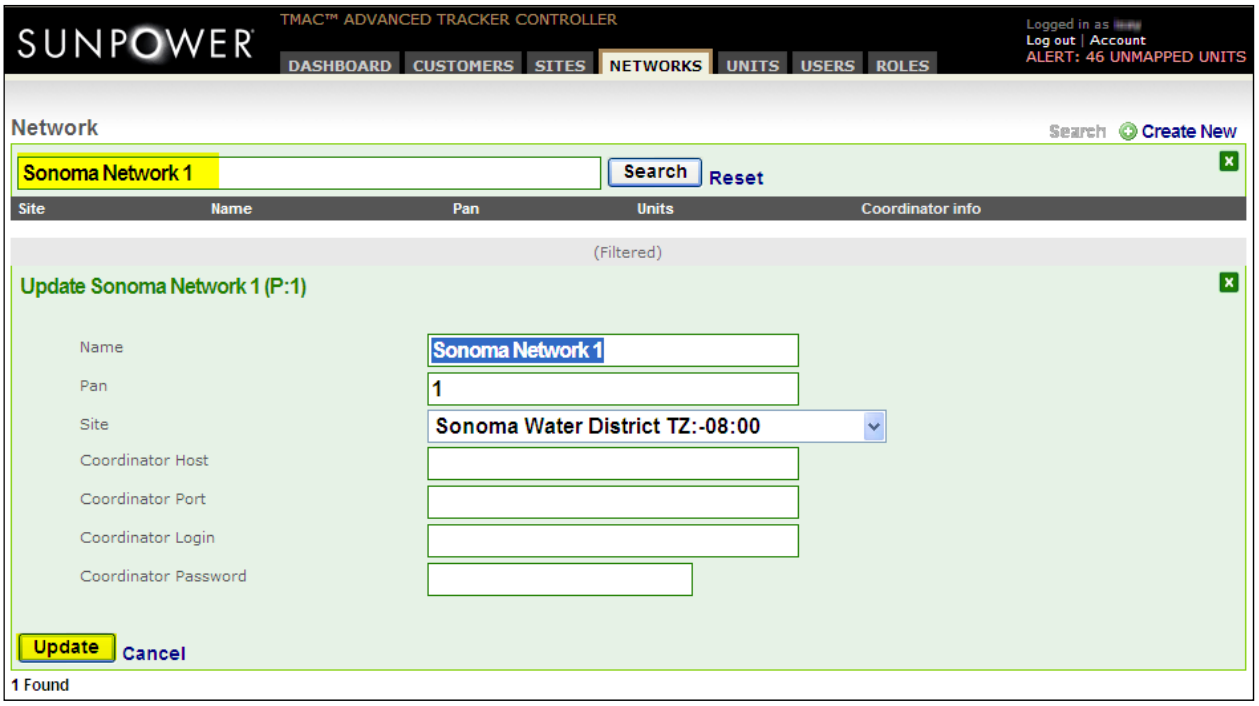



Fig. B69

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).

