# Network Controller 6
## T-600, T-600-USA

### MOUNTING AND WIRING GUIDE

This document covers the mounting and wiring of the Tridium® T-600 series (JACE 6) controller. It assumes that you are an engineer, technician, or service person who is performing control system installation. Instructions in this document apply to the following products:

| Models | Description |
|---|---|
| T-600, T-600-USA | T-600 base unit controller, powered by (either): |
| NPB-PWR | 24Vac/dc input/15Vdc output power module, DIN mountable |
| NPB-PWR-UN | 90–263Vac universal input/15Vdc output power module, DIN mountable |
| WPB-*XXX* | Wall-mount universal AC power adapter, with different models available, where -*XXX* is either: -US, -EUR, or -UK (vary by AC wall plug). |

**Note** Not covered in this document is the Niagara^AX software installation and configuration required for a fully functioning unit. This includes setting host IP address and password, serial port configuration, and other parameters. Refer to the *JACE NiagaraAX Install and Startup Guide* for this information.

In addition, the mounting and wiring of JACE® expansion options are covered in separate documents. See sections "Related Documentation," page 4, and "About Expansion Options," page 8.

These are the main topics included in this document:

# Preparation

Unpack the T-600 and power module (NPB-PWR, NPB-PWR-UN, or WPM-*XXX*) and inspect the package contents for damaged or missing components. If damaged, notify the appropriate carrier at once and return any damaged components for immediate repair or replacement. See "Returning a Defective Unit" on page 25.

- Included in this Package
- Material and Tools Required

## Included in this Package

Included in this package you should find the following items:

- a T-600 or T-600-USA base controller.
- This *T-600 (JACE 6) Mounting and Wiring Guide*, Part Number 11843  Rev 2.1
- a hardware bag containing the following items:
  - A grounding wire, with quick-disconnect 0.187" female connector.
- a power module (if ordered), which is required for operation.

  The power module can be one of the following:
  - NPB-PWR: 24Vac in-line, DIN-mount capable, with grounding wire, *or*
  - NPB-PWR-UN: 90-263 Vac in-line, DIN-mount capable, with grounding wire, *or*
  - WPM-XXX: External wall-mount power adapter (input: 90–254Vac, 50–60 Hz, output: 15Vdc, 1A) where *XXX* varies by the AC wall plug (for installation locale), such as:
    WPM-US    (U.S. or Japan installations), WPM-EUR (European installations, type "C" plug)
    WPM-UK    (United Kingdom installations, type "B" plug)

## Material and Tools Required

The following supplies and tools may be required for installation:

- DIN rail, type NS35/7.5 (35mm x 7.5mm) and DIN rail end-clips (stop clips), recommended for any installation that includes NPB-PWR or NPB-PWR-UN module and/or optional I/O modules.

  **Note**    Length of DIN rail is determined by the number of optional DIN-mounted options. See Figure 1 on page 6 for more details.

- If using a NPB-PWR power module, either one of the following:
  - UL listed, Class 2, 24Vac transformer, rated at minimum of 8.5VA to 20VA (approximate range of JACE-2 alone, to fully-expanded unit with four additional T-IO-16 modules and other option boards). Note that a *dedicated* transformer is required (cannot also power additional equipment).
  - 24Vdc power supply, capable of supplying at least 1A (24W).
- Suitable screws and screwdriver for mounting DIN rail, or if DIN rail not used, for mounting bases of T-600 controller, NPB-PWR or NPB-PWR-UN module (if used), and any I/O modules (if used).
- #2 phillips screwdriver: used to install and remove optional communications modules.
- Small flat-blade screwdriver: used for mounting or removing the T-600 from DIN rail, also for making wiring connections to RS-485 connector, and optionally LON and I/O connectors.

# Precautions

This document uses the following warning and caution conventions:

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**Caution**   Cautions remind the reader to be careful. They alert readers to situations where there is a chance that the reader might perform an action that cannot be undone, might receive unexpected results, or might lose data. Cautions contain an explanation of why the action is potentially problematic.

⚠️

**Warning**   **Warnings alert the reader to proceed with extreme care. They alert readers to situations where there is a chance that the reader might do something that can result in personal injury or equipment damage. Warnings contain an explanation of why the action is potentially dangerous.**

## Safety Precautions

The following items are warnings of a general nature relating to the installation and start-up of the T-600 controller. Be sure to heed these warnings to prevent personal injury or equipment damage.

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**Warning**   • **Depending on power module used, the circuit powering the T-600 is 90–263Vac at 50/60 Hz (if using NPB-PWR-UN), 24Vac at 50/60 Hz or 24Vdc (if using NPB-PWR), or from 100–240Vac at 50/60 Hz (if using WPM-*XXX*).  Disconnect power before installation or servicing to prevent electrical shock or equipment damage.**

• **Make all connections in accordance with national and local electrical codes. Use copper conductors only.**

• **To reduce the risk of fire or electrical shock, install in a controlled environment relatively free of contaminants.**

• **This device is only intended for use as a monitoring and control device. To prevent data loss or equipment damage, do not use it for any other purpose.**

## Static Discharge Precautions

Static charges produce voltages high enough to damage electronic components. The microprocessors and associated circuitry within a T-600 controller are sensitive to static discharge. Follow these precautions when installing, servicing, or operating the system:

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**Caution**   • **Work in a static-free area**.

• **Discharge any static electricity you may have accumulated. Discharge static electricity by touching a known, securely grounded object.**

• **Do not handle the printed circuit board (PCB) without proper protection against static discharge. Use a wrist strap when handling PCBs.   The wrist strap clamp must be secured to earth ground.**

## Battery Precautions

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**Caution**
- The NiMH battery used in this device may present a risk of fire or chemical burn if mistreated. Do not disassemble, heat above 122ºF (50ºC), or incinerate. Replace battery pack with type NPB-BATT only. Use of another battery may present a risk of fire or explosion.
- Dispose of used battery promptly. Keep away from children. Do not disassemble and do not dispose of in fire.

## WEEE (Waste of Electrical and Electronic Equipment)

**Recycling of Electronic Products:  (International Installations)**

In 2006 the European Union adopted regulations (WEEE) for the collection and recycling of all waste electrical and electronic equipment. It is no longer allowable to simply throw away such equipment. Instead, these products must enter the recycling process. To properly dispose of this product, please take it to a local recycling center.

If a local recycling center cannot be found, please return it to one of these offices:

Tridium Europe Ltd
1, The Grainstore
Brooks Green Road
Coolham, West Sussex
RH138GR United Kingdom

Tridium Asia Pacific Pte Ltd
17 Changi Business Park Central 1
Honeywell Building
Singapore 486073

Tridium Inc.
2256 Dabney Road, Suite C
Richmond, VA 23230

# Related Documentation

For more details on configuring and using the T-600 (JACE 6) controller, consult the following documents:

- *JACE NiagaraAX Install and Startup Guide*
- *T-IO-16 Installation and Configuration Guide*
- *T-IO-34 Installation and Configuration Guide*
- Various option card installation documents, such as:
    - *NPB-LON Option Install Sheet*
    - *NPB-2X-485 Option Install Sheet*
    - *NPB-232 Option Install Sheet*

    See the "About Option Cards" section on page 8 for a listing of option card types.
- *NiagaraAX Ndio Guide*
- *NiagaraAX User Guide*

# Mounting

Mount the T-600 controller in a location that allows clearance for wiring, servicing, and module removal.

## Environmental Requirements

Note the following requirements for the controller's mounting location:

- This product is intended for indoor use only. Do not expose the unit to ambient conditions outside of the range of 0ºC (32º F) to 50ºC (122º F) and relative humidity outside the range 5% to 95% non-condensing (pollution degree 1).
- If mounting inside an enclosure, that enclosure should be designed to keep the unit within its required operating range considering a 20-watt dissipation by the controller, plus dissipation from any other devices installed in the same enclosure. This is especially important if the controller is mounted inside an enclosure with other heat producing equipment.
- Do not mount the unit:
  - in an area where excessive moisture, corrosive fumes, or explosive vapors are present.
  - where vibration or shock is likely to occur.
  - in a location subject to electrical noise. This includes the proximity of large electrical contractors, electrical machinery, welding equipment, and spark igniters, and variable frequency drives.

## Physical Mounting

The following information applies about physically mounting the unit.

- You can mount the T-600 in any orientation. It it not necessary to remove the cover before mounting.
- Mounting on a 35mm wide DIN rail is recommended. The controller's base has a molded DIN rail slot and locking clip, as do power modules (NPB-PWR, NPB-PWR-UN) and both types of I/O expansion modules. Mounting on a DIN rail ensures accurate alignment of connectors between all modules.
- If DIN rail mounting is impractical, you can use screws in mounting tabs on the T-600, then in any end-connected accessory (NPB-PWR, etc.). Tab dimensions are on the last page of this document.

The following procedure provides step-by-step DIN rail mounting instructions for the controller.

**Note**  Mount the controller prior to mounting any accessory module (power module, I/O modules).

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**Procedure 1      Mounting on DIN rail**

**Step 1**    Securely install the DIN rail using at least two screws, near both ends of the rail.

**Step 2**    Position the T-600 on the rail, tilting to hook DIN rail tabs over one edge of the DIN rail (Figure 1).

**Step 3**    Use a screwdriver to pry down the plastic locking clip, and push down and in on the controller, to force the locking clip to snap over the other edge of the DIN rail.

**Step 4**    Mount any accessory item (NPB-PWR, I/O module) onto the DIN rail in the same manner.

**Step 5**    Slide the accessory along the DIN rail to connect its 20-position plug into the controller.

**Step 6**    Repeat this for all accessories, until all are mounted on the DIN rail and firmly connected to each other.

**Step 7**    To keep the final assembly together, secure at both ends with DIN rail **end-clips** provided by the DIN rail vendor. This also prevents the assembly from sliding on the DIN rail. See Figure 1.

