

# JACE 7 Wifi Option T7-WIFI

## INSTALL GUIDE

This document covers the hardware installation of the 802.11b/g Mini-PCI wireless networking option (T7-WIFI) in a Tridium® T-700 (JACE 7) controller.



**Note** This device is to be installed only by a qualified Tridium representative.

**Table 1 T7-WIFI description.**

Description	Notes
Provides WiFi LAN connectivity using the IEEE 802.11 b/g standard, seen as "Interface 3" in the TCP/IP Configuration of the T-700 platform. Installs in the controller's Mini-PCI slot, using a short micro-coax cable that allows the included stub antenna to be mounted on the controller. A 6.6 ft. (2m) coax extension cable and bracket is also included.	<b>It is highly recommended that you remove the controller from any mounting, and use a flat, well-lit, anti-static (ESD safe), surface to install this adapter card in the controller.</b> <b>Pre-installation</b> requires careful attachment of the micro-coax cable to the Mini-PCI WiFi card. <b>Mounting</b> requires removing all power from the controller, followed by removal of its cover, NiMH battery with bracket, any installed option card(s), and finally its metal shield. After installing the WiFi adapter card, you replace these items in the reverse order.



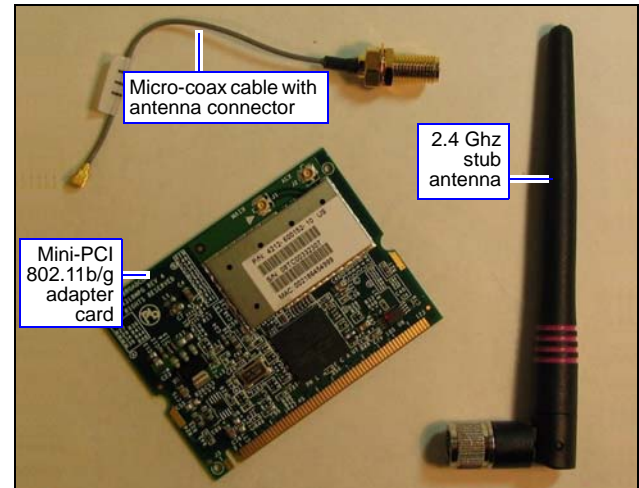
**Note** The controller requires NiagaraAX-3.6 or later to support operation of the T7-WIFI.

Not covered in this document is the *software setup and operation* of the installed WiFi network adapter. Refer to the *NiagaraAX JACE WiFi option - Engineering Notes* document. See "[Related Documentation](#)," page 10.

### Included in this Package

- a Mini-PCI 802.11b/g network adapter card.
- a short "micro-coax" cable with a U.FL connector end and an RP-SMA coax end (for antenna).
- a tilt-and-swivel, RP-SMA 2.4 Ghz stub antenna.
- a 6.6 ft. (2m) RP-SMA-type coax extension cable and metal bracket for relocating the antenna.
- an FCC/IC listing label, to apply on the controller.
- This *JACE 7 WiFi Option (T7-WIFI) Install Guide*, Part Number T-11943 Rev 2.

**Figure 1 T7-WIFI (card, micro-coax cable, antenna).**



In addition to items shown in [Figure 1](#) is an included 6.6 ft. (2m) coax extension cable and metal bracket. See "[Antenna Extension Cable](#)," page 8.

### Tools and Materials Required

- 1/4" (6mm) nutdriver (NiMH battery bracket).
- #2 Phillips screwdriver (for shield and option card screws).
- Anti-static mat or equivalent ESD safe work surface is strongly recommended.
- Long-nose pliers (to grip and remove antenna connector cutout in plastic cover).
- Appropriate tools and screws for mounting the antenna bracket, if used.

### Static Discharge Precautions



**Caution** Installation requires the handling of circuit boards with components sensitive to static discharge. **To prevent equipment damage:**

- **Work in a static-free area.**
- **Discharge any static electricity you may have accumulated, by touching a known, securely grounded object.**
- **Do not handle printed circuit boards (PCB) without proper protection. Use a wrist strap when handling PCBs, with the wrist strap clamp secured to earth ground.**

