

## Cleaning Your cRIO-FRC and Installing Protective Gaskets

This document describes how to clean the cRIO-FRC if it has been internally contaminated by metallic debris such as wire fragments, flakes, or dust. You must be very careful disassembling the cRIO-FRC. When you remove the printed circuit board (PCB) from the enclosure, it is vulnerable to electrostatic discharge (ESD) and physical damage. Failure to follow the directions in this document may result in damage to your cRIO-FRC and void the warranty.

**If you are uncomfortable with disassembling and cleaning your controller, you can provide a minimal level of protection by installing the external Module Connector Gasket. To do that, skip to the [Installing the Module Connector Gasket](#) section of this document.**

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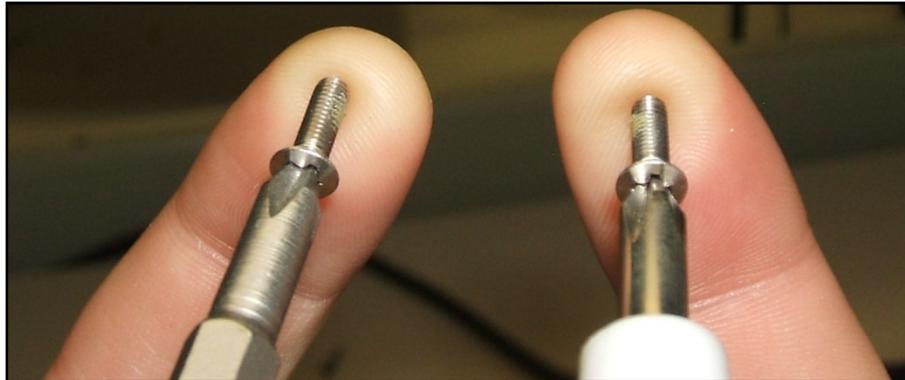
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## Preparation

Before getting started, make sure you have the following tools and an appropriate work environment.

### Required Tools:

- #1 Philips Head Screwdriver (**Caution:** If you use a different-sized screwdriver, you can easily destroy the cross recesses in the screw heads, making the screws nearly impossible to tighten or remove. Do not use a power screwdriver.)



On the left is a #1 screwdriver. On the right is a different-sized screwdriver.

- Compressed air
  - Protective Gasket Kit
  - Small, soft, clean paintbrush with non-conductive bristles
  - Small Ziploc® bag or other sealable container for holding loose parts such as screws
  - ESD grounding wrist straps and an ESD mat, properly installed and grounded
- NOTE: You should use an ESD mat whenever you handle electronics. However, if a mat is not available, you can discharge static electricity from your body by touching the bare metal of a grounded computer or other electrical equipment before touching the cRIO-FRC.



cRIO-FRC, Gasket Kit, ESD wristband, compressed air, #1 screwdriver, and clean paintbrush

#### Preparation:

- Clean your work area. You should disassemble the cRIO-FRC in a location free of dust and metallic debris.
- Properly ground yourself and the cRIO-FRC to prevent any electrostatic discharge (ESD) by using an ESD wristband and mat.
- Take off all rings, bracelets, and dangling necklaces to reduce the risk of ESD

