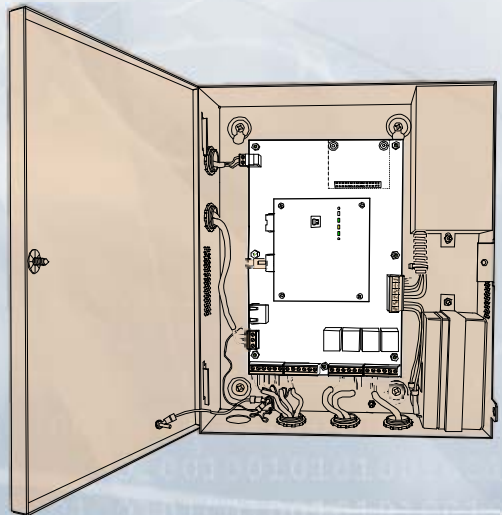


## 12

## T-RB-603 and T-RB-645 Retrofit Board Install Guide

The T-RB-603 and T-RB-645 are direct-fit replacement circuit boards for Tridium® JACE-403 (T-403) and JACE-545 (T-545) model controllers. Installation upgrades either unit without the need for any wiring changes, and provides increased performance along with the option to support either Niagara R2 or NiagaraAX 3.6 or higher, per the controller's installed license file. Each circuit board uses an NPM6E processor module that runs the QNX real-time operating system and Oracle Hotspot Java VM, ensuring NiagaraAX compatibility with current and future releases.



# TABLE OF CONTENTS

<b>About This Guide .....</b>	<b>3</b>
Related Documentation .....	3
<b>Product Description .....</b>	<b>4</b>
Board Features .....	4
<b>Preparation .....</b>	<b>5</b>
Included in this Package .....	5
Material and Tools Required .....	5
<b>Precautions .....</b>	<b>5</b>
Safety Precautions .....	6
Static Discharge Precautions .....	6
WEEE (Waste of Electrical and Electronic Equipment) .....	6
<b>Installation .....</b>	<b>7</b>
Pre-Installation .....	7
Replace the controller circuit board .....	7
<b>Power Up and Initial Checkout .....</b>	<b>11</b>
Controller LEDs .....	12
Controller Jumpers .....	13
Option Card Installation (NiagaraAX units only) .....	15
<b>Battery Replacement Notes .....</b>	<b>17</b>
Replacing the battery .....	17
Battery-less option .....	18
<b>Certifications .....</b>	<b>19</b>
Underwriters Laboratories (UL) / Canadian Standards Associations (CSA) .....	19
Federal Communications Commission (FCC) .....	19
Industry Canada Interference-Causing Equipment Standard (ICES) .....	19
Declaration of RoHS Compliance .....	19

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# About This Guide

This document covers the installation of the retrofit upgrade circuit boards for JACE controllers, models JACE-403 and JACE-545. It assumes that you are an engineer, technician, or service person who has experienced performing control system installations. Instructions in this document apply to the following products:

Model	Description
T-RB-603	Direct-fit replacement circuit board for a JACE-403 controller, with matching connector sockets for unplug-replug <sup>a</sup> installation with existing controller wiring. The board uses an NPM6E processor module with a PowerPC 440EP CPU, 256MB DDR RAM, 128MB Serial Flash, 512KB Boot Flash, 512KB Static RAM (SRAM), and runs the QNX Real-time Operating System, and the Oracle Hotspot Jave Virtual Machine. The unit can host either a Niagara R2 station (Niagara 2.301.535 or later) or a NiagaraAX station (NiagaraAX 3.6.45 or later), depending on installed license. Regardless of release, Niagara host (platform) configuration requires NiagaraAX Workbench 3.6.45 or later. If hosting an R2 station, the existing R2 Niagara Java Desktop Environment (JDE) is used to access the controller's running station.
T-RB-645	Direct-fit replacement circuit board for a JACE-545 controller, with matching connector sockets for unplug-replug <sup>a</sup> installation with existing controller wiring. The board uses an NPM6E processor module with a PowerPC 440EP CPU, 256MB DDR RAM, 128MB Serial Flash, 512KB Boot Flash, 512KB Static RAM (SRAM), and runs the QNX Real-time Operating System, and the Oracle Hotspot Jave Virtual Machine. The unit can host either a Niagara R2 station (Niagara 2.301.535 or later) or a NiagaraAX station (NiagaraAX 3.6.45 or later), depending on installed license. Regardless of release, Niagara host (platform) configuration requires NiagaraAX Workbench 3.6.45 or later. If hosting an R2 station, the existing R2 Niagara Java Desktop Environment (JDE) is used to access the controller's running station.

a. Onboard dialup modem module is not supported.