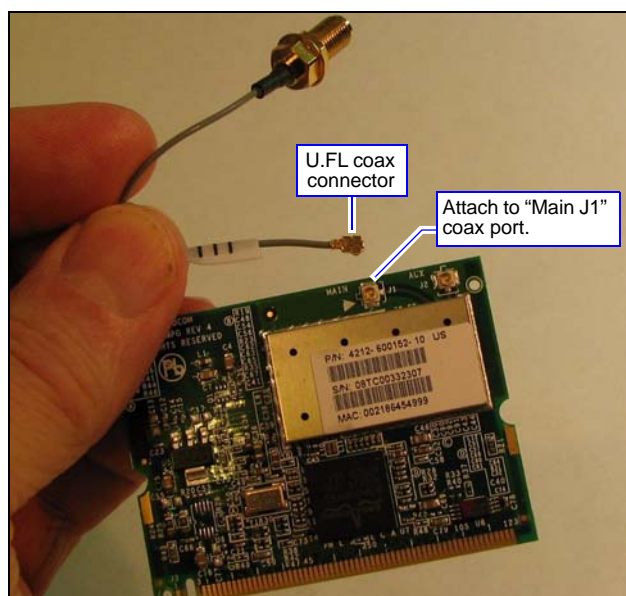
## Pre-installation

Prior to installing the WiFi adapter card, you must attach the micro-coax cable to the tiny “Main J1” coax port on the card. A “Hirose U.FL” coaxial connector is used to attach this cable, as shown in [Figure 2](#).



**Note** The U.FL coaxial connector is not designed for repeated attachments and reconnections.

**Figure 2** Mini-PCI WiFi card and micro-coax cable.

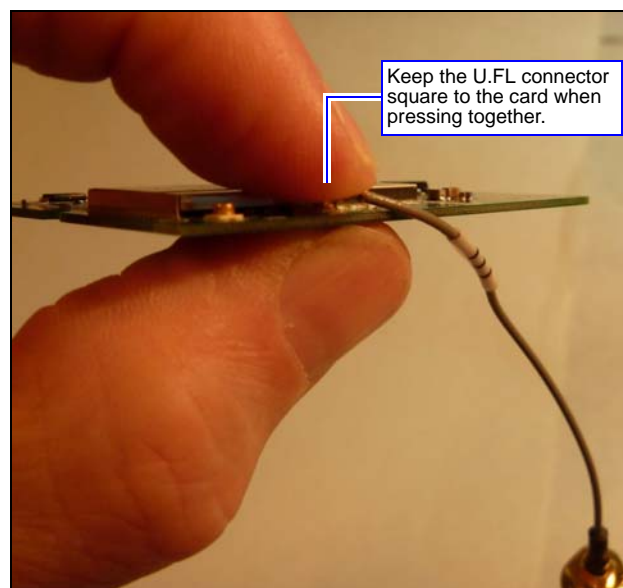


**Caution** See the previous “[Static Discharge Precautions](#),” page 1.

Be careful to attach this micro-coax cable correctly, keeping the female (U.FL) end square to the card as you press the cable onto the male port. Insertion at an angle may damage the cable or the card.

Keep the connector square to the card. You should feel a small “click” while squeezing the connector onto the card’s “Main J1” antenna port. ([Figure 3](#)).

**Figure 3** Pressing the U.FL coaxial connector together.



The click means the cable is attached—you can then carefully swivel it around as needed during the rest of the installation.

**Figure 4** Cable attached and adapter card ready to install.



**Caution** Avoid any strain on this cable while continuing with the installation of this option in the controller.

## Mounting



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

Mounting first requires pre-installation of the micro-coax cable. See “Pre-installation,” page 2.

Installation also involves removal and subsequent replacement of option cards, as follows:

- If a “**Version 1**” controller (has USB ports, as shown in figures in this document), you must remove any option card in Slot 1, in order to remove and replace the metal shield. Note that any option card in Slot 2 can remain in place.
- If a newer “**Version 2**” controller (no USB ports), you must remove any option card in *both* Slot 1 *and* Slot 2, in order to remove and replace the controller’s metal shield.

### Procedure 1 Mounting the T7-WIFI in the controller.

1. Backup the JACE controller’s configuration to your PC using the appropriate NiagaraAX software tool (for example, Workbench).
2. Stop any running station, using the Application Director platform view.
3. Remove power from the JACE—see the previous **Warning** above.