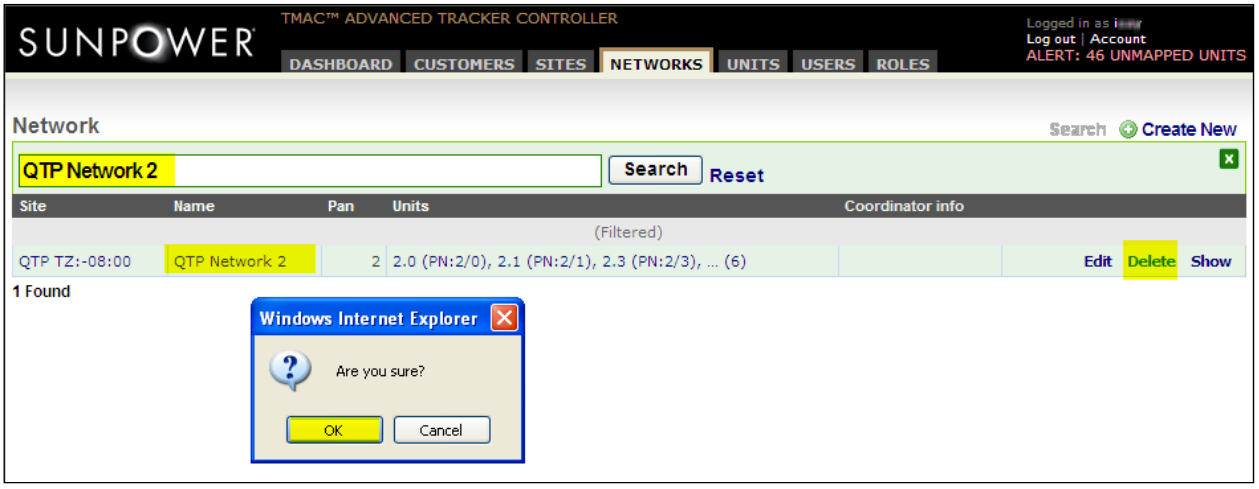



Fig. B70

## B.3.17 Assigning DTMAC 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 DTMACs 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 DTMAC 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 DTMAC 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).