**Note** Not covered in this document is the Niagara R2 or Niagara<sup>AX</sup> software installation and configuration required for a fully functioning unit. See the [“Related Documentation”](#) section below.

## Related Documentation

For software details on configuring and using the JACE-403 or JACE-545 controller with the installed retrofit upgrade circuit board, consult the following documents:

- *Retrofit Board Niagara R2 Install & Startup Guide* (if Niagara R2)
- *JACE NiagaraAX Install and Startup Guide* (if NiagaraAX)
- *JACE Data Recovery Service (SRAM Support) - Engineering Notes* (if NiagaraAX)

For other mounting and wiring details, including all field wiring and power wiring to the controller, please refer to the original mounting and wiring document that shipped with the JACE-403 or JACE-545 controller.

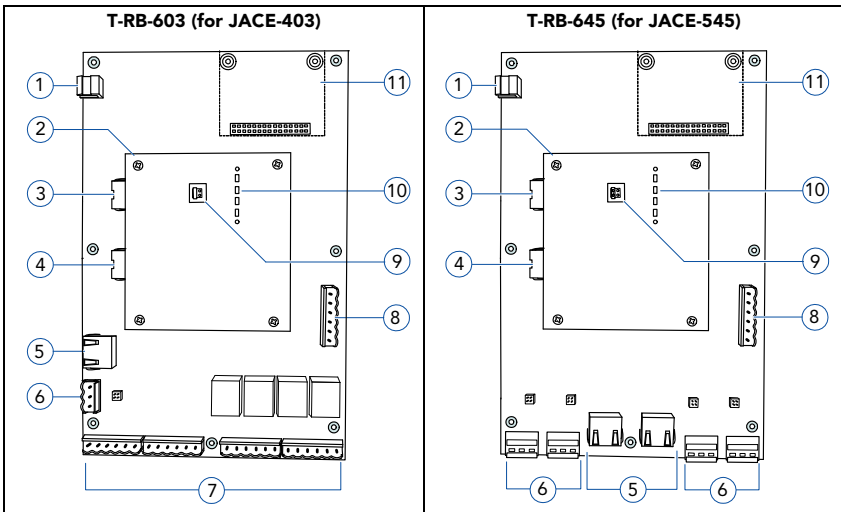
# Product Description

The retrofit T-RB-603 or T-RB-645 circuit board upgrades an existing JACE-403 or JACE-545 controller to a unit with a next generation NPM6E processor. The unit runs the QNX operating system and the Oracle Hotspot JVM. Compatibility with an existing R2 station is available, or the controller can run a NiagaraAX station instead. Support for either R2 or AX is specified in the license file installed in the controller. For complete specifications, please refer to the data sheets for the retrofit boards.

## Board Features

Both retrofit circuit boards are “plug compatible” with the controller board being replaced, allowing easy installation. [Figure 1](#) show important features.

*Figure 1 Retrofit circuit boards.*



### Item Description

- 1 FTT-10 LonWorks connector.
- 2 NPM6E Processor module mounted on circuit board.
- 3 10/100 Mbit/s Ethernet LAN 2 (secondary port, requires NiagaraAX for operation).
- 4 10/100 Mbit/s Ethernet LAN 1 primary port.
- 5 RS-232 Serial Port(s), RJ-45 connector (one on T-RB-603, two on T-RB-645).
- 6 RS-485 Serial Port(s), 3-position connector (one on T-RB-603, four on T-RB-645). Ports have RS-485 biasing jumpers. See “[RS-485 port biasing](#),” page 14.
- 7 Input/Output connectors on T-RB-603 (UIs 1- 6 left side, ROs 1-4 right side)
- 8 Power input connector (from unit’s transformer and battery).
- 9 Jumper block for serial shell mode selection.
- 10 Controller Status LEDs
- 11 30-pin JACE option card slot (requires NiagaraAX for operation). See “[Option Card Installation \(NiagaraAX units only\)](#),” page 15.



## Preparation

Unpack the retrofit circuit board and inspect the package contents for damaged or missing items. If damaged, notify the appropriate carrier and return for immediate repair or replacement.

- [Included in this Package](#)
- [Material and Tools Required](#)

## Included in this Package

Included in this package you should find the following items:

- The JACE controller circuit board with mounted NPM6E processor module, either model T-RB-603 (for JACE-403) or model T-RB-645 (for JACE-545).
- A hardware bag with four (4) “spare” 6-32 Keps nuts, for 1/4” (6mm) socket.
- This *T-RB-603 and T-RB-645 Retrofit Board Install Guide* document.

## Material and Tools Required

The following supplies and tools are used for installation:

- 1/4” (6mm) thin-walled *socket*: used to remove and refasten the seven Keps nuts that secure the controller’s circuit board, and also the enclosure door grounding wire. If installing an option card (NiagaraAX units only), a #2 Phillips screwdriver.
- A small “three-pronged parts retriever” can also be useful, see [Step 4](#) on page 9.
- Recommended: An anti-static wrist strap, connected to earth ground, to use when handling the retrofit circuit board. See “[Static Discharge Precautions](#),” page 6.