**Note** If a 12V sealed lead-acid backup battery is attached, disconnect it from the controller.

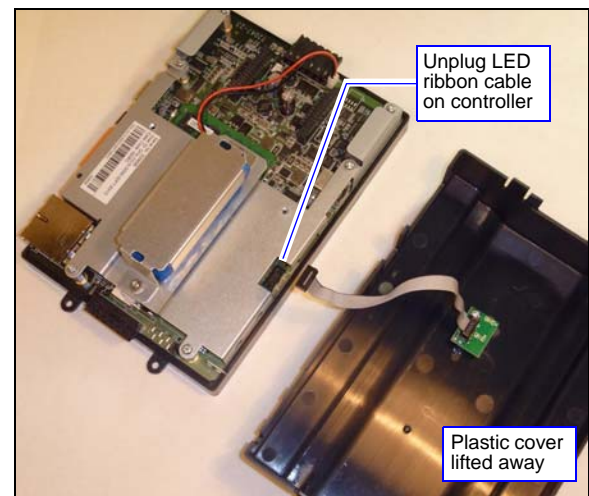
Wait for all LED activity to stop—after several seconds, all LEDs on the JACE should be off.

4. Remove the controller from any mounting and place it on a flat, well-lit surface.
5. Remove the controller’s cover. To do this, press in the four tabs on both ends of the unit, and lift the cover off.



**Caution** An LED ribbon cable connects the cover to the main board. Be careful when lifting the cover off.

**Figure 5 LED ribbon cable connector on controller.**

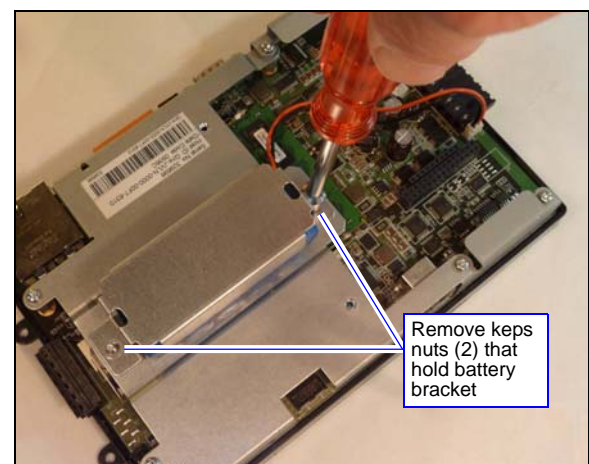


6. Unplug the LED ribbon cable from the connector on the controller, as shown in **Figure 5** above. Move the cover assembly aside for now.
7. Remove the NiMH battery and its metal bracket.



**Note** It is possible to install the option *without* removing the battery/bracket from the shield. However, removing them makes it *easier* to jockey the shield about later, when fastening the antenna coax connector in the shield hole.

**Figure 6 Remove 2 nuts and battery pack, bracket.**

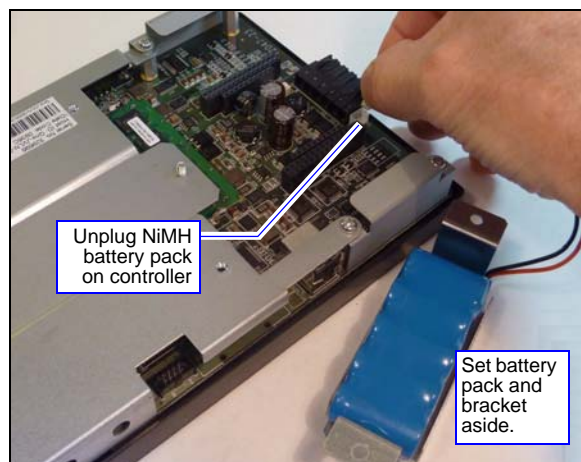


Use a 1/4" (6mm) nutdriver to unfasten the two keeps nuts that secure the bracket (**Figure 6**). Retain the nuts. Lift the battery and bracket off, keeping the two items together (**Figure 7**).



8. Unplug the NiMH battery from the main board.

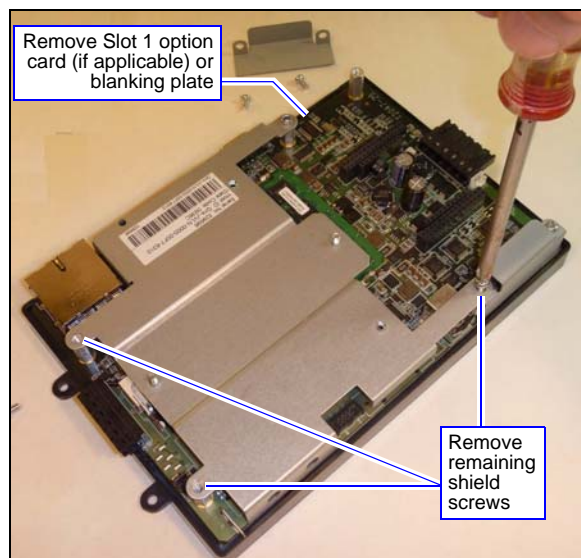
**Figure 7 Unplug NiMH battery on controller board.**



See [Figure 7](#). Set the battery pack and bracket aside, keeping them together.