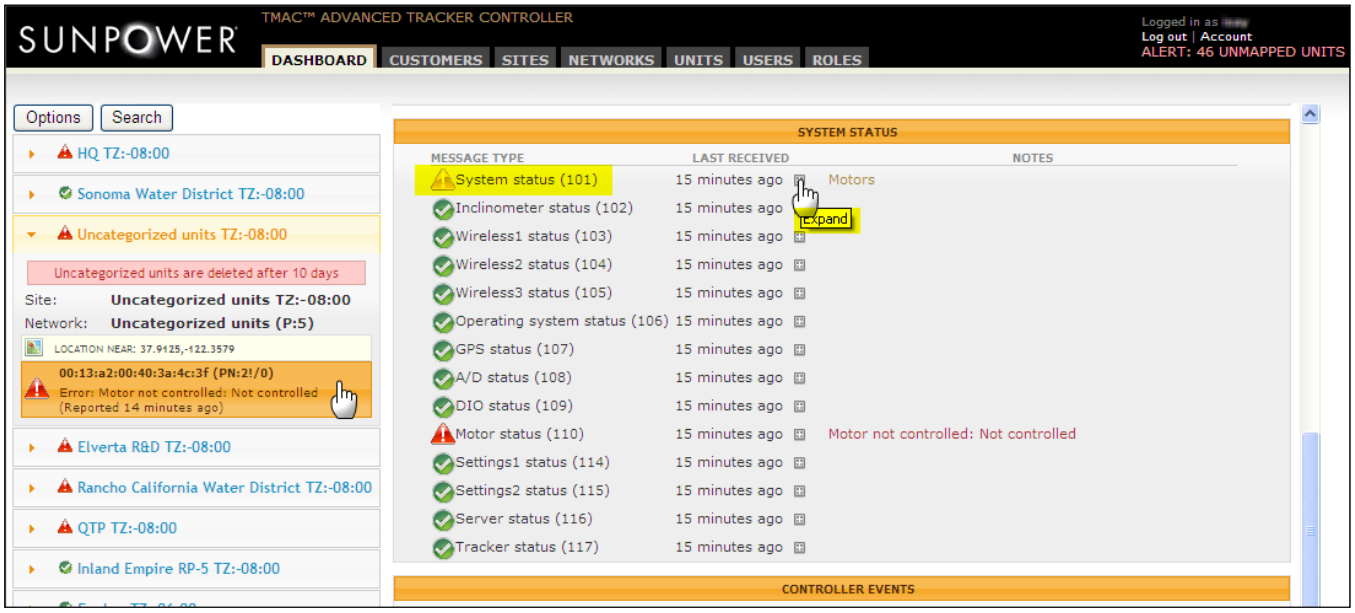



Fig. B71

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

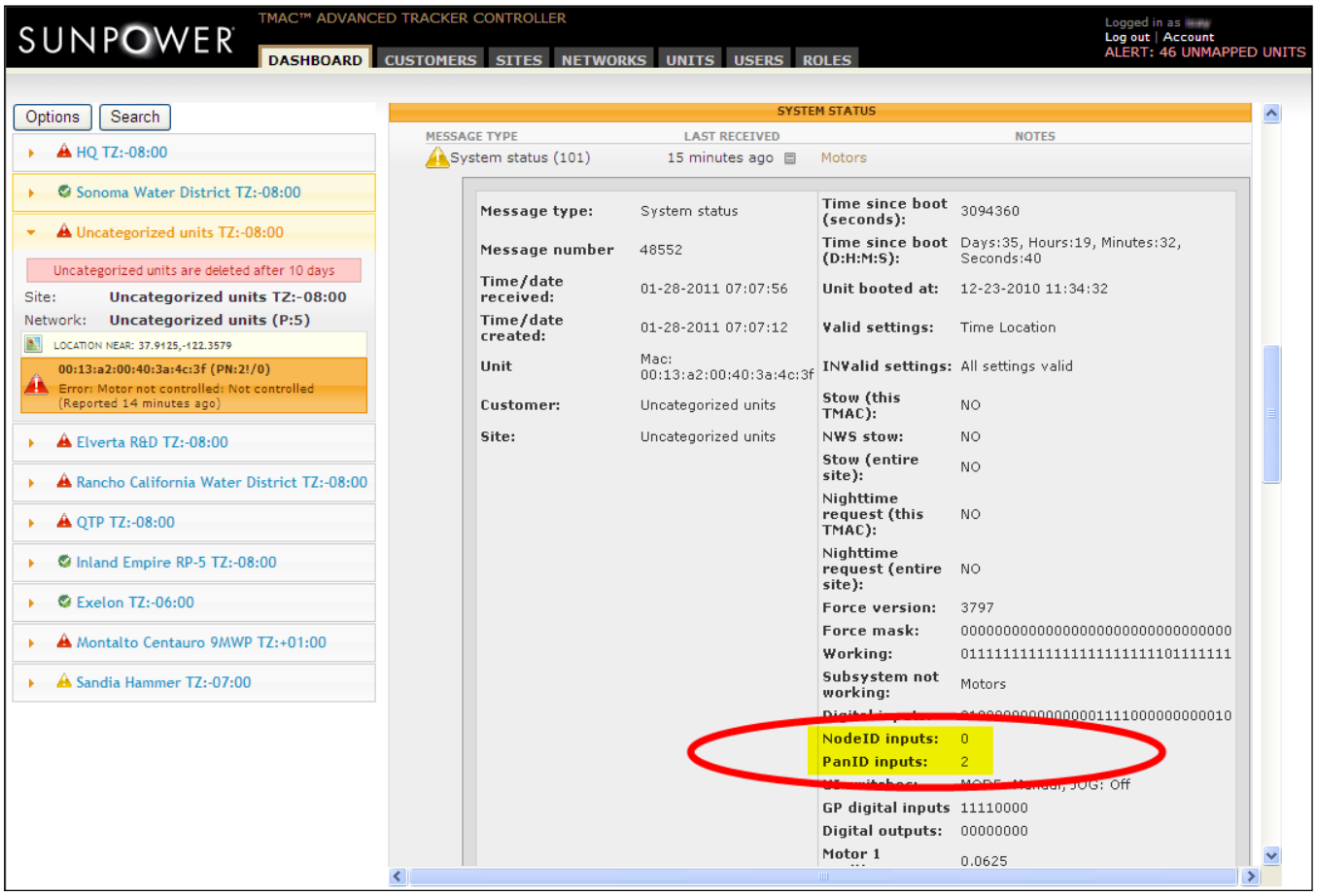



Fig. B72

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

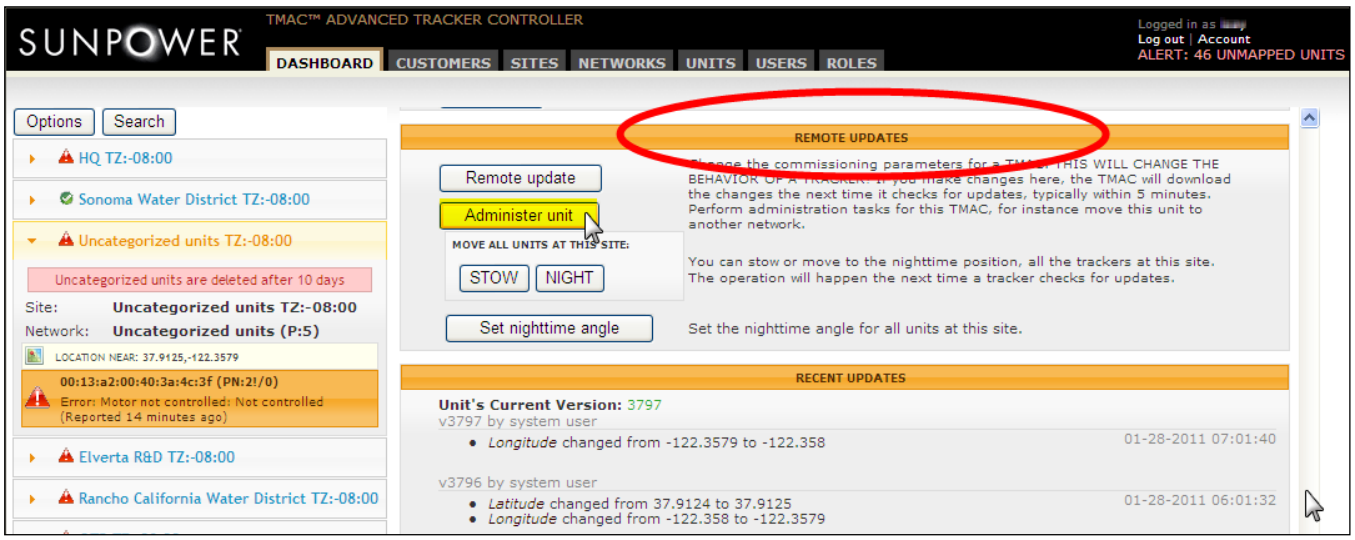



Fig. B73

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

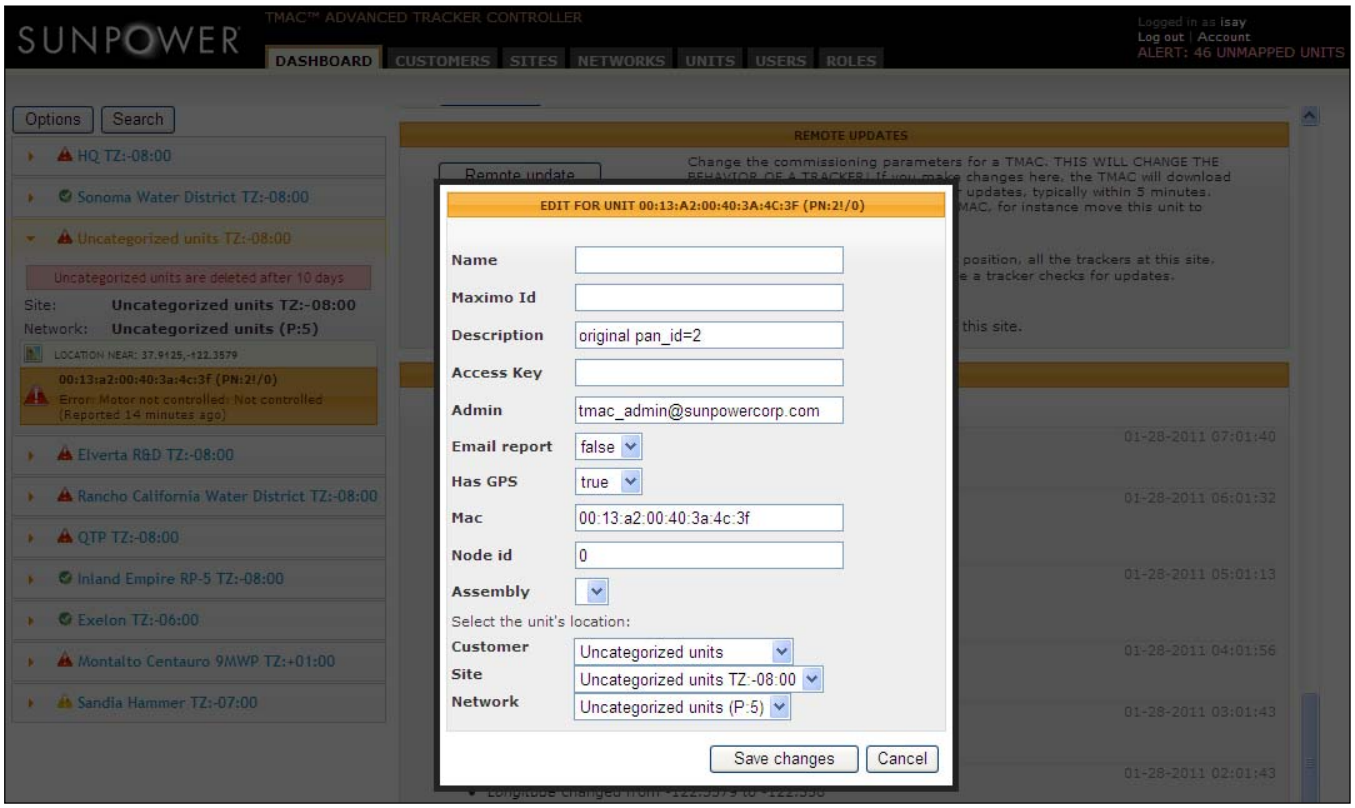



Fig. B74

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

| | |
|---|---|
| **Name** | Enter the DTMAC name. |
| **Maximo Id** | Enter the Maximo ID in this format: MXXX_AREAXX_TRKXX<br>• The MXXX value is the project number<br>• The AREAXX value is the location number<br>• The TRKXX value is the tracker number |
| **Description** | Enter the description for the DTMAC. |
| **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 DTMAC. |
| **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 DTMAC Unit Information

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

1. Click the **UNITS** tab to open the Unit page.
2. Manage DTMAC unit profiles using links on the page.
   - To edit a DTMAC unit profile:
     a. Locate the DTMAC unit using the search function. Enter the DTMAC 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).