## Disassembling the cRIO-FRC

### CAUTION

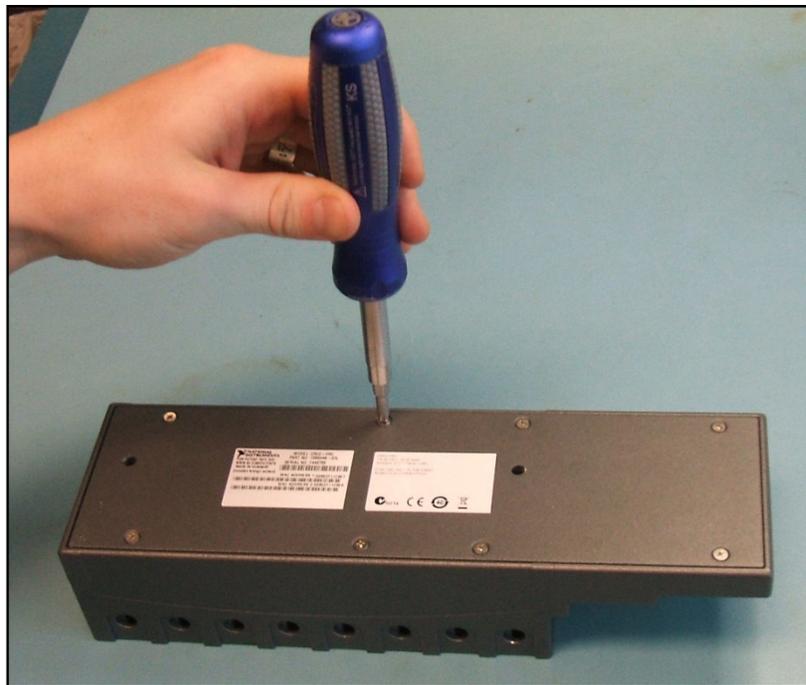
When handling the cRIO-FRC circuit board, never hold it by the components or connectors. Make sure to hold the board only by the edges. Do not touch the integrated circuits. Before starting, make sure you have read the above sections listing the tools and preparation required.

1. Remove all external components from the cRIO. This includes any I/O modules, dust covers, power cable and connector, and any Ethernet or serial cables.



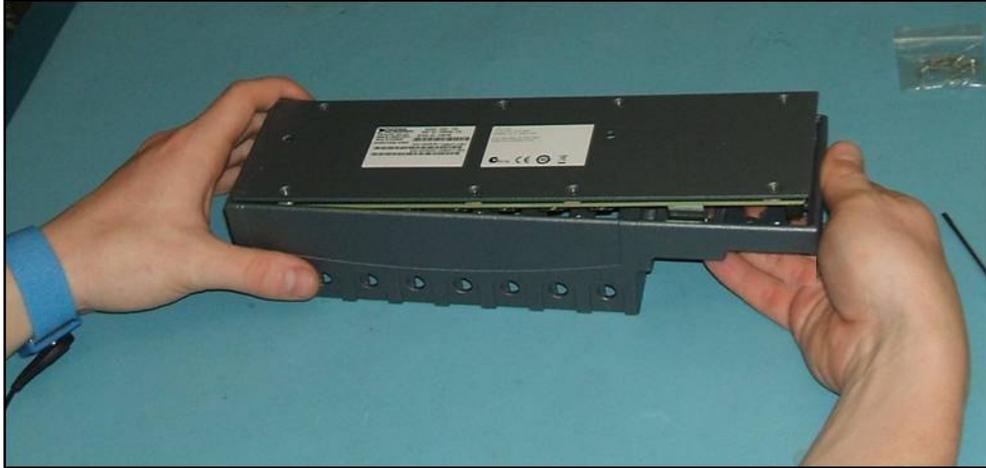
cRIO-FRC with all external components removed

2. Place the cRIO-FRC face down on the ESD mat. Using the #1 Philips screwdriver, remove the eight screws that secure the back plate to the chassis (Note: Take care to apply moderate downward force and work slowly to reduce the risk of damaging the cross recesses in the screw heads). Place the screws in a safe place like a Ziploc® bag or other sealable container.