9. Use a #2 Phillips screwdriver to remove the option card in Slot 1, if applicable. Otherwise unfasten the two screws that hold the Slot 1 blanking plate.

**Figure 8 Remove Slot 1 item, unfasten shield screws.**

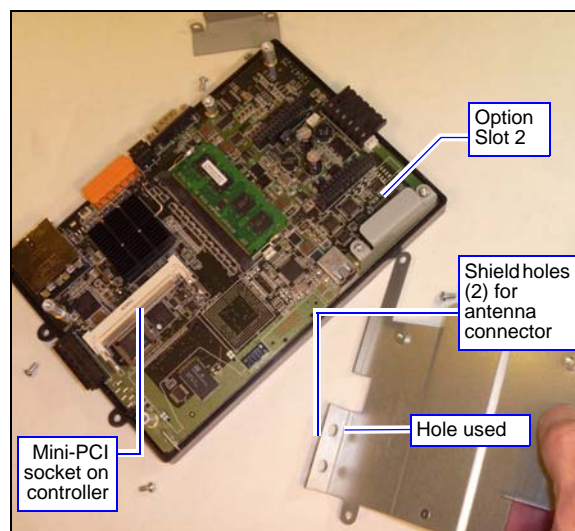


**Note** If a Version 2 controller, where a Slot 2 option card tab sits on *top* of the shield, remove that Slot 2 option card or blanking plate too.

Remove the remaining shield screws ([Figure 8](#)), and retain all screws.

10. Lift the shield away from the unit. See [Figure 9](#).

**Figure 9 Shield lifted away from controller.**



Note the Mini-PCI socket on the controller board and the antenna connector holes (2) on the shield.

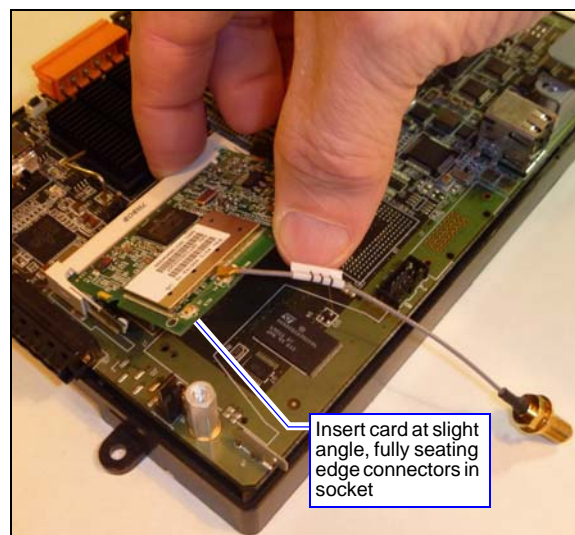


**Note**

If a Version 1 controller (as shown) and adding a *new* option card in *Slot 2* at this time, install it now—before replacing the shield. Be sure its header pins are correctly aligned into the connector socket.

11. Insert the WiFi adapter card into the socket, at an angle of around 25 degrees ([Figure 10](#)).

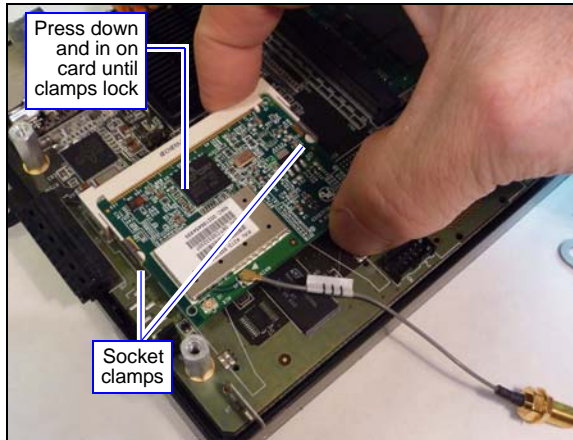
**Figure 10 Insert adapter card in socket at slight angle.**



Edge connectors of the card should be fully seated in the socket, as shown above.