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Removing and Replacing the Cover

**Figure 1    T-600 controller and accessory mounting details.**
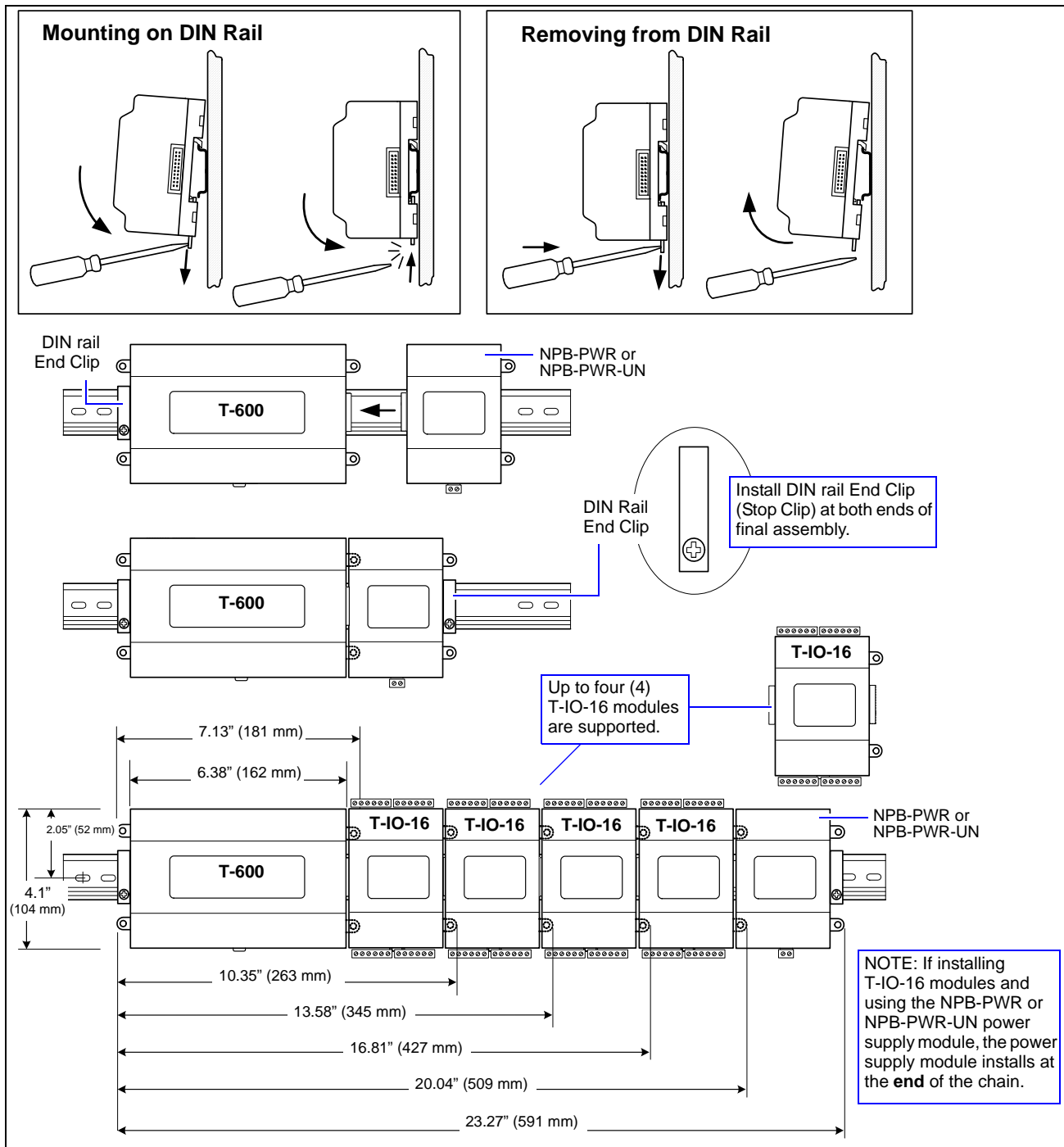


## Removing and Replacing the Cover

You must remove the T-600 cover to connect the battery (new unit) or to replace the battery, and to install any option boards. The cover snaps onto the base with four plastic tabs (two on each end).

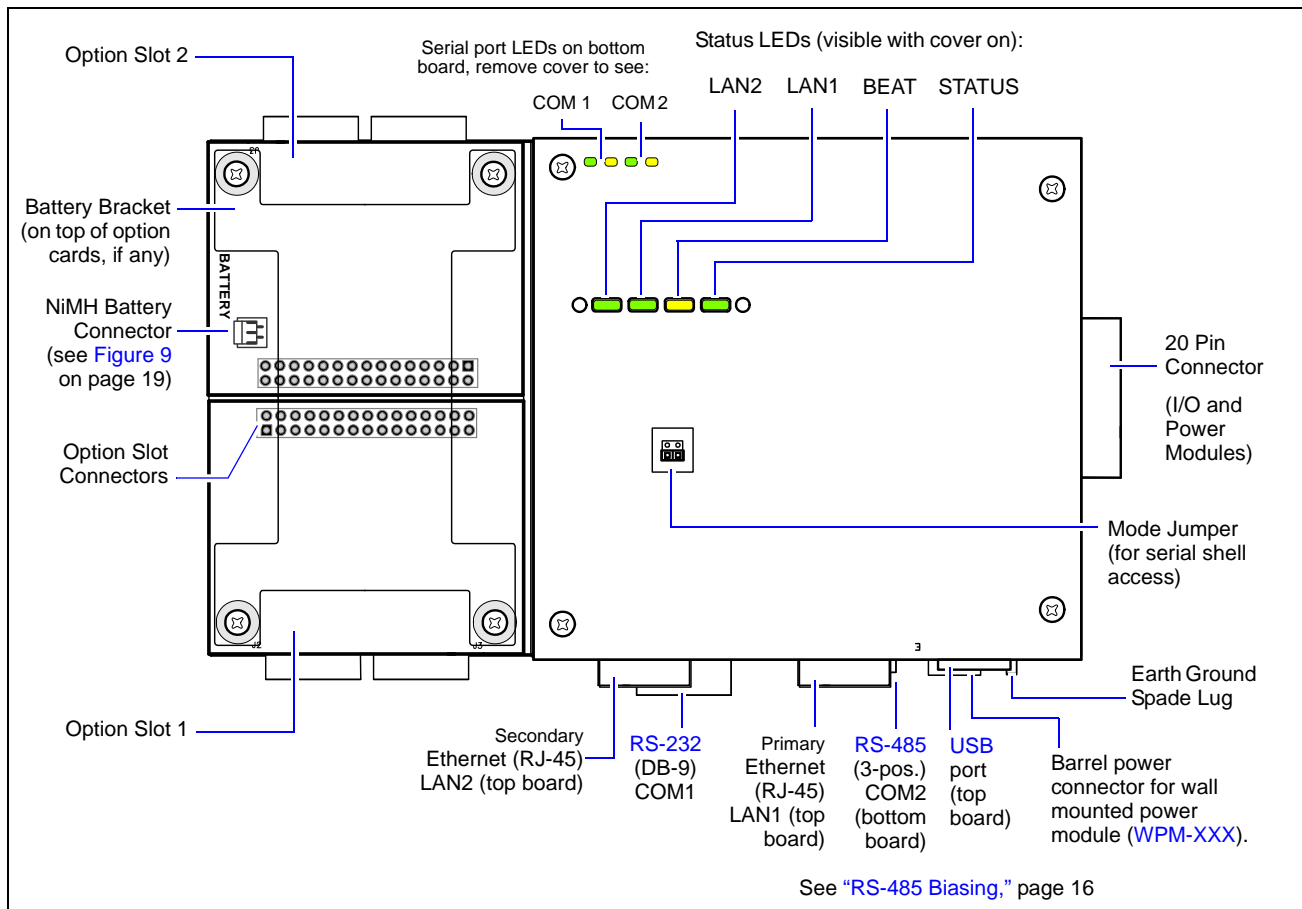To remove the cover, press in the four tabs on both ends of the unit, and lift the cover off. See Figure 2.

Figure 2    Press in four tabs on ends of cover to remove cover.



Cover Tabs
(2 each end)

Press
Tabs In
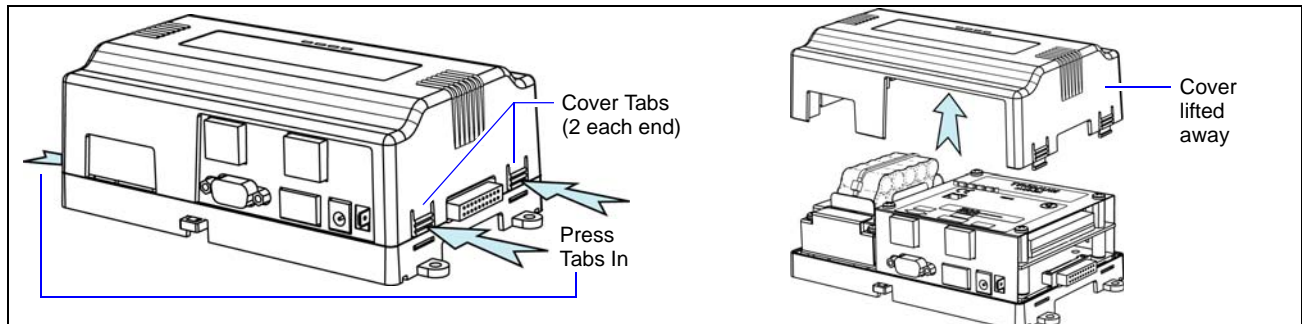
Cover
lifted
away

**Note**    If accessory modules are plugged into the controller, you may need to slide them away from the unit to get to the cover tabs.

To replace the cover, orient it so the cutout area for comm ports is correct, then push inwards to snap in place.

# Board Layout

Figure 3 shows the location of LEDs, option slots, and other features of the T-600 controller with cover removed. For a side view of communications ports and other features, see Figure 6 on page 14.

Figure 3    T-600 controller board layout details.



Option Slot 2

Serial port LEDs on bottom
board, remove cover to see:

COM 1    COM 2

Status LEDs (visible with cover on):

LAN2    LAN1    BEAT    STATUS

Battery Bracket
(on top of option
cards, if any)

NiMH Battery
Connector
(see Figure 9
on page 19)

BATTERY

Option Slot
Connectors

20 Pin
Connector

(I/O and
Power
Modules)

Mode Jumper
(for serial shell
access)

Option Slot 1

Secondary
Ethernet (RJ-45)
LAN2 (top board)

RS-232
(DB-9)
COM1

Primary
Ethernet
(RJ-45)
LAN1 (top
board)

RS-485
(3-pos.)
COM2
(bottom
board)

USB
port
(top
board)

Earth Ground
Spade Lug

Barrel power
connector for wall
mounted power
module (WPM-XXX).