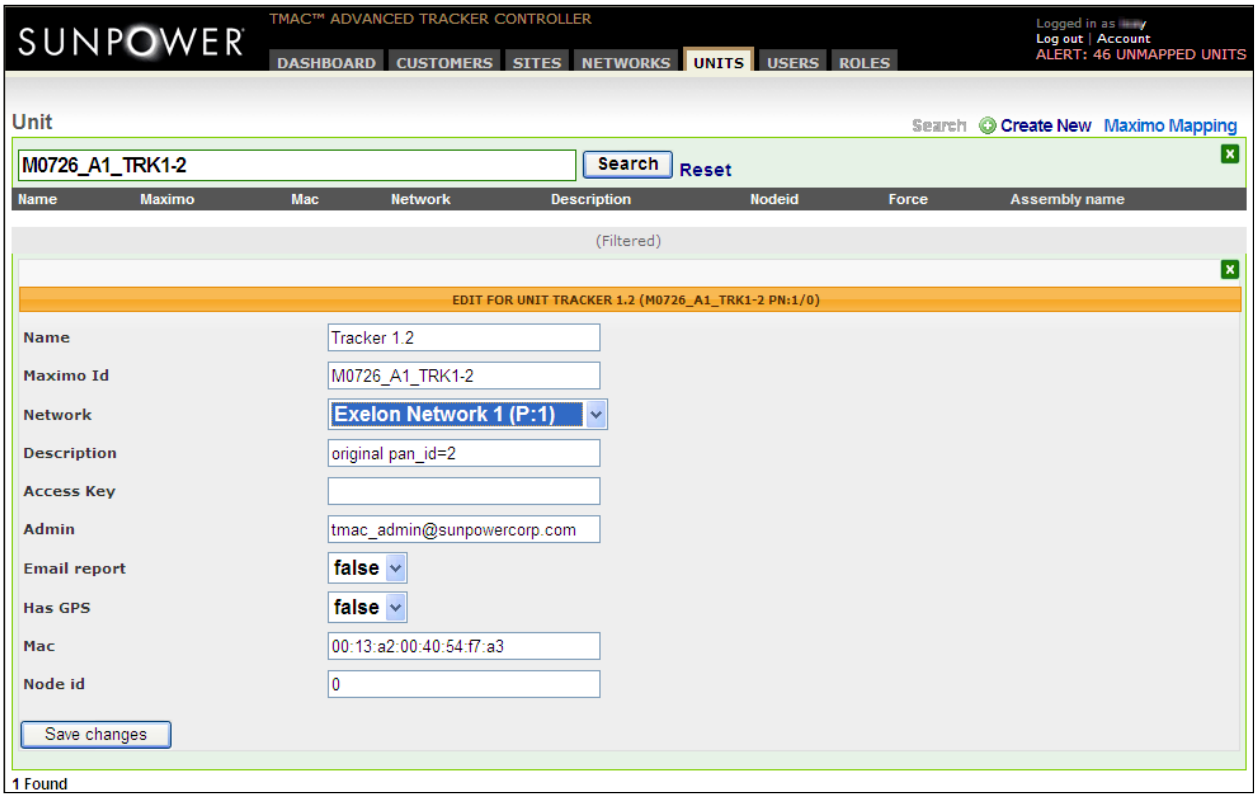



Fig. B75

- To delete a DTMAC unit profile:
  a. Locate the DTMAC unit using the search function. Enter the DTMAC 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).

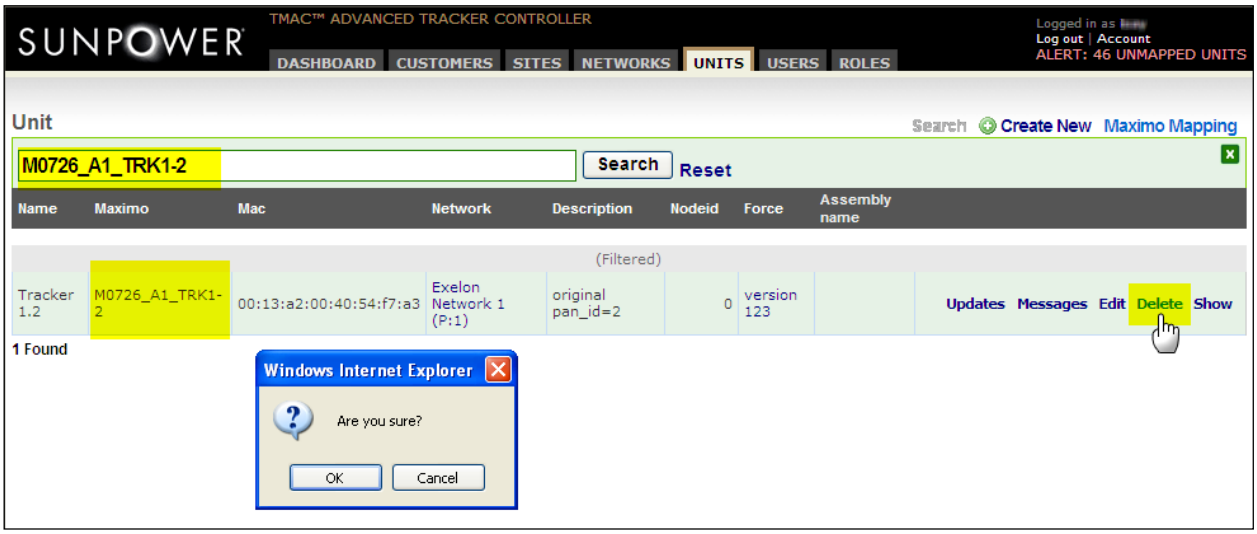



Fig. B76