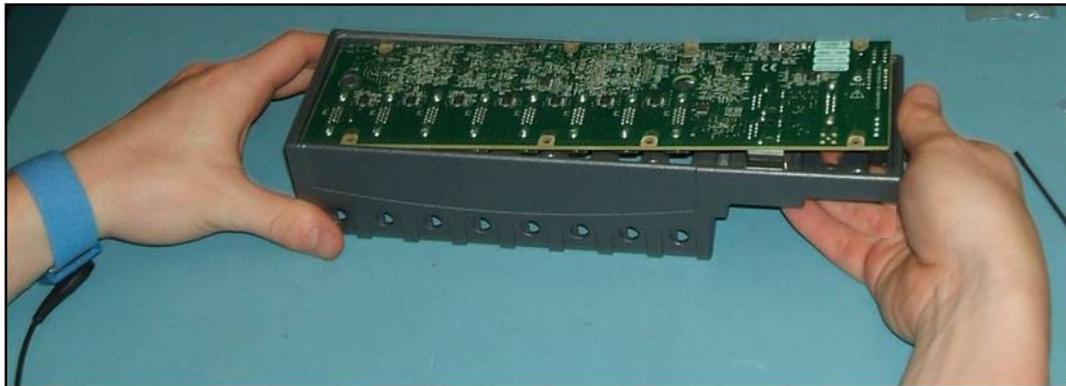
Removing the screws

3. Keeping the cRIO-FRC facing downward, use one hand to gently press on the serial connector to raise the back plate and PCB board and use your other hand to lift off and set aside the back plate.



Removing the back plate

4. Using the same method as in the previous step, raise the PCB by lifting the serial port from under the chassis with one hand, and carefully remove the PCB with the other hand. Place the PCB on the ESD mat with the connectors facing up, and set the chassis aside.



Removing the PCB

## Cleaning the cRIO-FRC

### CAUTION

Use only compressed air to clean the cRIO-FRC. Do not clean the cRIO-FRC casing or PCB with any cleaners or solvents.

### CAUTION

When using compressed air, do not hold the can upside down or in a manner that causes liquid propellant to spray onto the cRIO-FRC casing or PCB.

1. Hold the chassis away from your work surface and use compressed air to dislodge and remove debris from all sides of the chassis. Note that holding the chassis away from the work surface removes the risk of blowing debris from the chassis to the PCB.



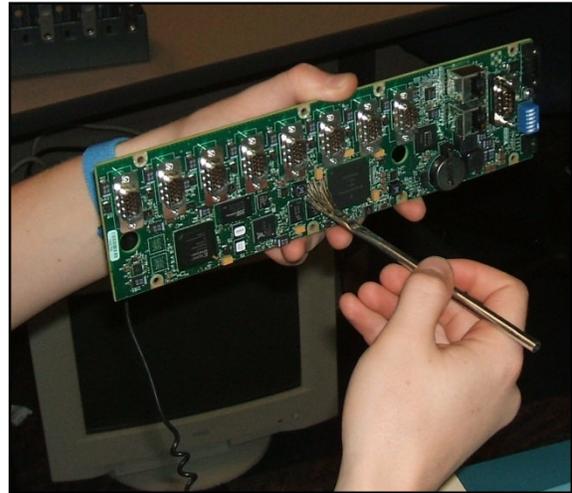
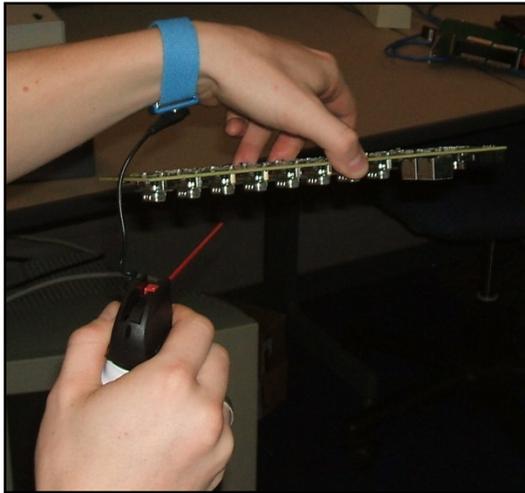
Removing debris from the chassis with compressed air