See "RS-485 Biasing," page 16

# About Expansion Options

The T-600 controller provides for *field-installable* expansion with two kinds of options:

- **Option cards**—Install on connectors inside the controller base unit. See "About Option Cards".
- **Accessory modules**—To "chain" on the T-600's 20-pin end connector. See "About Accessory Modules".

## About Option Cards

The T-600 has two (2) option slots for custom option cards designed for use with JACE controllers. Each slot has a 30-pin connector on the controller's base board. See Figure 3 on page 7.

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**Warning** **Power to the controller must be OFF when installing or removing option cards, or damage will occur! Also, you must be very careful to plug an option card into its connector properly (pins aligned).**

Option cards typically provide additional communications features, such as with the following available models (with others still in development) listed in Table 1.

**Table 1**      T-600 option cards.

| Model | Description | Notes |
|---|---|---|
| NPB-LON | FTT-10A LON (LonWorks) adapter with a 2-position removable screw-terminal connector plug. | Up to 2 LON option cards may be installed.<br>• If one LON option, it operates as LON1, regardless of slot.<br>• If two LON options, LON1 is Option slot 1, LON2 is Option slot 2. |
| NPB-2X-485 | Dual, optically-isolated, RS-485 adapter with two 3-position removable screw-terminal connector plugs. | One or two 485 option cards may be installed.<br>If installed in Option slot 1, ports are COM3 and COM4. If two 485 options are installed, ports are COM3 and COM4 for Option slot 1, and COM5 and COM6 for Option slot 2. |
| NPB-MDM | 56Kbps Auto-dial/Auto-answer Modem with one RJ-11 connector for phone line.<br><br>**Note:** Not supported if NPB-GPRS modem option is also installed. | Maximum of one. Does not have own UART (unlike NPB-2X-485, NPB-232, etc.). Must be installed in Option slot 1, where it operates as COM1. This disables the RS-232 base serial port (DB-9 connector) on the T-600 during normal operation.<br><br>**Note:** If a NPB-MDM is installed, and the "mode jumper" (see Figure 3) is put in "Serial Shell" position, the T-600 base RS-232 port becomes active immediately following a reboot. This allows an RS-232 connection to the "serial shell" for debugging purposes. To re-enable the modem, you must put the mode jumper back in the "Normal" position, and reboot again. |
| NPB-232 | Single port RS-232 adapter, with a DB-9M connector. Uses its own on-board UART. Supports baud rates up to 115200. | One or two 232 option cards may be installed.<br>If installed in Option slot 1, port is COM3. If two 232 options are installed, ports are COM3 for Option slot 1, and COM4 for Option slot 2. |
| NPB-GPRS-W<br>NPB-GPRS | Wireless GSM cellular modem using GPRS (General Packet Radio Service) data technology, powered by the controller. | Requires AX-3.4 or later. One GPRS option card is supported. Includes SMA coax tilt-and-swivel antenna.<br>The NPB-GPRS-W model is bundled with a Wyless provisioned SIM card. The NPB-GPRS model does not include a SIM card. |
| NPB-ZWAVE<br>  – US *or*<br>  – EU | Z-Wave wireless serial gateway<br>between the JACE's NiagaraAX station and an RF wireless Z-Wave domain. Includes a RP-SMA tilt-and-swivel antenna. | Requires AX-3.5 or later.<br>-US model is 908.42 MHz for U.S. usage.<br>-EU model is 868.42 MHz for European usage. If installed in option slot 1, card operates as COM3. |

**Table 1          T-600 option cards. (continued)**

| Model | Description | Notes |
|---|---|---|
| NPB-SRAM | Provides "battery-less" operation.<br>Card has static RAM (SRAM) and integral backup capacitor for data storage during power lost periods. | Requires AX-3.6 or later.<br>Does not use/affect COM port operaton.<br><br>**Note:** Use requires removing NiMH battery pack and any external 12V battery |
| NPB-SED-001 | Sedona Framework option card with both wireless 6LoWPAN and wired RS-485 port, based on the Jennic JN5139 wireless microcontroller. Includes tilt-and-swivel RP-SMA antenna. | Requires AX-3.5 or later, with AX-3.6 or later required for Sedona 1.1 support.<br>Enables JACE to operate as wireless network coordinator and 6LoWPAN tunnel, to integrate wireless Sedona Jennic-based devices in the hosted station. Card uses one COM port, e.g. COM3 if slot 1.<br><br>**Note:** COM port used is not available in the hosted NiagaraAX station, but is reserved for future MS/TP support. |

For more details on port assignments and other features, refer to specific option card installation documents.

## Mounting Option Cards

Refer to the installation document that accompanies a specific option card for complete details. The following procedure provides a basic set of steps.

**Procedure 2          Mounting option cards on a T-600 controller.**

**Step 1**     **Remove power** from the controller—see the previous Warning.

**Step 2**     Remove the cover. See "Removing and Replacing the Cover," page 6.

**Step 3**     Remove the battery and bracket assembly by taking out the four screws holding it in place, setting the screws aside for later. Unplug the battery from the connector on the controller's base board.

**Step 4**     Remove the blanking end plate for the slot you are installing the option card into.
(Retain the blanking plate in case the option card must be removed at a later date.)

**Step 5**     Carefully insert the pins of the option card into the socket of the appropriate option card slot.
The mounting holes on the option board should line up with the standoffs on the base board. If they do not, the connector is not properly aligned. Press until the option card is completely seated.

**Step 6**     Place the custom end plate that came with the option card over the connector(s) of the option card.

**Step 7**     Plug the battery connector plug into the battery connector on the controller's base board.

**Step 8**     Set the battery and bracket assembly back over the option card slots, with the mounting holes aligned with the standoffs.

**Step 9**     Place the four screws through the battery bracket, end plates, and into the standoffs on the controller's base board. Using a screwdriver, hand tighten these screws.

**Step 10**    Replace the cover.

## About Accessory Modules

The T-600 controller has a 20-pin, right-angle, Euro-DIN connector that accepts custom-built accessory modules. The connector provides power and signal lines to any connected modules, and is located on the end of the T-600 opposite to the option cards.

**Warning**

- **Power to the controller must be OFF when inserting or unplugging accessory modules. Wait for all LED activity to stop (all LEDs to be off).**

- **Also, do not connect live voltages to the inputs or outputs of an I/O module (T-IO-16 or T-IO-34) while it is in an "un-powered state" before plugging the module into a T-600.**

  Otherwise, **damage to the I/O module and/or the controller may result!**

Each accessory module has a DIN-mount base, and typically provides two (2) 20-pin connectors that allow you to "chain" multiple accessories (see Procedure 1 on page 5). Table 2 lists currently available accessory modules.

**Table 2    T-600 accessory modules.**

| Model | Description | Notes |
|-------|-------------|-------|
| NPB-PWR | DIN-mountable, 24V isolated power module, used to power T-600 from a dedicated, external, Class-2, 24Vac transformer *or* a 24Vdc power supply. | • Only one NPB-PWR per T-600 controller.<br>• Do not install if using WPM-XXX or NPB-PWR-UN.<br>• Wiring is covered in *this document*, see "NPB-PWR," page 12. |
| NPB-PWR-UN | DIN-mountable, Universal 90–263 Vac input, 15Vdc output, 30W power supply to power T-600. | • Only one NPB-PWR-UN per T-600 controller.<br>• Do not install if using WPM-XXX or NPB-PWR.<br>• Wiring is covered in *this document*, see "NPB-PWR-UN," page 13. |
| T-IO-16 | DIN-mountable, 16 points I/O module, used to provide I/O points as noted. | Provides the following I/O points:<br>• 8 - Universal Inputs (UIs).<br>• 4 - Digital Outputs (DOs), SPST-relay type.<br>• 4 - Analog Outputs, 0–10Vdc type.<br>Up to four (maximum) T-IO-16 accessory modules are supported.<br>Wiring is covered in a *separate* document, see the *T-IO-16 Installation and Configuration Guide.* |
| T-IO-34 | DIN-mountable, combined 34 points I/O with 24V isolated power module, used to provide I/O points as well as power T-600 from a dedicated, external, Class-2, 24Vac transformer *or* a 24Vdc power supply. | Only one T-IO-34 per T-600. Provides the following I/O points:<br>• 16 - Universal Inputs (UIs).<br>• 10 - Digital Outputs (DOs), SPST-relay type.<br>• 8 - Analog Outputs, 0–10Vdc type.<br>Up to 2 additional T-IO-16 modules can be used. Do not power the T-IO-34 if using WPM-XXX.<br>Wiring is covered in a *separate* document, see the *T-IO-34 Installation and Configuration Guide.* |

# Wiring Details

See Figure 3 on page 7 to locate connectors and other components on the T-600 controller.

**Note** If  biasing is needed for the controller's RS-485 base port, controller disassembly and reassembly is needed. See "RS-485 Biasing," page 16.

Make connections to the controller in the following order.

1. Install any option cards (LON, RS-485, RS-232, etc.) in option slots 1 and 2. See "Mounting Option Cards," page 9 for a general procedure. For complete details, refer to the specific installation document that shipped with the option card.

2. Connect supplied earth grounding wires (with spade connector) from the earth ground lug on the T-600 and any accessory modules (if used) to a nearby earth grounding point. See "Grounding" for details.

3. Prepare power wiring (leave the unit powered off). See "Power Wiring" for details.

4. Connect communications cables. See "Communications Wiring," page 14 for ports available on the T-600 base unit. For ports on any installed option board (LON, RS-485, modem) see the specific mounting and wiring guide for any additional details.

5. If IO accessory modules are installed, connect the I/O wiring. Refer to the appropriate mounting and wiring guide for complete details.

6. Connect the backup battery to the T-600 battery connector, and apply power to the unit. See "Power Up and Initial Checkout," page 19.

## Grounding

An earth ground spade lug (0.187") is provided on the base of the T-600 for connection to earth ground. For maximum protection from electrostatic discharge or other forms of EMI, connect the supplied earth grounding wire to this lug and a nearby earth ground (see Figure 4 on page 12). Keep this wire as short as possible.