**Note** If the controller’s existing 12V, 1.2A-hr sealed lead-acid backup battery in has not been replaced in the last two years, you may wish to replace it when installing the retrofit circuit board. The Tridium part number for this battery is 10023. See “[Battery Replacement Notes](#),” page 17.

## Precautions

This document uses the following warning and caution conventions:



**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 in 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 replacement circuit board. Be sure to heed these warnings to prevent personal injury or equipment damage.



### Warning

- **A 120Vac or 240Vac circuit powers the transformer in the unit.**
- **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.**

## Static Discharge Precautions

Static charges produce voltages high enough to damage electronic components. The JACE printed circuit board contains components that are sensitive to static discharge. Follow these precautions when installing the replacement board:



### 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 printed circuit boards (PCBs) without proper protection against static discharge. Use a wrist strap when handling PCBs. The wrist strap clamp must be secured to earth ground.

## 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  
RH13 8GR 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

# Installation

Installation is summarized in the following sections:

- [Pre-Installation](#)
- [Replace the controller circuit board](#)

## Pre-Installation

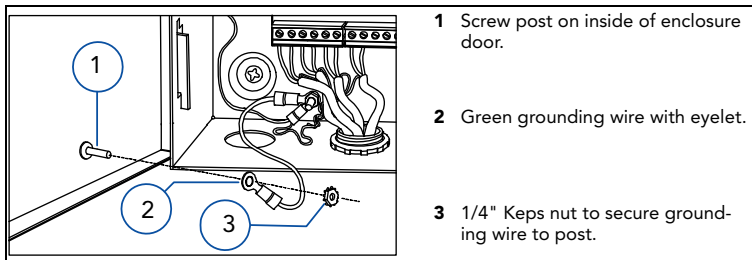
### Procedure 1 Backup the existing station database

- Step 1 Using the appropriate Niagara R2 or NiagaraAX tools (R2 JDE or AX Workbench), open a connection to the existing JACE-403 or JACE-545, and save the station database and any associated files to your local PC.
- Step 2 Close the Niagara connection to the controller, and place all controlled equipment under manual control.

### Procedure 2 Remove the enclosure door (optional)

Removing the enclosure door should allow more light inside the unit, and may make it easier to access the mounting nuts and connectors.

- Step 1 Open the JACE enclosure door about half way.
- Step 2 If the grounding wire near the bottom is fastened to the screw post on the inside of the door, use a 1/4" (6mm) socket to unfasten it from the door.



Set the nut aside to reuse later.

- Step 3 Slide the door towards the top of the unit, until the hinge tabs on the door clear the hinge slots on the enclosure.
- Step 4 Lift the door away from the unit.
- When done, replace the door and grounding wire in the reverse fashion.

## Replace the controller circuit board



**Caution** Be aware of small surface-mounted components on circuit boards near each mounting point!

- Use a 1/4" (6mm) thin-walled *socket*, not a nut driver, to carefully loosen or tighten the nuts that secure the circuit board to the 7 mounting studs. A nut driver can cause board damage to adjacent components, while a socket (if used carefully) typically does not.

Also see "Static Discharge Precautions," page 6.

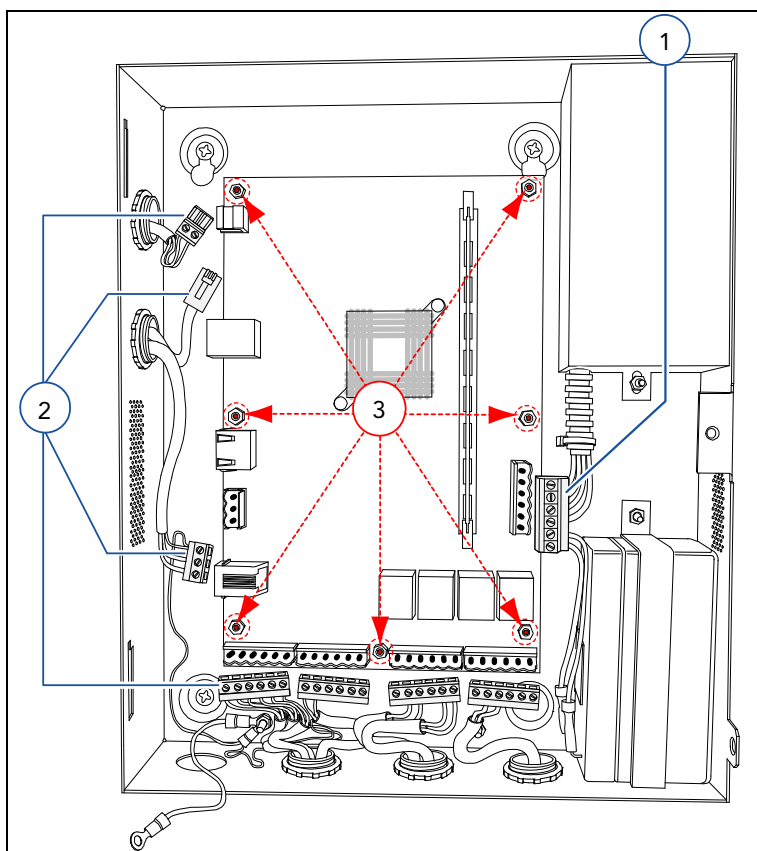
**Procedure 3 Remove the existing controller circuit board**