12. Press down on the adapter card while pressing in the socket, until the socket side clamps snap in place on the card. See [Figure 11](#).

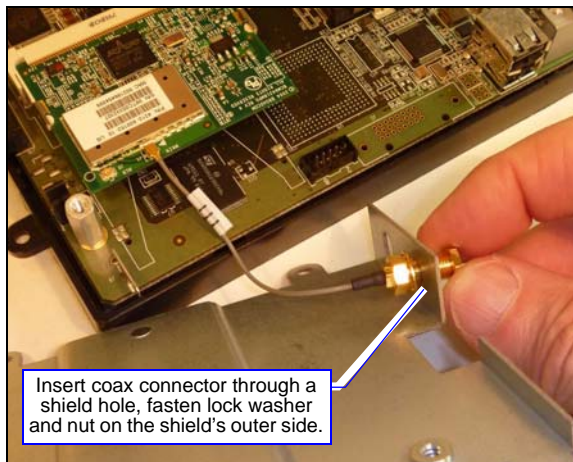
**Figure 11 Press down and in until socket clamps lock.**



The socket clamp on each side of the card should be locked in place, with edge connectors of the card seated firmly in the socket.

13. With the card installed, remove the nut and lock washer from the coax connector, and insert the threaded end through either of the two holes on the underside of the shield.

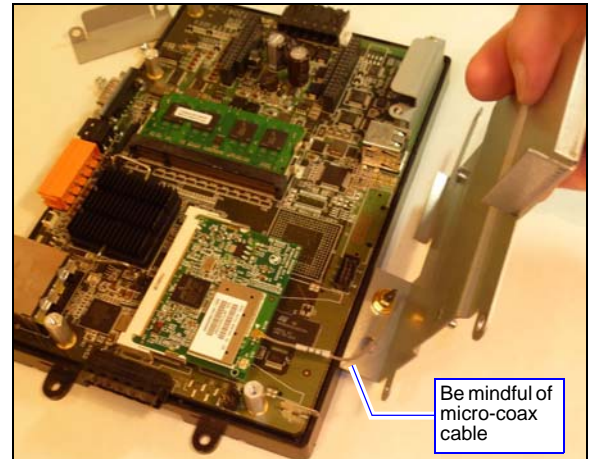
**Figure 12 Coax connector through shield hole.**



Install the lock washer and thread the nut onto the coax connector, as shown in [Figure 12](#). Tighten the nut (**be careful not to twist or pull the micro-coax cable**).

[Figure 13](#) shows the shield ready to reposition back onto the controller, with the WiFi card installed, and the antenna coax connector mounted in the shield hole.

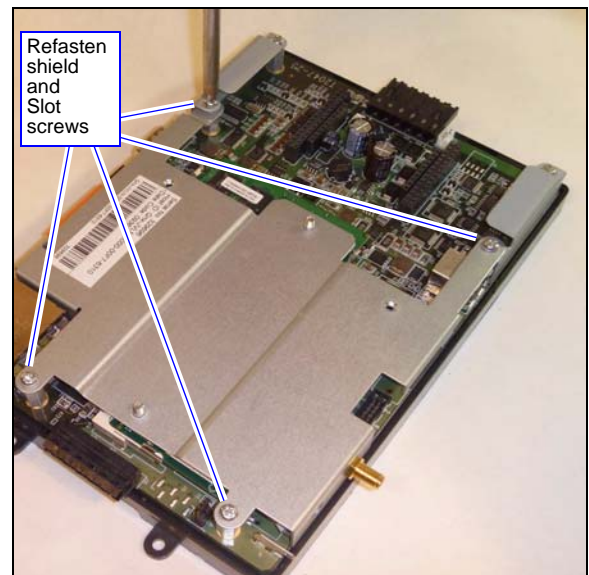
**Figure 13 Card installed, shield ready to reposition.**



Be careful not to pinch the micro-coax cable when repositioning the shield back onto the controller.

14. Position the shield back into place and secure with the screws previously removed.

**Figure 14 Reposition shield, refasten screws.**



Replace any option card removed from Slot 1, if applicable, refastening the two mounting screws. Otherwise, refasten the screws holding the Slot 1 blanking plate, as shown in [Figure 14](#) above.