Power is provided for plug-in accessory modules through the 20-pin accessory connectors. However, you should also connect the earth ground spade lug of *each accessory module* to ground in the same manner.

## Power Wiring

The T-600 controller must be powered by an approved 15 Vdc power source. This can be *either*[1] a DIN-mount 24Vac/dc-powered module (NPB-PWR), a DIN-mount line-powered (90–263 Vac) module (NPB-PWR-UN), or an external wall mount AC adapter (WPM-*XXX*).

The T-600 controller does not include an on/off switch. To apply power, you either:

• if NPB-PWR, plug in its 2-position power connector.
• if NPB-PWR-UN, energize the AC circuit (90–263 Vac) wired to that module.
• if WPM-XXX, plug in the power connector to the T-600.

**Caution** Do not connect *both* the WPM-*XXX* and NPB-PWR / NPB-PWR-UN supplies at the same time, or equipment damage may result.

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1. A fourth power option is available: a T-IO-34 accessory module, which is a combination of the NPB-PWR module and two T-IO-16 modules (plus two extra relays). Please refer to its mounting and wiring instructions document for more details. For general information on accessory modules, see "About Accessory Modules," page 10.

If desired, you can use the wall mount WPM-*XXX* in your office (to initially commission the T-600), and then install the T-600 at the job using either a NPB-PWR or NPB-PWR-UN module. The following sections provide more details:

- NPB-PWR (24Vac/dc-powered in-line module)
- NPB-PWR-UN (Universal 90V–263Vac-powered in-line module)
- WPM-XXX (Wall Power Modules)

## NPB-PWR

Using the NPB-PWR module lets you power the T-600 (and if installed, T-IO-16 modules) from a **dedicated** Class 2, 24Vac transformer, or from a 24Vdc power supply. If installing T-IO-16 modules, the NPB-PWR installs as the *last* (end) module in the chain. See Figure 1 on page 6.

**Note** If powering from a 24V transformer, do *not* power any other equipment with it. Otherwise, conducted noise problems may result. Also, do not ground either side of the transformer's 24V secondary.

**Figure 4** **NPB-PWR module wiring connections.**
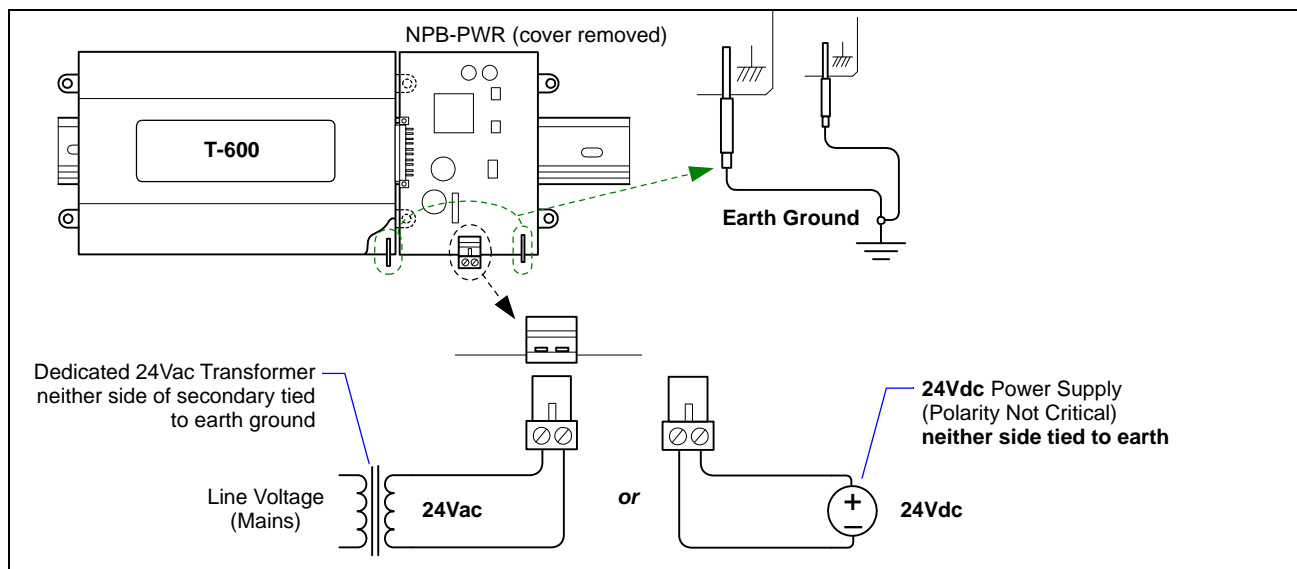


Located at the bottom of the NPB-PWR module is a 2-position power connector, and an earth ground spade lug, as shown in Figure 4.

Connect the supplied earth ground wire to a nearby earth ground point. Unplug the power connector plug from the module and make connections to it as shown in Figure 4.

**Caution** Do not plug 24V power into the NPB-PWR (reinsert connector plug) until all other mounting and wiring is completed. See "Power Up and Initial Checkout," page 19.

Power consumption depends on installed accessories and option boards, and may vary from:

- T-600 with NPB-PWR module alone: approximately 8.5 VA (AC) or 8.5 W (DC)
- T-600 with NPB-PWR and four (4) T-IO-16 modules, and option cards: up to 20 VA (AC) or 20 W (DC)

## NPB-PWR-UN

The NPB-PWR-UN module lets you power the T-600 (and if installed, T-IO-16 modules) from AC line power, with a universal input range from 90–263Vac. If installing T-IO-16 modules, the NPB-PWR-UN installs as the *last* (end) module in the chain. See Figure 1 on page 6.
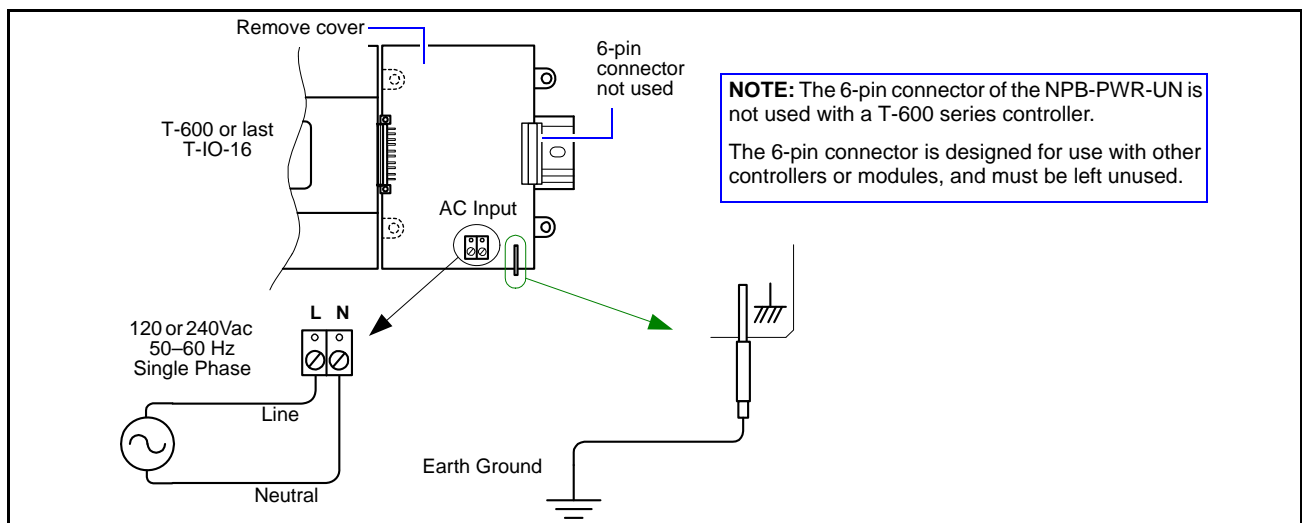
**Warning**
- **A 120Vac or 240Vac circuit powers the NPB-PWR-UN.   Disconnect power to this circuit before installation to prevent electrical shock of equipment damage.**
- **Make all connections in accordance with national and local electrical codes. Use copper conductors only.**
- **Do not exceed the 30W capacity of the NPB-PWR-UN by the powered devices.**

Power input connections are made to the terminals on the circuit board (cover removal is required). An earth ground connection must be made to the grounding lug using the supplied earth wire. See Figure 5.

**Figure 5    NPB-PWR-UN module wiring connections.**



**Procedure 3    Wiring NPB-PWR-UN input power and earth ground.**

**Step 1    Remove power** from the AC circuit being wired to the NPB-PWR-UN—see previous Warning •.

**Step 2    Remove the NPB-PWR-UN cover.**
To do this, press in the four tabs on both ends of the unit, and lift the cover off.

**Step 3    If the controller or a T-IO-16 accessory module is plugged into the unit, you may need to slide it away to get to the cover tabs.**

**Step 4    Connect the supplied earth grounding wire to a nearby grounding point. See Figure 5.**

**Step 5    Make AC circuit connections line (mains) and neutral to the terminals labeled "INPUT PWR."**

**Step 6    Replace the cover on the NPB-PWR-UN.**
Make sure all modules in the mounted assembly are firmly connected together and secured.

**Caution**    Do not energize the AC circuit wired to the NPB-PWR-UN until all other JACE mounting and wiring is completed. See "Power Up and Initial Checkout," page 19.

## WPM-*XXX*

All models of wall power modules (US, EUR, UK, JA) are self-contained, isolated, switching power supplies designed to plug into a standard building power receptacle of appropriate voltage. To supply power to the T-600, you then simply plug the barrel connector plug from the WPM-*XXX* into the barrel power connector on the T-600 base board (see Figure 6 on page 14).