- Step 1 If a JACE-403 controller with I/O points with voltage, turn the devices off or disconnect power to them.
- Step 2 Remove building power to the controller enclosure, typically by turning off a nearby switch (if wired), or a circuit breaker.
- Step 3 Unplug the 6-position power plug from the circuit board connector, and unplug the remaining connectors (see [Figure 2](#)).



**Note** Label cables/plugs if necessary, so you can replug into the right connectors.

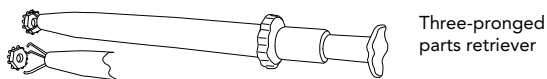
*Figure 2 Unplug connectors from existing board (JACE-403 shown).*



Item	Description
1	6-position power plug.
2	Other connector plugs (LON, Ethernet, RS-232, RS-485, I/O (if JACE-403).
3	Seven (7) 1/4" (6mm) Keps nuts mounting circuit board to studs and standoffs.



- Step 4 Using a 1/4" (6mm) thin-walled socket, loosen the seven Keps nuts (see [Figure 2](#)). To avoid dropping them, use a “three-pronged parts retriever” to finish removing each one, spinning the nut off the stud. Retain each Keps nut.



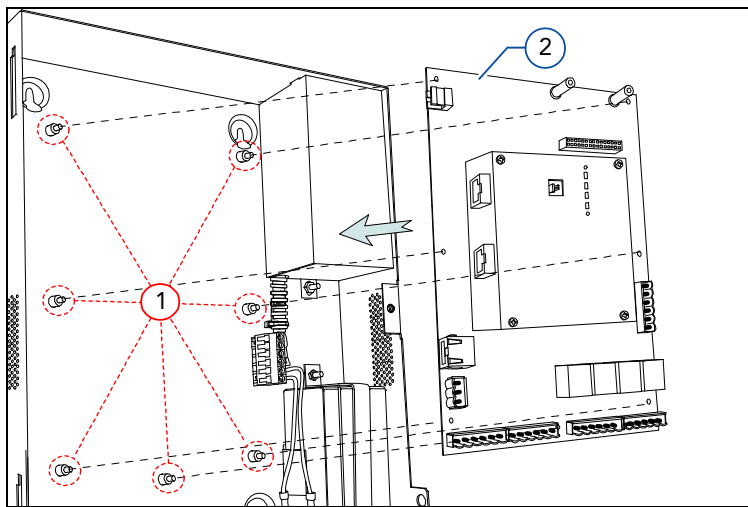
- Step 5 With all connector plugs and seven Keps nuts removed, pull the circuit board forward to remove from the studs and standoffs.
- Step 6 Discard the old circuit board, observing all local and federal recycling regulations. See “[WEEE \(Waste of Electrical and Electronic Equipment\)](#),” page 6.



**Note** If configuring the unit for NiagaraAX *and* using an option card, you may wish to add a new enclosure knockout now, **before** installing the retrofit board. See the [Note](#) on page 15 for more details.

#### Procedure 4 Install the retrofit controller circuit board

- Step 1 With the old circuit board removed, make sure all seven mounting studs have standoffs. If any standoff dropped off, replace it on the mounting stud.



Item	Description
1	Seven (7) mounting studs with standoffs.
2	New retrofit circuit board with NPM6E processor module (T-RB-603 shown).

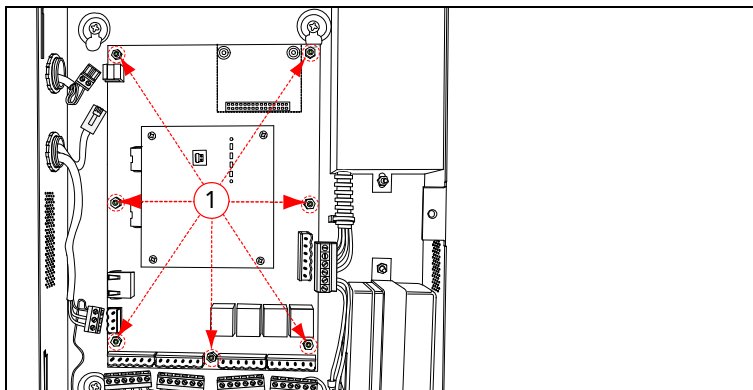
- Step 2 Mount the retrofit board onto the seven mounting studs.