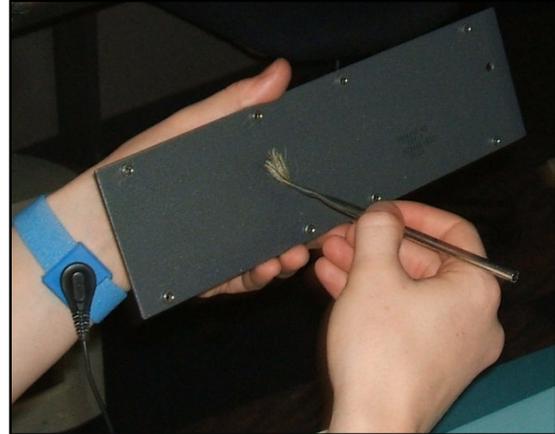
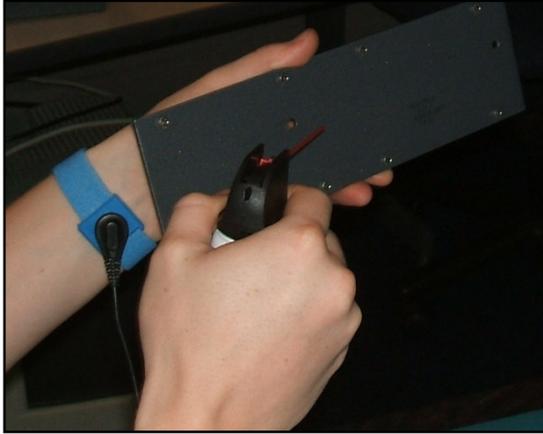
2. Check to see if there are any foreign objects on or in the chassis that were not dislodged by the compressed air. If so, use a small, soft, clean, dry paintbrush to remove the debris.



Using a paintbrush to remove foreign objects from the chassis

3. Repeat steps 1 and 2 to clean the PCB and back plate. Be careful not to force debris under the components.





## Installing the I/O and Ethernet Gaskets

Before reassembling the cRIO-FRC, you can install two gaskets to help prevent future contamination.

### NOTE

The gaskets reduce the risk of contamination but do not completely eliminate it. You should still keep the cRIO-FRC away from conductive debris such as metal shavings and grinding debris.

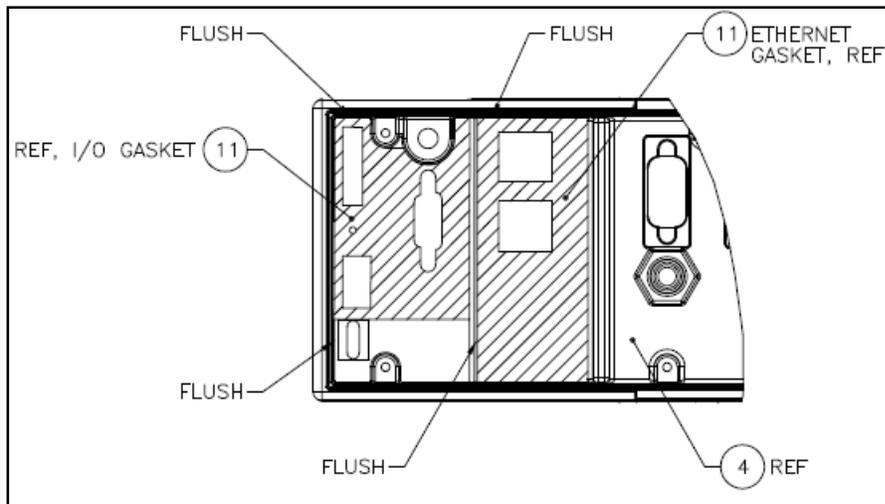
### CAUTION

The gaskets are made of a thin, flexible material that can tear if they are repositioned after application. Make sure each gasket is properly aligned before applying pressure to set the adhesive.

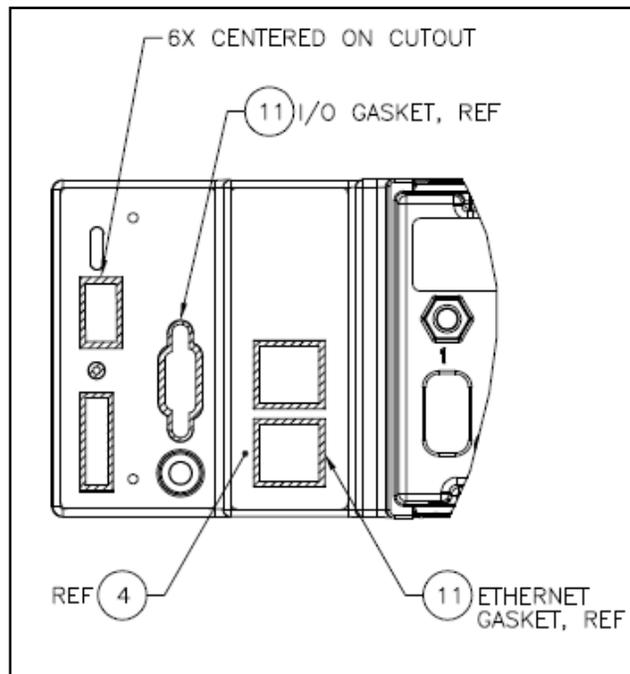
1. Place the chassis face down on the ESD mat.
2. Remove one of the gaskets from the packaging and peel away the paper backing to reveal the adhesive. Take care to minimize adhesive contact with foreign objects such as fingers or dust.