⚠️

**Caution**    Do not plug the barrel connector plug from the WPM-*XXX* into the T-600 until all other mounting and wiring is completed. See "Power Up and Initial Checkout," page 19.
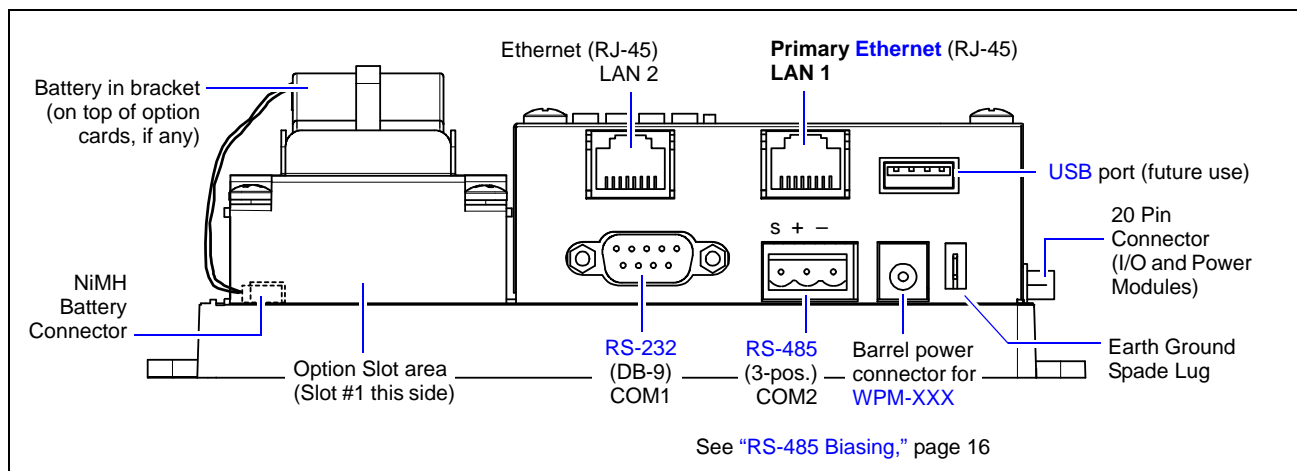
# Communications Wiring

Connect communications wiring to the T-600 using ports on the bottom of the unit (Figure 6), which include:

- Ethernet
- Serial

📝

**Note**    Prior to connecting cables, provide strain relief for them to prevent damage to the controller.

**Figure 6**      **T-600 controller bottom side (cover removed).**



Battery in bracket (on top of option cards, if any)

Ethernet (RJ-45) LAN 2

Primary **Ethernet** (RJ-45) **LAN 1**

USB port (future use)

20 Pin Connector (I/O and Power Modules)

NiMH Battery Connector

s + −

RS-232 (DB-9) COM1

RS-485 (3-pos.) COM2

Barrel power connector for WPM-XXX

Earth Ground Spade Lug

Option Slot area (Slot #1 this side)

See "RS-485 Biasing," page 16

## Ethernet

Two, female 10/100-Mbit Ethernet connections are provided on the T-600. These are RJ-45 connectors labeled LAN2 and LAN1. Use a standard Ethernet patch cable for connecting to a hub or Ethernet switch. An activity LED for each Ethernet port is visible, and are labeled "LAN2" and "LAN1" on the cover.

The factory-default IP address for **LAN1** on a T-600 is `192.168.1.12n`, where the last numeral `n` in the address matches the T-600's serial number, and subnet mask is `255.255.255.0`. By default, LAN2 on a T-600 is disabled. Refer to the *JACE NiagaraAX Install and Startup Guide* for details on changing IP address.

📝

**Note**    Typically, you *only use LAN1* (primary port), unless you have a specific application for isolating a driver's network traffic to a separate LAN, using LAN2. Do *not* use LAN2 as the primary port.

## Serial

There are two serial ports on the T-600 base unit. Each has a UART capable of operation up to 115,200 baud. At the bottom of the board (see Figure 6), the left port is an RS-232 port using a DB-9 plug (male) connector. To the right of this is a two-wire with shield RS-485 port, using a screw-terminal connector plug.

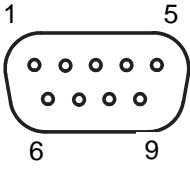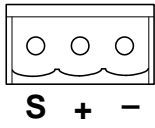**Note**  A green "receive" LED and yellow "transmit" LED are provided for each serial port. These LEDs are located on the bottom board, on the *opposite side* of the serial connectors (see Figure 3 on page 7). These LEDs are labeled on the board (COM1, COM2) and are not visible with the cover on.

**RS-232—**An RS-232 serial port using a male DB-9 connector always operates as COM1. You can use standard DB-9 serial cables with this port. The T-600 is a serial DTE device, such another DTE device (PC, for example) requires a "null modem" cable. If connecting the T-600 to a DCE device (modem, for example), a straight-through cable is used. Table 3 provides standard serial DB-9 pinouts.

**Note**  If a modem option card (NPB-MDM) is installed, this port becomes disabled—except if rebooted with the mode jumper (see Figure 3 on page 7) in the "Serial Shell" position.

**Table 3**      Serial port (RS-232 and RS-485) pinouts.

| Base RS-232 DB-9 Port (COM1) | | | Base RS-485 Port (COM2) |
|---|---|---|---|
| **Pinout References** | **Signal** | **DB-9 Plug Pin** | **Pinouts** |
| **DB-9 Plug** (male)  1    5  6    9 | DCD — Data carrier detect | 1 | **3-position connector** (male)  S  +  − |
| | RXD — Receive data | 2 | |
| | TXD — Transmit data | 3 | |
| | DTR — Data terminal ready | 4 | |
| | GND — Ground | 5 | |
| | DSR — Data set ready | 6 | |
| | RTS — Request to send | 7 | |
| | CTS — Clear to send | 8 | |
| | not used on the T-600 | 9 | |

**RS-485—**An RS-485 port uses a 3-position, screw terminal connector and always operates as COM2. Wire to this connector with shielded 18-22AWG wiring (refer to the TIA/EIA-485 standard). As shown in Table 3, the screw terminals (from left-to-right) are shield, plus (+), and minus (–).

**Note**  As shipped from the factory, the RS-485 port on the controller is "unbiased". If necessary, you can change this to add RS-485 biasing. However, this requires some disassembly and reassembly of the controller. See the next section "RS-485 Biasing".

**USB —**A single USB port is on the top board.

**Note**  The USB port is for future use.

# RS-485 Biasing

The RS-485 port on the controller's base board has a pair of two-pin jumpers that can be shorted with jumper blocks to provide "biasing". As shipped from the factory, these pins are not shorted, thus the RS-485 port is unbiased.

📝

**Note**    See "Need for RS-485 Bias" before following the "Adding RS-485 Bias" procedure. In many cases, the default unbiased RS-485 port is preferred.

## Need for RS-485 Bias

📝

**Note**    A full discussion of communications line termination is beyond the scope of this document.

Biasing sometimes improves RS-485 communications by eliminating "indeterminate" idle states. When you install two, 2-pin shorting blocks on the controller's RS-485 bias jumper pins, this adds two onboard 3.3K ohm resistors into the controller's RS-485 circuit, as follows:

- from RS-485 "+" to 5V.
- from RS-485 "-" to Ground.

📝

**Notes**    • In general, **only one device** on an RS-485 trunk should be biased. Otherwise, undue loading of the circuit may result, with fewer devices supported.

- RS-485 bias resistors are **different** than "termination resistors", externally installed at the two physical ends of a daisy-chained RS-485 trunk, across the "+" and "-" terminals. Termination resistors are typically 100 or 120 ohm value resistors.

- **Whenever termination resistors are used, RS-485 biasing is typically required.**

## Adding RS-485 Bias

📝

**Note**    In many cases **you must furnish the required two 2-pin shorting blocks**. They must be the "shorter style" jumper blocks. Otherwise, tall blocks interfere when reseating the NPM board. Only units shipped after mid-2011 may include the jumper shorting blocks, positioned on one pin only of both 2-pin jumpers. See Figure 8 on page 18. Earlier units have only the four bare jumper pins.

To add biasing, you must power off the controller and remove some assemblies (including metal shield, NPM board) to access the base board jumper pins, located behind the RS-485 port. Then you must install two shorting blocks on these jumper pins. Then you reassemble the unit by remounting the NPM board, hex standoffs, metal shield, and shield screws.

⚠️

**Warning**    **Remove all power from the controller before working on the unit. Observe static discharge precautions (see "Static Discharge Precautions," page 3).**

If the controller is already installed or mounted, it is recommended that you remove it first. Then work on a flat, stable, and well-lit work surface.