**Caution** Be **careful** when refastening mounting nuts, mindful of delicate surface mount components near mounting holes. **Do not overtighten nuts.**

Step 3 Start replacing Keps nuts onto mounting studs. To avoid dropping them in the enclosure, use a “three-pronged parts retriever” to grip each nut, spinning it onto a mounting stud. [Figure 3](#) shows the location of the studs.

*Figure 3 Retrofit circuit board (T-RB-603) mounting studs.*



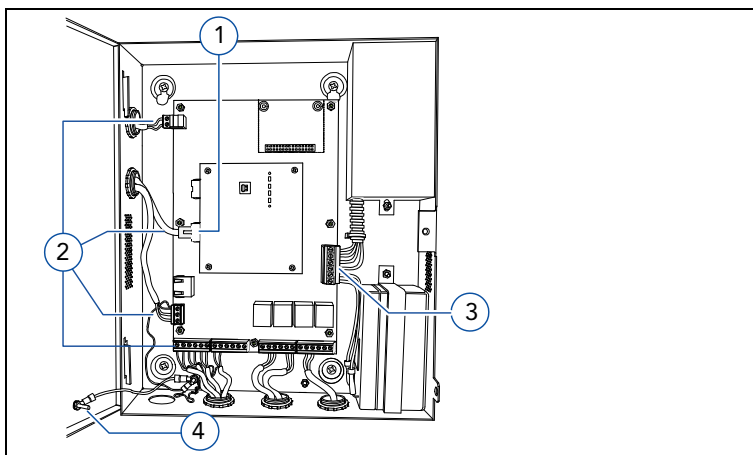
#### Item Description

- 1 Install Keps nut onto each of the seven (7) mounting studs with standoffs.

Step 4 Use a 1/4" (6mm) thin-walled socket to finish, hand tightening the nuts.

Step 5 Replug connector plugs into board connectors, with the power plug **last**.

*Figure 4 Replug connectors from cabling, and remount door (if removed).*



#### Item Description

- 1 NOTE: Use the LAN1 (lower) port on NPM6E module for Ethernet. Initially, you may connect an Ethernet patch cable between LAN1 and your Workbench PC.
- 2 Replug all field cabling connectors.
- 3 Replug the power input connector last.
- 4 Replace the enclosure door (if removed), refastening ground wire to door stud.

- Step 6 Replace the enclosure door (if removed), refastening the grounding wire to the door stud. See [“Remove the enclosure door \(optional\),”](#) page 7.
- Step 7 If installing an option card (NiagaraAX units only), see [“Option Card Installation \(NiagaraAX units only\),”](#) page 15.
- Step 8 If replacing the backup battery, see [“Battery Replacement Notes,”](#) page 17.

## Power Up and Initial Checkout

Following the installation of the retrofit circuit board, and also optionally the 12V sealed lead-acid battery, perform the following:

### Procedure 5 Initial power up and checkout.

- Step 1 Restore building power to the controller enclosure, typically by turning on a nearby switch (if wired), or a circuit breaker. If the 6-position power connector plug is not inserted into the circuit board connector, do that now.
- Step 2 Verify the “STATUS” LED (on the NPM6E processor module) is lit green. This indicates that the system is OK and that power is applied.  
  
Once the JACE boots, the adjacent yellow “BEAT” (heartbeat) LED begins 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 2 minutes, contact Systems Engineering for technical assistance. Also see [“Controller LEDs,”](#) page 12.
- Step 3 To commission the JACE, open a Workbench AX-3.6.45 or later host (platform) connection to the controller.

You can do this using an Ethernet patch cable between your Workbench PC and the LAN1 (primary) port on the NPM6E processor module, where the the factory default IP address for the LAN1 port is: **192.168.1.12n**

where **n** is the last numeral of the controller’s serial number

and the default subnet mask is **255.255.255.0**

Then in the commissioning process, you reassign IP parameters as before.

Or, first you can move a jumper on the NPM6E module to put the controller in “serial shell mode”. Then after rebooting it, you can communicate using an RS-232 connection between your PC and the RS-232 COM1 port on the controller’s base board. This lets you use “system shell” to reassign its IP parameters **before** starting the commissioning process from Workbench. See [“Serial Shell Mode”](#) on page 13.

See [“Related Documentation,”](#) page 3, for software commissioning details, including details on the system shell menu available in serial shell mode.