If a Version 2 controller, replace any option card removed from Slot 2, also refastening its screws.



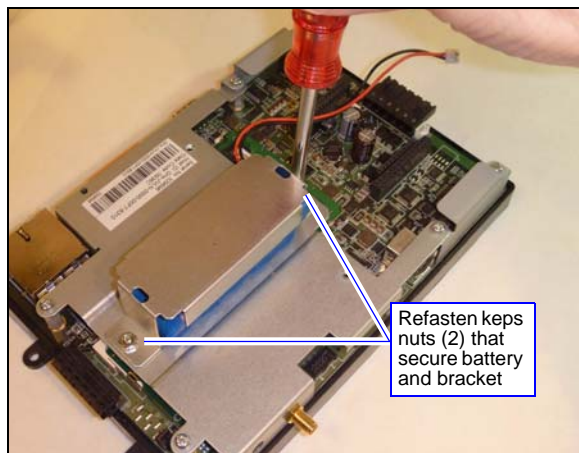
**Note**

Whenever installing an option card, be sure to align the header pins of the card correctly into the connector socket.



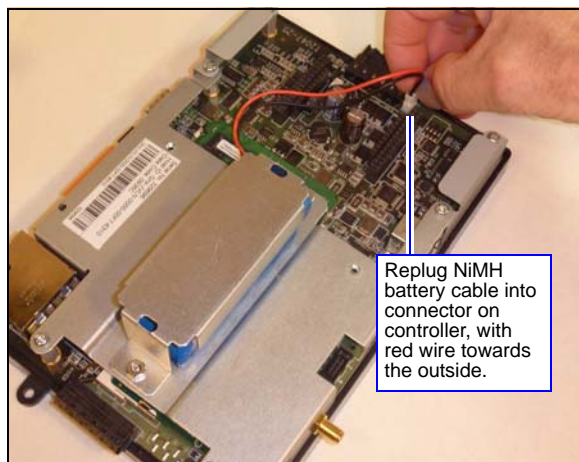
15. Replace the NiMH battery pack and mounting bracket onto the shield and refasten the two keys nuts using a 1/4" (6mm) nutdriver. See [Figure 15](#).

**Figure 15 Refastening NiMH battery and bracket nuts.**



16. Plug the connector plug of the battery into the NiMH battery connector on the controller, as shown in [Figure 16](#) below.

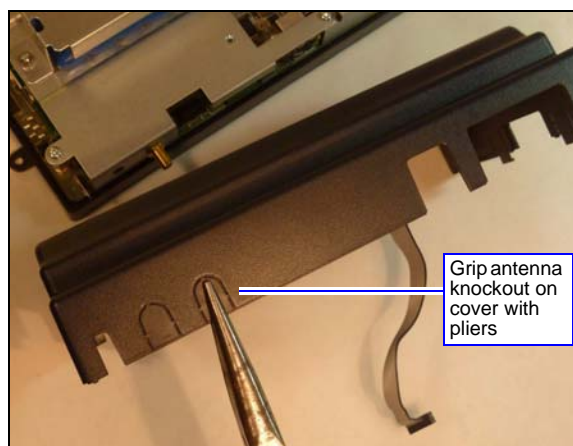
**Figure 16 Replug NiMH battery cable into controller.**



**Note** The red wire goes towards the outside edge. Note the battery connector is keyed—you cannot plug the battery in reversed.

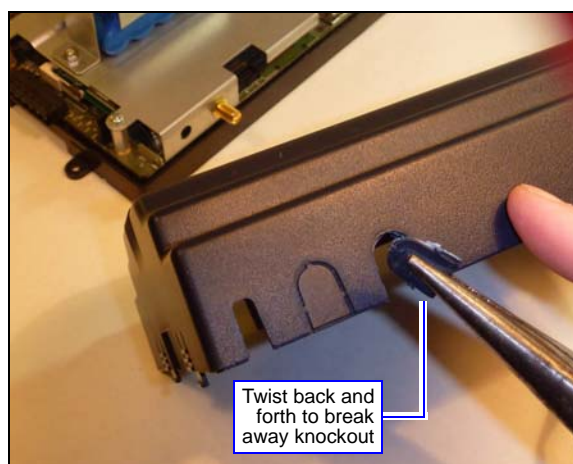
17. Before replacing the plastic cover, remove the antenna knockout. To do this, first grip the knockout with a pair of long nose pliers. See [Figure 17](#).