**Figure 7     Basic stages of controller disassembly.**
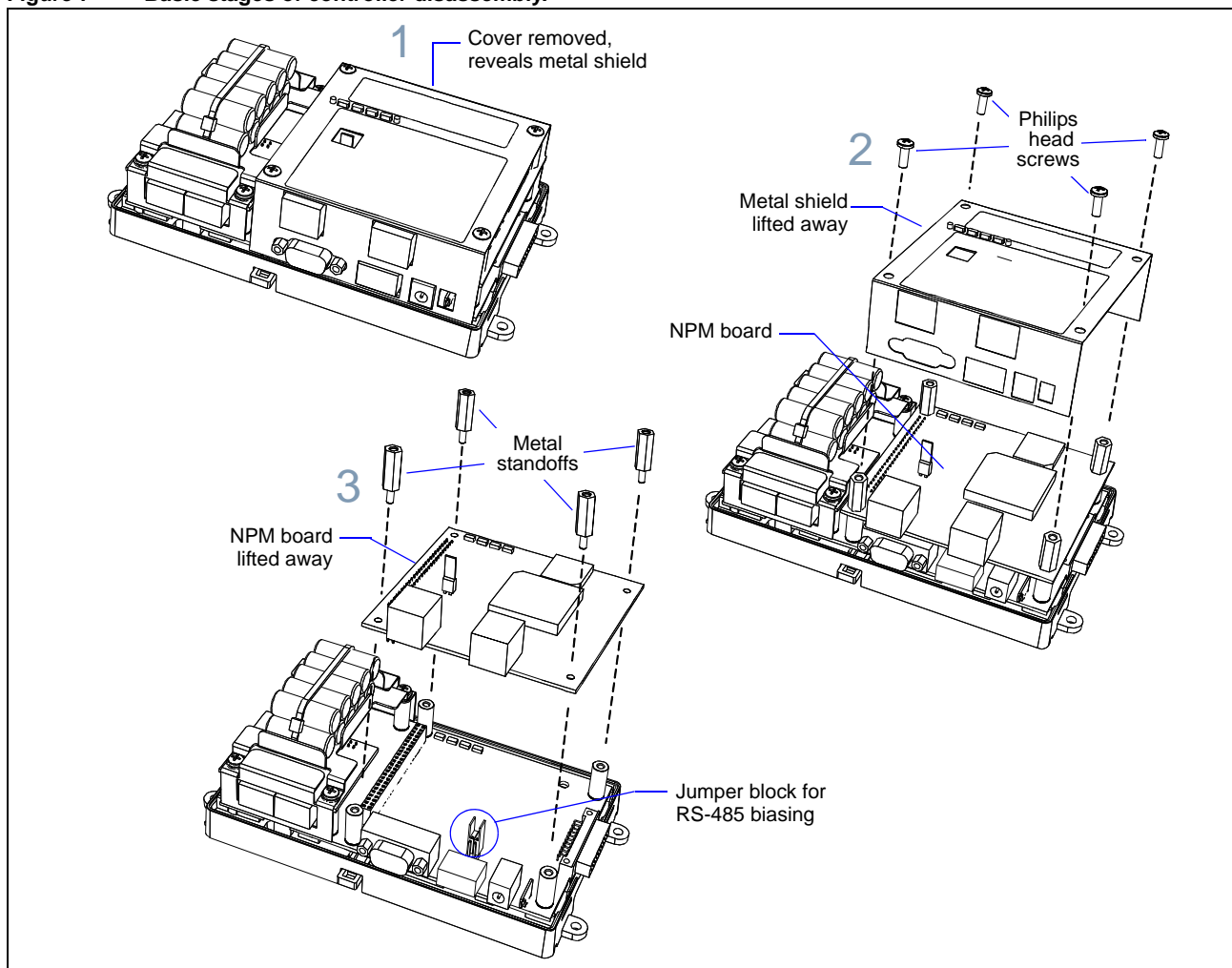


**Procedure 4     Disassembling the controller.**

**Step 1**    **Remove all power** from the controller. (See previous Warning).

**Step 2**    Remove the plastic cover from the unit. See "Removing and Replacing the Cover," page 6.

**Step 3**    Remove the four Philips head screws that secure the metal shield, and set them aside.

**Step 4**    Remove the metal shield and set it aside.
To do this, carefully pry up from the top (hole vented side) first, then push out the other side to slip the port holes past the port edges. Then lift the shield up and away.

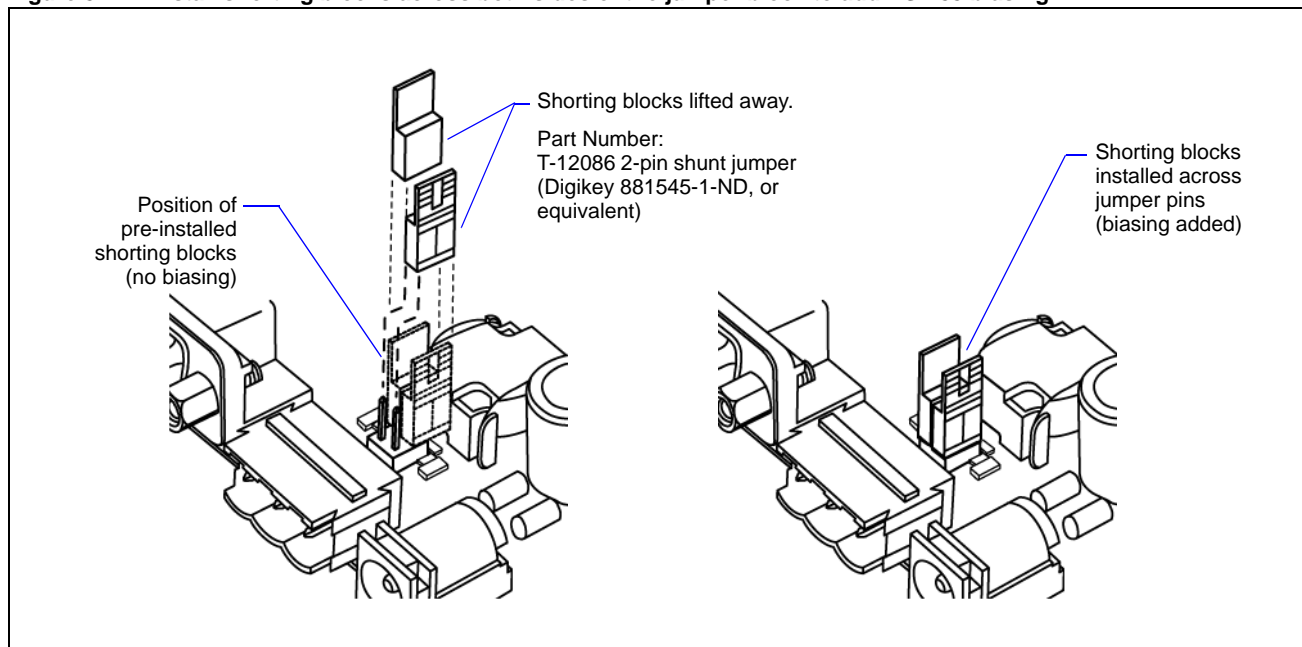**Note**    Be mindful of the "side clips" on the controller's two Ethernet ports.

**Step 5**    Use a 1/4" (7mm) nutdriver to unscrew the four metal standoffs, and set them aside.

**Step 6**  Carefully pry up the NPM-6 board, noting that the two-row, 50-pin connector is on the option card side. Keep the board level as you work it loose from this connector.

**Step 7**  Set the NPM board aside. Note the jumper block on the base board behind the RS-485 port.

---

**Procedure 5**   **Installing shorting blocks to add RS-485 biasing.**

---

**Step 1**  Locate the four jumper pins behind the RS-485 port.
Newer units have two 2-pin shorting blocks pre-installed on one pin each. See Figure 8.

**Step 2**  To add biasing, install a shorting block across both pins on each side of the jumper block, shorting the pins as shown in Figure 8 (right).

---

**Figure 8**   **Install shorting blocks across both sides of the jumper block to add RS-485 biasing.**



Shorting blocks lifted away.

Part Number:
T-12086 2-pin shunt jumper
(Digikey 881545-1-ND, or equivalent)

Position of pre-installed shorting blocks (no biasing)

Shorting blocks installed across jumper pins (biasing added)

**Procedure 6**   **Reassembling the controller**

---

**Step 1**  Carefully replace the NPM-6 board back onto the 50-pin connector, with its corner mounting holes aligned on the four lower standoffs. Press down on the connector to fully seat the NPM board. See Figure 7 on page 17.

**Step 2**  Refasten the four metal hex standoffs, hand tightening with a 1/4" (7mm) nutdriver.

**Step 3**  Replace the shield back onto the unit. To do this, carefully ease it over the port side first; then spring it down over the other side. Make sure its corner holes align with the metal standoffs below.

**Step 4**  Refasten the four Philips head screws that secure the shield to the standoffs.

**Step 5**  Replace the plastic cover onto the unit.

---

# Power Up and Initial Checkout

Ensure power wiring to the T-600 controller is ready—see the "Power Wiring" section on page 11. Refer to Figure 3 on page 7 for the locations of the T-600 battery connector, status LEDs and barrel power connector (for WPM-*XXX* only). Refer to Figure 4 on page 12 for location of the power connector on the WPM-XXX module.

Following all mounting and wiring, perform the following:

**Procedure 7    Initial power up and checkout**

**Step 1**    Connect the Backup Battery.

**Step 2**    Apply Power.

**Step 3**    Check the Status LEDs.

## Connect the Backup Battery

With the cover removed from the T-600 (see "Removing and Replacing the Cover," page 6), locate the red and black wires coming from the NiMH backup battery, with 2-position connector plug. Insert the plug into the battery connector on the base board (below option slot 2 area), as shown in Figure 9.

**Figure 9    NiMH backup battery connector on T-600 controller base board.**
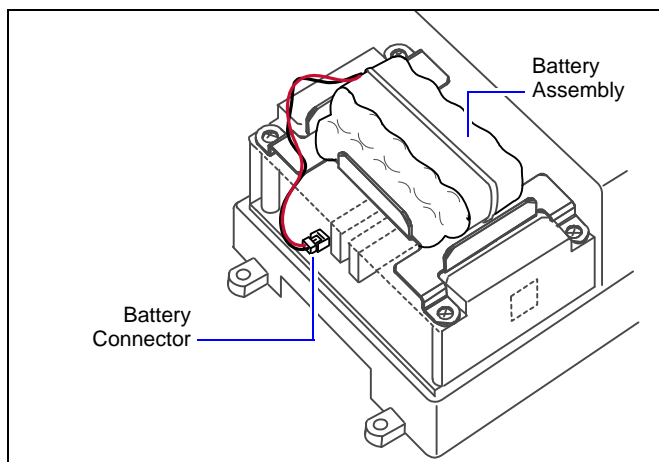


The connector is keyed—you cannot insert it incorrectly. The red (positive) connection should be the furthest from the two 30-pin option board connectors. For more battery details, see "About the Battery," page 20.

## Apply Power

Apply power to the T-600 by plugging in the power plug into either the T-600 (if wall mount AC adapter WPM-XXX) or the 24V-powered NPB-PWR module. If powering using the line-voltage input NPB-PWR-UN power supply module, energize the 90–263 Vac circuit wired to the module.

⚠️ **Caution**    Do not connect *both* the WPM-*XXX* and NPB-PWR / NPB-PWR-UN supplies at the same time, or equipment damage may result, or a power outage may go unrecognized.

## Check the Status LEDs

When power is applied, the green LED labeled "STATUS" will light. This indicates that the system is OK and that power is applied. Once the T-600 boots, the yellow "BEAT" (heartbeat) LED will begin blinking, with a typical rate of about 1 Hz. Blinking should begin within 30 seconds after power is applied.

If after applying power, the STATUS LED goes out, or if the BEAT LED comes on (steady) and stays lit longer than two minutes, contact Systems Engineering for technical assistance. See also the "Using Status LEDs" section on page 21.

## About the Battery

The T-600 is provided with a custom 10-cell NiMH battery pack mounted to the unit (under the cover). This battery allows the JACE to continue operation through very short power bumps (a few seconds in duration). If a longer power outage occurs, the battery provides enough run time for the T-600 to backup data and then shutdown. Typically, this is one minute. Shutdown occurs automatically, after data is backed up to on-board flash memory.