## Controller LEDs

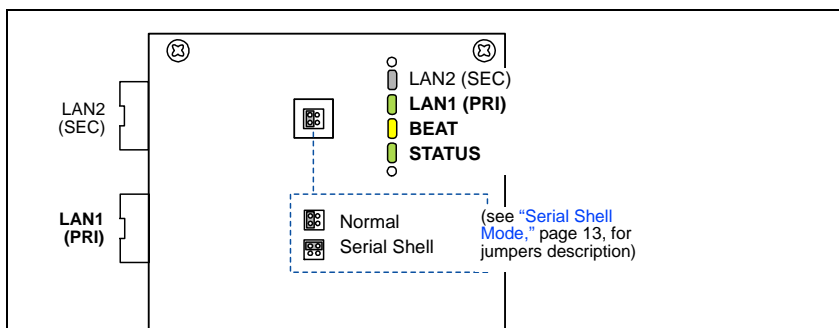
The retrofit circuit board provides a number of LEDs, including the following:

- [LEDs on NPM6E processor module](#) - Ethernet, Heartbeat, Status
- [LEDs on main circuit board](#) - LON, Serial, (and if T-RB-603), Relay Output Status

### LEDs on NPM6E processor module

Figure 5 shows the LEDs on the NPM6E processor module, with descriptions below.

Figure 5 LEDs and mode jumper positions on NPM6E processor module.



### Ethernet

Each 10/100Mb Ethernet port, “LAN2” (Secondary) and “LAN1” (Primary) has one green LED on the NPM6E module. LED activity for an Ethernet port is 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.



**Note** The LAN2 (Secondary) Ethernet port is not supported in Niagara R2.

### BEAT

(Heartbeat) In normal operation, the yellow “BEAT” 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.



**Caution** During boot-up of a JACE-403 with retrofit board, the heartbeat LED may blink in a 90% on — 10% off pattern. This is typical during a *core software upgrade*. **Do not remove power during this period**, or data loss may result (I/O module’s firmware upgrade may be in progress).

### STATUS

The “STATUS” LED provides a CPU machine status check, and should remain lit whenever the JACE is powered. If the STATUS LED does not light while power is applied, contact System Engineering for technical support.



## LEDs on main circuit board

The T-RB-603 and T-RB-645 main circuit board has LEDs for [LON](#) and [Serial](#) ports, and if a T-RB-603, also [Relay Output Status](#) LEDs, described as follows:

### LON

Two LEDs are located near the LON port and show transmit and receive activity.

- The *yellow* transmit LED (TxD) indicates that the JACE is *transmitting* a message on the LON trunk.
- The *green* receive LED (RxD) indicates that another LonWorks device is transmitting a message.

### Serial

Two LEDs for each RS-232 and RS-485 serial port are located near the ports on the main circuit board. They show transmit and receive activity for these serial ports.

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

These LEDs are driven by pulse detectors that 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.

### Relay Output Status

If a T-RB-603 (only), there are four (4) relay output status LEDs. These *yellow* LEDs are located below the associated form-C relay, just above the screw terminals for each output's wiring. Under normal operation, LEDs indicate activity as follows:

- Off—Relay coil is not energized
- On—Relay coil is energized

Therefore, for a circuit with a normally open contact, an On status indicates that the contact is closed. For a circuit with a normally closed contact, an On status indicates that the contact is open.

## Controller Jumpers

The retrofit circuit board has jumper blocks to allow for [Serial Shell Mode](#) operation and for [RS-485 port biasing](#), as described below.

### Serial Shell Mode

The controller's NPM6E processor module has a four-pin jumper header and one 2-pin jumper block that you can reposition, as needed, to enable or disable "serial shell mode" operation of the JACE. In this mode, the RS-232 COM1 port on the controller allows "system shell" menu access, using serial parameters: 115200, 8, N, 1.



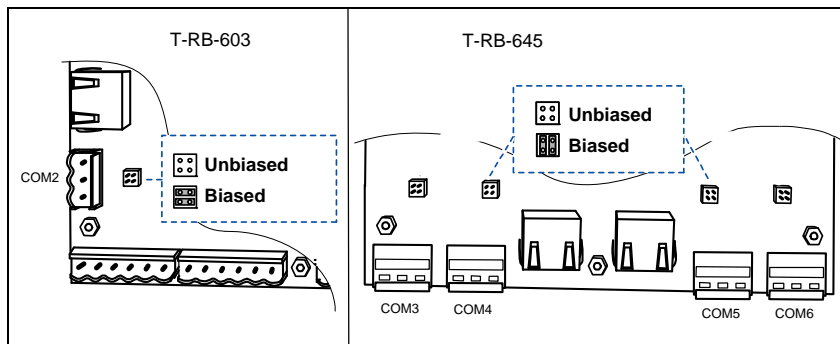
**Note** You must reboot the controller after repositioning this jumper before any serial shell change becomes effective. When done, don't forget to return to the jumper block to its normal position and reboot again.