**Figure 17 Grip antenna knockout on cover with pliers.**



Gripping tightly, twist the pliers jaws to break the cutout free from the cover ([Figure 18](#) below).

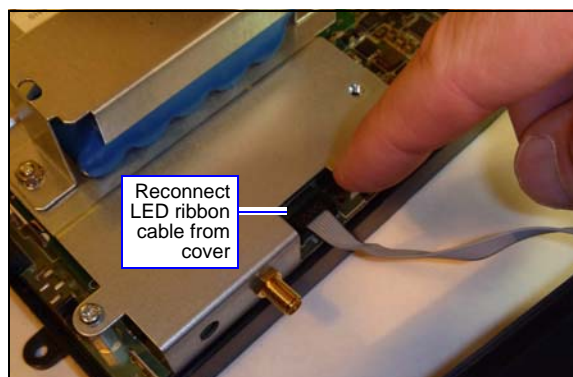
**Figure 18 Removing cover antenna knockout.**



Clean up any jagged edges of the cutout, by burnishing with the rounded edges of the pliers.

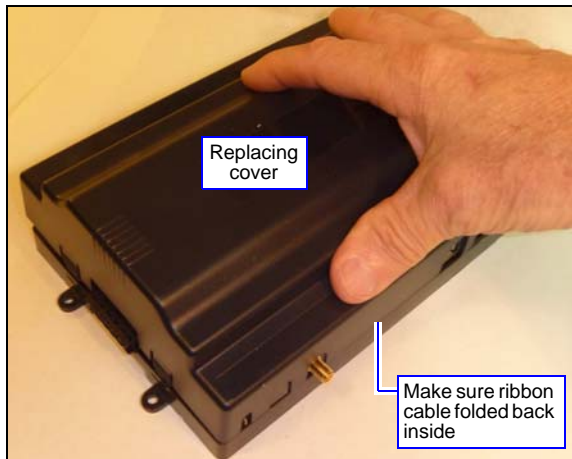
18. Reconnect the LED ribbon cable from the cover to the connector on the controller ([Figure 19](#)).

**Figure 19 Reconnect LED ribbon cable in controller.**



19. Apply the included FCC/IC listing label onto an available area of the controller's metal shield.
20. Replace the cover onto controller, orienting the antenna knockout over the coax connector.

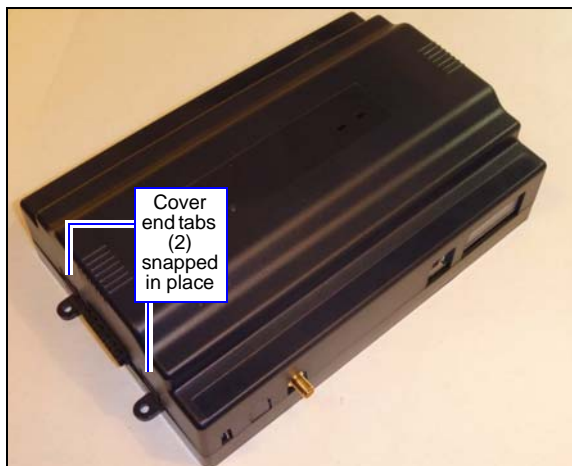
**Figure 20 Replacing cover back on controller.**



**Note** Make sure that the LED ribbon cable is connected and not outside the base.

21. Press down on both ends of cover to make sure end tabs (2 each side) are snapped in place.

**Figure 21 Cover replaced on controller.**



22. Remount controller as before (if applicable).
23. If accessory modules were unplugged, plug them back into the controller as before, and secure.
24. If you disconnected an external, 12V sealed lead-acid battery, reconnect it back to the controller.

## Attaching Antenna



**Note** For FCC compliance, use only the antenna supplied with the T7-WIFI option, or else a specific antenna listed as tested by Tridium.

A 2.4 GHz stub antenna with tilt-and-swivel RP-SMA female coax connector is provided for use with the WiFi adapter in the T-700 controller. To attach, simply insert into the RP-SMA coax jack on the controller, and finger-tighten the knurled nut (Figure 22).

**Figure 22 RP-SMA stub antenna on controller.**



Rotate in whatever position is needed for mounting clearance and/or best reception.

If needed, you can use the included [antenna extension cable](#). Typically, this is required whenever the controller is installed inside a metal enclosure.