The T-600 charges the battery during normal operation, until fully charged. Typically, the charge operation completes within 18 hours. Following a power outage, the battery is charged again, as necessary. The power and battery circuitry is monitored by a station running on the JACE (via the PowerMonitorService). Station alarms are generated whenever primary power is lost, or if the battery is uncharged or unable to hold a sufficient charge.

The battery should be replaced approximately every three years, or more often if the unit is in a high temperature environment.

**Note** A NiMH battery characteristic is to lose charge if not left in charge mode (trickle charge). Leaving the battery unconnected, or in the unit powered off will cause the battery to fully discharge in a matter of weeks. Note that in the case of a new T-600, it ships from the factory with a completely discharged battery. Therefore, allow at least 18 hours for the battery to charge if it has not been in a powered unit.

For more information on the use and replacement of the battery, refer to the "Required Battery Maintenance" section on page 22.

# Using Status LEDs

The T-600 controller includes several LEDs that can help determine the status of the unit. They are located in two places: the top of the controller (visible through the cover), and for serial ports, on the bottom board (only with cover removed). From left-to-right these LEDs include:

- Ethernet Ports
- Heartbeat
- Status
- Serial Ports

Refer to Figure 3 on page 7 for the exact locations of status LEDs on the controller.

## Ethernet Ports

Each Ethernet port ("LAN2", "LAN1") has one green LED, visible on the top cover.

A "LAN*x*" LED indicates activity on that port as follows:

- **Off**—No Ethernet link is made
- **On**—Ethernet link is present, but no activity on the LAN
- **Blinking**—Ethernet link is present with data activity on the LAN.

## Heartbeat

The "BEAT" LED is located to the right of the Ethernet status LEDs, and is yellow. Under normal operation, this LED should blink about once per second. If the heartbeat LED stays *on constantly*, *does not light*, or blinks *very fast* (more than once per second), contact System Engineering for technical support.

**Warning**  **During boot-up, the heartbeat LED blinks in a 90% on - 10% off pattern. Do not remove power during this time, or any attached I/O module may be damaged and require return to factory.**

## Status

The "STATUS" LED is located to the right of the heartbeat ("BEAT") LED, and is green. This LED provides a CPU machine status check, and should remain lit whenever the T-600 is powered. If the STATUS LED *does not light* while power is applied, contact System Engineering for technical support.

## Serial Ports

LEDs for the two serial ports are located on the T-600's *bottom* board, on the *opposite side* of the RS-232 and RS-485 ports (see Figure 3 on page 7). Labels "COM1" and "COM2" correspond to the software configuration of the COM ports. LEDs show the transmit and receive activity for the serial ports and optional modem.

**Note**  You must remove the cover to the serial port LEDs. See "Removing and Replacing the Cover," page 6.

- The **yellow** transmit LED indicates that the controller is *sending* data out the serial port over a communications line to a connected device.
- The **green** receive LED indicates that the controller is *receiving* data from a connected device.

These LEDs provide a fixed on-time when data is detected on the port. If the receive LED is on constantly, this indicates a problem with the communications channel, such as a shorted wire or reversed wiring.

# Maintaining the T-600

This section provides information on the following topics:

- Cleaning
- Required Battery Maintenance
- Replacement Parts
- Replacing the T-600 base assembly
- Returning a Defective Unit

## Cleaning

If dust or metal filings are present inside the unit, clean with vacuum or compressed air. Otherwise, no cleaning inside the unit is required. Optionally, if the cover becomes dirty, you can wipe it with a damp cloth and mild detergent.

## Required Battery Maintenance

Battery life expectancy is a function of its discharge cycles (the number of discharges and their depth) and the ambient temperature of the battery during normal operation. In most applications, the battery should see relatively few discharges. Therefore, ambient temperature has more to do with determining the life expectancy of the battery than does any other factor. If the T-600 is installed in a conditioned space, the battery should provide dependable service for approximately three years (average). In an environment where the operating temperature is higher (that is, 50ºC or 122ºF), you should only expect the battery to last approximately one year.

The NiMH battery in the T-600 controller is fully discharged when factory shipped. Additionally, NiMH batteries lose charge over time if not kept trickle-charged (for more details, see "About the Battery," page 20). Therefore, even a new unit (or replacement battery) will require up to 18 hours of powered operation before it can provide reliable backup power (is at full charge).

The controller monitors the battery and periodically loads the battery to test its ability to maintain battery-backed functions. Investigate any battery trouble message, and check the battery connections to the unit. Replace the battery as required. To order a new battery, see the "Standard Replacement Parts" section on page 23.

### Replacing the Battery

The replacement NPB-BATT battery is a complete assembly, that is a custom NiMH battery pack pre-attached to a battery bracket. See Figure 9 on page 19.

⚠️

**Caution**     Use only battery packs approved for use with the T-600 controller.

To replace the battery, proceed as follows:

**Procedure 8        Replacing NiMH battery assembly on a T-600.**

**Step 1**     **Backup** the controller's configuration to your PC using the appropriate NiagaraAX software tool (for example, Workbench).

**Step 2**     Remove power from the controller.
Wait for LED activity to stop—after several seconds, all LEDs on the JACE should be off.

**Step 3**     Remove the cover. See "Removing and Replacing the Cover," page 6.

**Step 4**    Remove the old battery and bracket assembly by taking out the four screws holding it in place, setting the screws aside for later. Unplug the battery from the connector on the base board.

**Step 5**    Plug the battery connector plug of the *replacement battery* into the battery connector on the controller.

**Step 6**    Set the replacement battery/bracket assembly back over the option card slots, with the mounting holes aligned with the standoffs.

**Step 7**    Place the four screws through the battery bracket, option card blanking plates, option cards (if any), and into the standoffs on the controller's base board. Using a screwdriver, hand tighten these screws.

**Step 8**    Replace the cover.

**Step 9**    Restore power to the controller and verify normal operation.

# Replacement Parts

Servicing the T-600 controller may call for replacement parts. There are three categories of parts:

- Non-replaceable Parts
- Standard Replacement Parts
- New Replacement Units

## Non-replaceable Parts

Other than the parts listed in the replacement parts sections, there are no serviceable components on the base assembly.

### Memory

Any addition, modification, or replacement of memory components requires software configuration and is not a field upgrade. For additional information on modifying the memory capacity of the T-600, consult your regional Tridium office.

### Fuse

The controller contains a non-user replaceable fuse, soldered on the circuit board. This fuse provides protection from internal shorts or connection to incorrect power supplies. If the fuse circuitry is suspect, contact your regional Tridium office for technical support. See the "Returning a Defective Unit" section on page 25.

## Standard Replacement Parts

Standard replacement parts are listed in Table 4 and can be ordered from stock without restriction. Standard replacement parts cannot be returned for credit and should be disposed of in an appropriate manner.

**Table 4    Standard replacement parts.**

| Part Number | Description |
|---|---|
| NPB-BATT | NiMH Battery Pack (with battery bracket)—see "Replacing the Battery," page 22 |
| 10027 | RS-485 connector plug, 3-position |

**Note**    Screws used for the T-600 are standard #6-32 x 3/8" types, which you can obtain locally if lost.

## New Replacement Units

To replace a faulty unit, order and install a *new* T-600 controller. If the faulty T-600 is *still in warranty*, you can receive credit by returning it. Be sure to contact the vendor for a return material authorization (RMA) number before shipping an item for return credit. See "Returning a Defective Unit," page 25, for more details.

| | |
|---|---|
| **Note** | Before ordering a new T-600, it is strongly recommended that you contact your normal technical support resource to eliminate the possibility of a software issue or mis-configuration problem. |

## Replacing the T-600 base assembly

| | |
|---|---|
| **Caution** | Before handling circuit boards, discharge any accumulated static by touching the metal surface of the T-600. For details, see the "Static Discharge Precautions" section on page 3. |

To replace the T-600 base assembly in the field, proceed as follows:

**Procedure 9**        **Replacing a T-600 base assembly.**

**Step 1**    Using the appropriate NiagaraAX software tool, back up the controller's configuration to your PC.

**Step 2**    Remove power to the controller. The unit should power down automatically.
Wait for all LEDs to remain off.

| | |
|---|---|
| **Note** | If IO accessory modules are installed, and any I/O points have voltage, turn the devices off or disconnect power to them. |

**Step 3**    Note positions of all communications and other wiring cables going to the T-600, as well as all installed accessory modules (if they must be removed). If necessary, label connectors and accessory modules to avoid mis-connection later, after T-600 is replaced.

**Step 4**    Unplug all Ethernet, serial, LON, modem, and I/O connectors from the T-600, and unplug its earth ground wire.

**Step 5**    If IO accessory modules are installed:

– If DIN rail mounting with DIN end-clips was used, you may be able to remove the DIN rail end clip that secures the T-600 end of the assembly, and then *slide* the controller away from the rest of the assembly. Then you can remove the controller from the DIN rail (see Figure 1 on page 6), leaving the mounting and wiring of IO modules untouched.
  In this case, after removing the T-600 controller from the DIN rail, skip ahead to Step 6.

– If tab (screw) mounting was used *instead* of DIN rail mounting, or if a combination of DIN rail mounting *and* tab screws (into the T-600's "accessory side" tab holes, see last page), you will need to remove the accessory modules *first*, before removing the T-600.
  In this case:
  **a.** Making a careful note or all wiring terminations, unplug the I/O connector plugs and earth ground wires from the installed IO modules.

    **b.** Remove the installed accessory modules, starting with the end module. Modules may be secured by screws in mounting tabs or clipped to a DIN rail, or fastened by some combination. See Figure 1 on page 6 for details on removal from (and mounting onto) DIN rail.

    **c.** Remove any screws fastening the T-600, and remove it (see Figure 1).

**Step 6** Remove the cover from the old T-600 (see "Removing and Replacing the Cover," page 6).
Note the position of installed option boards, if any. You must transfer them to the replacement T-600.

**Step 7** Remove the option boards from the old T-600 controller and install them into the replacement T-600, if applicable. See "Mounting Option Cards," page 9, for more details.

**Step 8** Check the RS-485 biasing jumpers on the existing unit, and duplicate on the replacement unit (see Procedure 4 on page 17).

**Step 9** Mount the replacement T-600 as it was previously, using the same DIN rail location and/or screws.

**Step 10** Reconnect/remount any removed accessory modules, being careful to replace in the same order, using the same DIN rail location and/or screws. Secure all accessory modules as done previously.