The default jumper setting is "Normal" (no serial shell), see [Figure 5](#) on page 12.

## RS-485 port biasing

The T-RB-603 has one non-isolated RS-485 port (COM2) on the left side of the circuit board, while the T-RB-645 has four optically-isolated RS-485 ports (COM3, COM4, COM5, COM6) along the bottom of the circuit board.

Figure 6 RS-485 bias jumpers on T-RB-603 and T-RB-645.



Each RS-485 port has an adjacent four-pin jumper header, on which you can install *two* 2-pin jumper blocks to enable “RS-485 biasing”, if needed. See Figure 6 above.

As shipped from the factory, these pins are not shorted, thus each RS-485 port is *unbiased*. This matches the default configuration of the original (replaced) circuit board. See “Need for RS-485 bias” for related background details.

### 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 an RS-485 port’s 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.



- Note**
- In general, only *one device* on an RS-485 trunk should be biased. Otherwise, undue circuit loading 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.



## Option Card Installation (NiagaraAX units only)

The T-RB-603 or T-RB-645 retrofit circuit board provides one 30-pin option card slot, compatible with JACE 2/6 style option cards. Option card usage is supported only if the unit is configured with NiagaraAX (and *not* Niagara R2).



**Warning** Power to the controller must be OFF when installing or removing an option card, or damage will occur!

**Also, you must be very careful to plug an option card into the connector properly (pins aligned).**

Refer to the installation document that accompanies a specific option card for complete details.



**Note**

- The existing JACE-403 or JACE-545 enclosure lacks a top wiring knockout (near the option card location). If configuring a retrofit unit for NiagaraAX and using an option card, you will need to *route its associated cabling* around to a bottom or left-side wiring knockout.
- Alternatively, using the appropriate electrical knockout punch, you could *add* a top wiring knockout on the enclosure. In this case, it is strongly recommended to do this *after* removing the old circuit board, **but before** installing the new T-RB-603 or T-RB-645 retrofit board! Otherwise, damage to the retrofit board could easily occur.

Table 1 lists the different option cards types, with notes specific to each retrofit board. Procedure 6 provides a basic set of installation steps.

*Table 1 Option card types and NiagaraAX notes, by retrofit circuit board type*

Option card model/type	T-RB-603 (JACE-603) Notes	T-RB-645 (JACE-645) Notes
NPB-232 (Single RS-232 port)	Uses COM3	Uses COM7
NPB-2X-485 (Dual RS-485 ports)	Uses COM3 and COM4	Uses COM7 and COM8
NPB-LON (LonWorks FTT-10)	Operates as LON2	
NPB-GPRS-W (Wireless GPRS modem)	Uses COM3 and COM4	Uses COM7 and COM8
NPB-SED-001 (Wireless Sedona Jennic option)	Uses COM3 (not available to station)	Uses COM7 (not available to station)
NPB-ZWAVE (Wireless Z-Wave serial gateway)	Uses COM3	Uses COM7
NPB-SRAM (SRAM option)	Not Supported (NPM6E processor module has own SRAM).	
NPB-MDM (Dialup modem)	Not Supported	

### Procedure 6 Installing an option card (NiagaraAX units only).

- Step 1 If applicable, backup the controller's configuration to your PC using platform tools in NiagaraAX Workbench.
- Step 2 **Stop** any running station, using the Application Director platform view.

- Step 3 Unplug the 6-position power connector from the circuit board.
- Step 4 Using a #2 Phillips head screwdriver, remove the two screws from the option card mounting posts, and set them aside.
- Step 5 Carefully insert the pins of the option card into the option card socket. The mounting holes on the option card 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 Replace the two screws through the end plate and into the standoffs on the controller's base board. Using a screwdriver, hand tighten these screws.
- Step 8 Plug in the power connector in and verify operation.