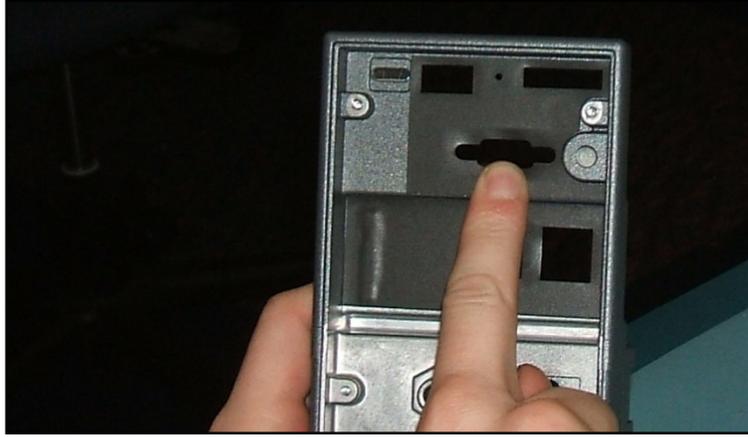
3. Lightly place the gasket in the chassis adhesive side down making sure it is aligned correctly according to the following diagram.



4. Repeat steps 2 and 3 for the other gasket.
5. Before firmly seating the gaskets, flip the chassis over and confirm that the gasket openings and chassis openings are centered.

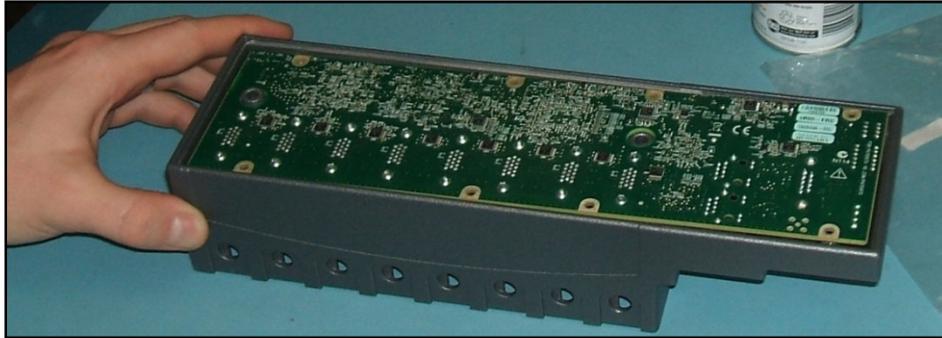


6. Using your finger, firmly press each gasket into place. Work slowly and take care not to tear the gasket material.

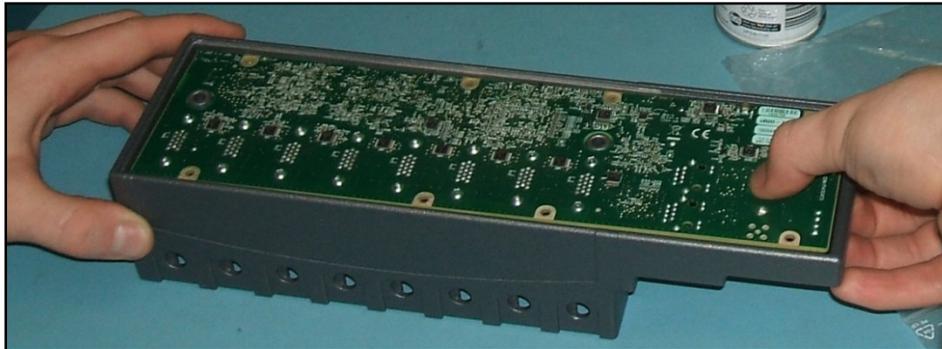


## Reassembling the cRIO-FRC

1. Place the chassis face down on the ESD mat.
2. Position one end of the PCB board over the corresponding hole in the casing, and gently ease it back into place inside the chassis.