**Step 11** Reconnect earth ground wires to the controller's grounding lug and any installed accessory modules.

**Step 12** Reconnect any Ethernet, serial, modem, and I/O connectors to the controller and any installed accessory modules.

**Step 13** If using IO modules, and any of your I/O points have voltage, turn the devices back on, or reconnect power to them.

**Step 14** Restore power to the T-600. It should boot up as a new unit (see "Check the Status LEDs," page 20).

**Step 15** Using the NiagaraAX platform tools, re-commission the T-600, and install the saved station database. For more details, see the *JACE NiagaraAX Install and Startup Guide*.

## Returning a Defective Unit

For proper credit on an in-warranty unit, ship the defective unit per the vendor's return material procedure.

**Note** If the defective unit is under warranty, please follow return instructions provided in this section.
If the unit is *out of warranty*, please discard it, observing all recycling regulations (see "WEEE (Waste of Electrical and Electronic Equipment)," page 4).

    • Do not return an out-of-warranty T-600 controller.

Prior to returning the unit, contact your vendor to obtain a return materials authorization (RMA) number and other instructions.

Please provide:

- Product model
- Serial number
- Nature of defect
- PO number to secure the RMA

# Certifications

## Federal Communications Commission (FCC)

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference with radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case, users at their own expense will be required to take whatever measures may be required to correct the interference. Any unauthorized modification of this equipment may result in the revocation of the owner's authority to continue its operation.

## Canadian Department of Communications (DOC)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numerique de la classe A respecte toutes les exigencies du Reglement sur le material broilleur du Canada.

## Declaration of RoHS Compliance

This product meets all requirements of RoHS Directive (EU 202/95/EC). All components used in this product are RoHS compliant, and there have been no leaded solders used in manufacture.

Related to the RoHS (Restriction of Hazardous Substances) Directive is another European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE). The WEEE Directive aims to reduce the waste arising from electrical and electronic equipment, and improve the environmental performance of everything involved in the life cycle of electrical and electronic equipment.

For related details, see the precaution "WEEE (Waste of Electrical and Electronic Equipment)" on page 4.

# CE Declaration of Conformity ᴄᴇ

| | |
|---|---|
| **Application of Council Directive:** | 2004-108-EC |
| **Manufacturer's Name:** | Tridium Inc. |
| **Manufacturer's Address:** | 3951 Westerre Parkway, Suite 350<br>Richmond, Virginia 23233<br>United States of America |
| **Manufacturer's Representative:** | Steve Fey, President<br>Tridium Inc. |
| **Product Model Number:** | JACE-600, IO-34, NPB-ZWAVE, NPB-SRAM |
| **Type of Equipment:** | Electrical Equipment for Measurement, Control and Laboratory Use |

**EMC Standards Applied:**

| Standard | Description | Criteria Met |
|---|---|---|
| EN 61326-1: 2006 Class B | Electro-Magnetic Compatibility Emissions, Generic | Complies as documented below |
| EN 55011: 2007 +A1: 2007 | Conducted Emissions – Voltage Class B | Pass Class B |
| EN 55011: 2007 +A2: 2007 | Radiated Emissions – Class B | Pass Class B |
| EN 61000-3-2: 2006 | Harmonic Current Emissions | Pass |
| EN 61000-3-3: 2005 +A1: 2001 +A2: 2005 | Voltage Fluctuations/Flicker | Pass |
| IEC 61000-4-2: 1995 +A1: 1998 +A2: 2001 | Electrostatic Discharge Immunity | Pass Criteria A |
| IEC 61000-4-3: 2006 | Radiated Electromagnetic Field Immunity | Pass Criteria A |
| IEC 61000-4-4: 2004 | Electrical Fast Transient/Burst Immunity | Pass Criteria A* |
| IEC 61000-4-5: 2006 | Surge Immunity | Pass Criteria A |
| IEC 61000-4-6: 2007 | Conducted Radio Frequency Immunity | Pass Criteria A |
| IEC 61000-4-11: 2004 | Voltage Dips Interruptions and Variations | Pass Criteria A |
| IEC 61010-1: 2001 | Safety requirement for electrical equipment for measurement, control and laboratory use | Pass |

* Note 1, A ferrite (Fair-Rite part #0431164181) was placed around a shielded power cord.

I, **Steve Fey**, hereby declare that the equipment specified above conforms to the above Directives and Standards.
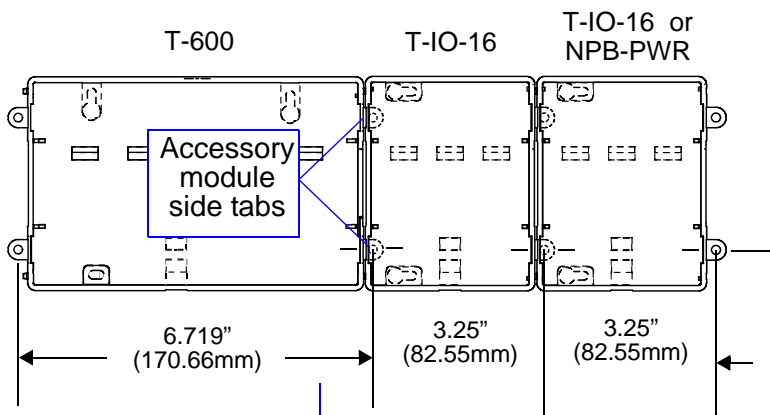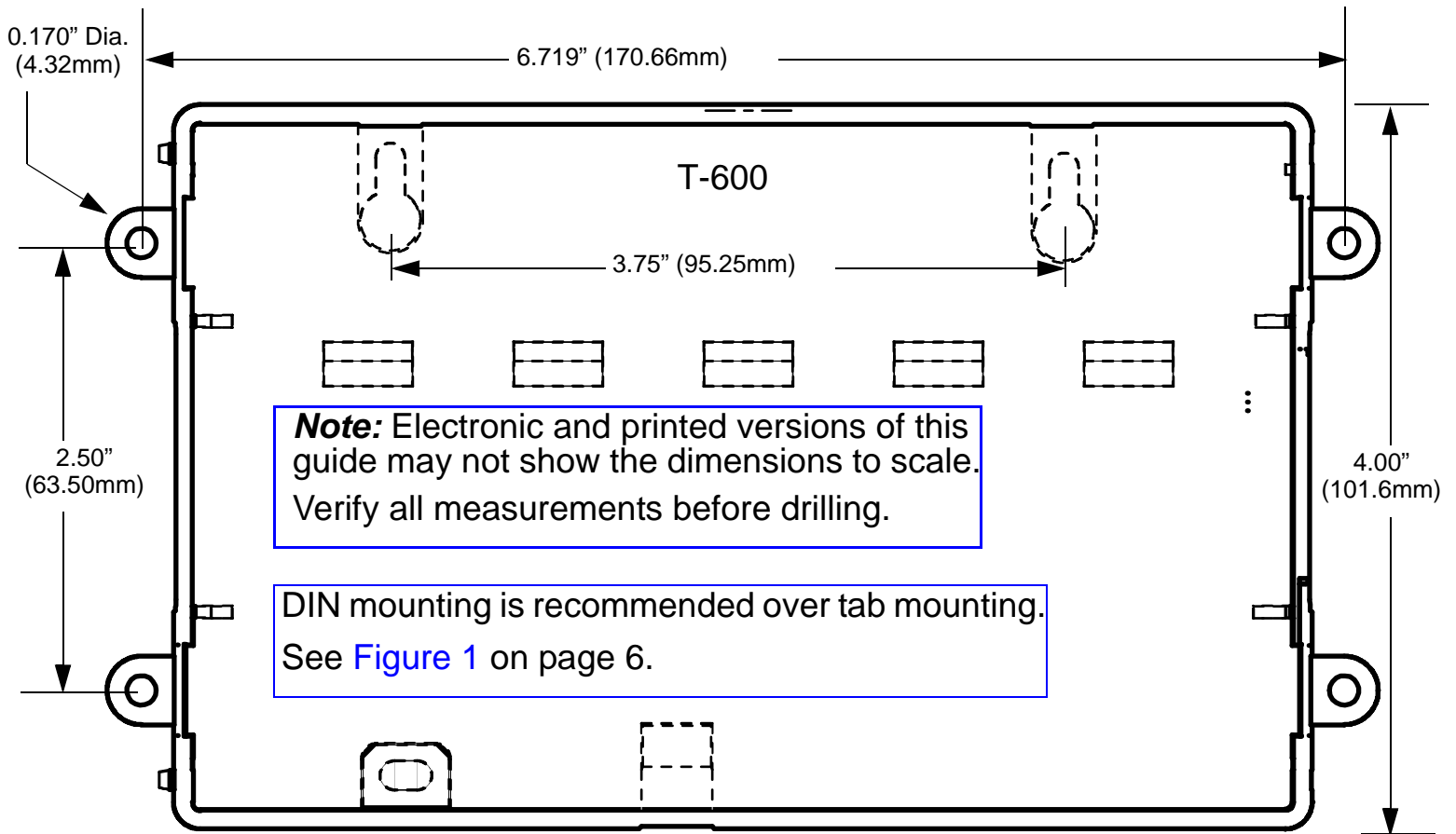
President, Tridium Inc.                                                    December, 2010

# Tab Mounting Dimensions

0.170" Dia.
(4.32mm)

6.719" (170.66mm)

T-600

3.75" (95.25mm)

2.50"
(63.50mm)

4.00"
(101.6mm)

**Note:** Electronic and printed versions of this guide may not show the dimensions to scale. Verify all measurements before drilling.

DIN mounting is recommended over tab mounting. See Figure 1 on page 6.

T-600          T-IO-16          T-IO-16 or NPB-PWR

Accessory module side tabs

6.719"
(170.66mm)

3.25"
(82.55mm)

3.25"
(82.55mm)

Distance between center of tabs from one unit to another unit.

**Tip:** If mounting accessory modules, future removal/replacement of the controller is simplified if you do **not** install screws in the "accessory module side" tabs of the controller (see above).

NPM-PWR,
NPB-PWR-UN,
or T-IO-16

3.48"
(88.55mm)

2.50"
(63.50mm)