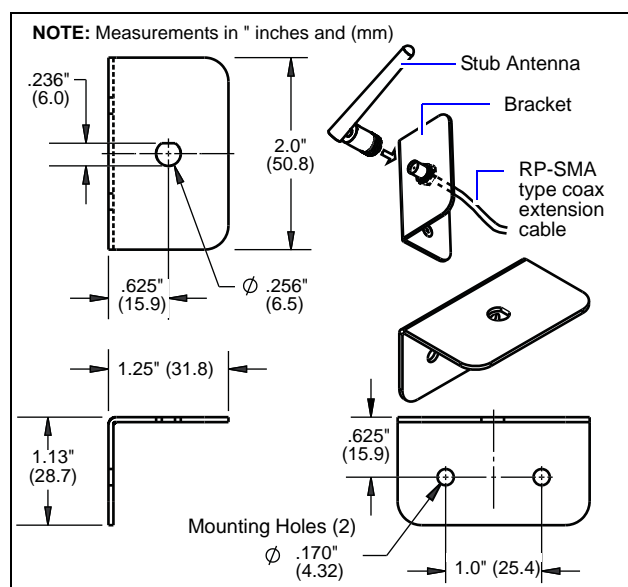


**Note** The antenna cannot be any closer than 10" (254 mm) to *any other antenna*, for example, on another wireless option card (NPB-GPRS or NPB-SED-001) also installed in the controller. In this case, use the included antenna extension cable kit to relocate the antenna to maintain this minimum distance.

## Antenna Extension Cable

To locate the included stub antenna off the T-700 controller, install the included cable extension kit. Included is a 6.6 ft. (2m) RP-SMA-type coax extension cable and a steel bracket for wall or panel mounting. See [Figure 23](#) for bracket details and dimensions.

**Figure 23** Extension cable bracket details.



Again, note that the antenna cannot be located any closer than 10" (254 mm) to any other antenna.

## Parts

The following **replacement parts** may be ordered for the T7-WIFI option:

**Table 2** Parts for T7-WIFI option.

Option/Part	Description
CBL-SED-EXT	Replacement 6.56 ft (2m) RP-SMA type coax extension cable, and mounting bracket. See <a href="#">Antenna Extension Cable</a> .
11277	Replacement adjustable-angle 2.4GHz RP-SMA coax-mounted stub antenna.

## Specifications

- Corresponds to IEEE 802.11b/g specification.
- Uses frequencies in the 2.4 GHz to 2.5 GHz ISM band, as defined by IEEE 802.11.
  - FCC channels 1 to 11
- Supports physical layer security using WEP, WPA-PSK, WPA2-PSK, WPA, WPA2, or none (configurable in NiagaraAX platform).
- Supports private key certificate in corporate environment, via import key file feature in NiagaraAX platform interface.



## Approvals



### Note

A label with FCC and IC listing ID numbers is included in the T7-WIFI hardware bag. Apply this label to an available area on the controller's metal shield.

## FCC

The WiFi adapter used with the T7-WIFI option card is FCC approved, and has an FCC ID of:

- **IXMMPGBR05**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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. If not installed and used in accordance with the instructions, it 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

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

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

**Caution:** To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

## Canada - Industry Canada (IC)

The WiFi adapter also complies with RSS 210 of Industry Canada, with an IC ID of:

- **4110A-MPGBR05**

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.

L' utilisation de ce dispositif est autorisée seulement aux conditions suivantes : (1) il ne doit pas produire de brouillage et (2) l' utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

The term "IC" before the equipment certification number only signifies that the Industry Canada technical specifications were met.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing.

Pour empêcher que cet appareil cause du brouillage au service faisant l'objet d'une licence, il doit être utilisé à l'intérieur et devrait être placé loin des fenêtres afin de fournir un écran de blindage maximal. Si le matériel (ou son antenne d'émission) est installé à l'extérieur, il doit faire l'objet d'une licence.

**Caution:** Exposure to Radio Frequency Radiation. The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website [www.hc-sc.gc.ca/rpb](http://www.hc-sc.gc.ca/rpb).

## Related Documentation

Refer also to the following related documents:

- *JACE-700 Mounting and Wiring Guide*
- Various *Install Sheet* documents for compatible option cards—for example, the
  - *NPB-LON Option Install Sheet*
- *NiagaraAX JACE WiFi option - Engineering Notes*
- *JACE NiagaraAX Install and Startup Guide*
- *NiagaraAX Platform Guide*

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