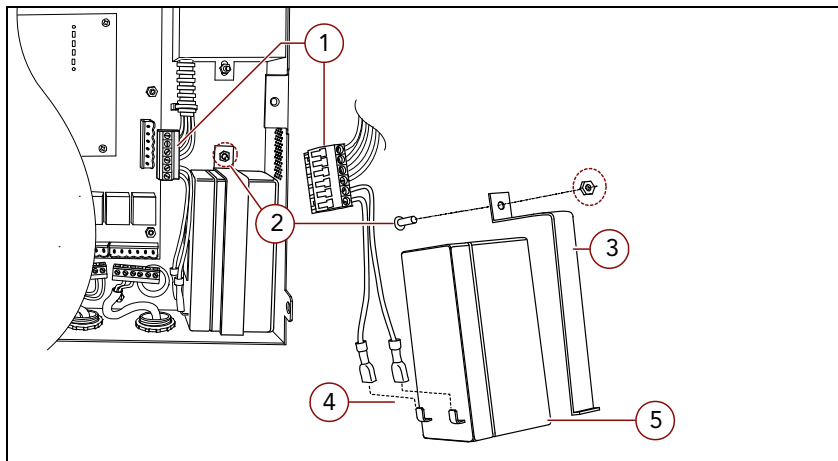
## Battery Replacement Notes

Typically, regular maintenance includes eventual replacement of the 12V sealed lead-acid backup battery (unless a NiagaraAX unit installed *without* the battery—see “Battery-less option” on page 18).

Battery life is determined largely by ambient temperature conditions. If the controller is installed in a conditioned space, and has seen relatively few discharges (typical), an average battery life is around 3 years.

When installing the retrofit board, it may be convenient to also replace this battery. The battery is secured in the enclosure by a metal bracket and a nut (Figure 7).

*Figure 7 12V sealed lead-acid battery in JACE-403 or JACE-545 enclosure.*



Item	Description
1	6-position power connector (unplug when replacing battery).
2	Enclosure mounting stud and Keps nut securing battery strap.
3	Metal battery bracket (bottom hooks into slot in enclosure bottom).
4	Quick-connect Faston battery terminals.
5	12V 1.2Ah sealed lead-acid battery, with 0.187" Faston quick-connect terminals.



**Warning** When replacing the battery or harness, maintain proper polarity as marked on the label inside the unit. Although the controller is fully protected against shorted battery terminals, the battery itself is not internally protected. Use extreme care to not short circuit the battery. A shorted battery may overheat rapidly and damage the power wiring harness or cause other physical harm to the hardware.

## Replacing the battery

To replace the battery, follow the steps in [Procedure 7](#).

**Procedure 7 Replacing the 12V sealed lead-acid backup battery.**

- Step 1 If applicable, backup the controller's configuration to your PC using platform tools in NiagaraAX Workbench.
- Step 2 **Stop** any running station, using the Application Director platform view.
- Step 3 Unplug the 6-position power connector. Do not remove the male connector plug from the wiring harness.
- Step 4 Use a 1/4" (6mm) socket, unscrew the lock nut from the battery bracket.
- Step 5 Hold the battery in place while you remove the battery bracket.
- Step 6 Disconnect the two quick-connect terminals on the battery.



**Note** The JACE will lose its time and date settings if it is disconnected from both battery and AC power for more than one hour.

- Step 7 Remove the old battery and recycle as defined by your regional codes. For recycling within the US, see the labeling on the battery.
- Step 8 Connect the quick-connect terminals to the new battery, ensuring that the:
- a RED (+) wire is connected to the positive battery terminal
  - b BLACK (–) wire is connected to the negative battery terminal.
- Step 9 Secure the new battery to the bottom of the unit with the bracket and tighten the lock nut.
- Step 10 Plug in the power connector in and verify normal operation.

**Battery-less option**

A unit running NiagaraAX (*not* Niagara R2) can be software configured to operate “battery-less”, using only the onboard SRAM of the NPM6E processor module to maintain data in a power loss or brownout event. Or, the unit can be configured to use *both* its sealed lead-acid backup battery and SRAM backup.



**Note** Although a JACE-603 or JACE-645 (running NiagaraAX) *can* be configured to run without its provided backup battery, in most cases it is expected for the *battery to be used*. This provides immunity to “power quality events” including momentary power outages or brownouts—which otherwise can result in a controller *reboot*—even if for only one or two AC cycles (1/60th or 1/30th of a second).

For a number of reasons, *other* models of SRAM-equipped controllers running NiagaraAX *may* be better candidates for a “battery-less” installation. Typically such controllers use a smaller, more difficult-to-replace NiMH (nickel metal hydride) battery pack, and are often mounted in areas harder to access than a JACE-603 or JACE-645 controller. Refer to the documents listed in the [“Related Documentation”](#) on page 3 for configuration details on SRAM support.



# Certifications

## Underwriters Laboratories (UL) / Canadian Standards Associations (CSA)

This equipment has been tested and is recognized:

- UL 916 Standard For Energy Management Equipment - Edition 4 - Revision Date 2010/06/04, File E207782: Recognized component listing as 12112 (T-RB-603) and 12113 (T-RB-645).
- CSA C22.2 No. 205 Signal Equipment - Edition 1 - Issue Date 1983/06/01

## Federal Communications Commission (FCC)

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 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. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## Industry Canada Interference-Causing Equipment Standard (ICES)

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

## Declaration of RoHS Compliance

This product meets all requirements of RoHS Directive (EU 2012/19/EU). 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 6.