3. Replace the back plate on top of the PCB. You may need to apply slight pressure after having installed the protective gasket to push the connectors through the gasket openings. **DO NOT USE EXCESSIVE FORCE ON THE PCB.** If you feel resistance, remove the PCB and check the alignment.

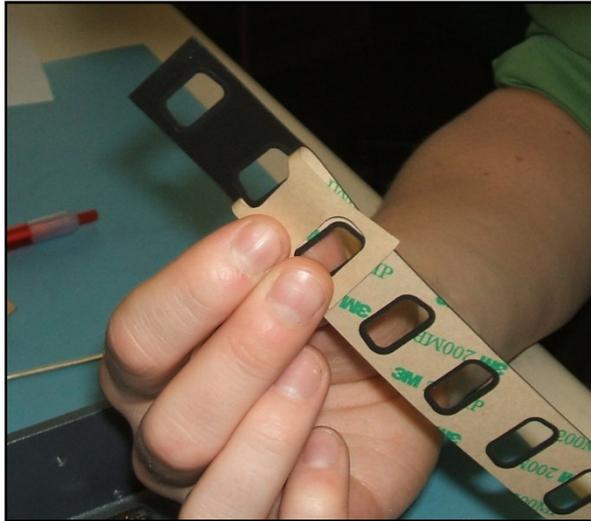


4. Use the #1 Phillips head screwdriver to secure the back plate to the chassis using the eight screws. Be careful not to over-tighten or strip the screws. The maximum recommended installation torque is 4.9 in-lb.



## Installing the Module Connector Gasket

1. Place the chassis face up on the ESD Pad.
2. Partially remove the backing from the Module Connector Gasket to reveal the adhesive. Take care to minimize adhesive contact with foreign objects such as fingers or dust.



3. Lightly place the Module Connector Gasket in the chassis module cavity adhesive side down, and gently press the gasket over the first connector.



4. Working from the first connector, gently peel away enough of the backing to press the gasket down over each connector, taking care not to stretch the gasket too much.



5. When the gasket is in place around all connectors, go back over it and firmly press it into place with a soft, blunt tool.



6. Reinstall your I/O Modules and dust caps.

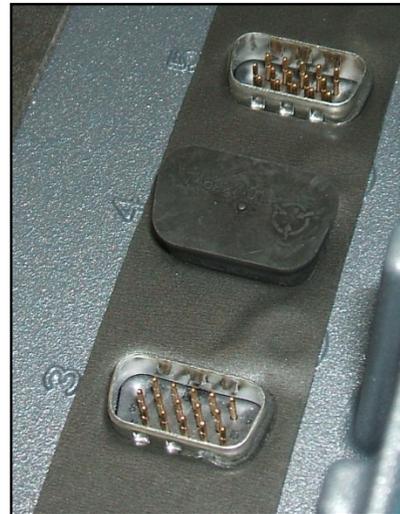
**CAUTION**

Use only light pressure to place the dust caps over the empty connectors. Using excessive force can damage the gasket and the connectors. Note that the dust caps will not be as deeply recessed with the gasket installed. If you find that the dust caps do not remain seated when subjected to vibration, you can leave them off.

Lightly Pressing Dust Cap



Dust Cap in Place



Module Slot	IO Module
1	NI 9201
2	NI 9201
3	Empty
4	NI 9403
5	Empty
6	NI 9403
7	Empty
8	NI 9472

7. Reattach power, Ethernet, and serial cables, and test for functionality.

**Congratulations! You have successfully cleaned your cRIO controller and applied gaskets to help prevent future contamination. Please remember to keep the cRIO-FRC and other robot electronics isolated from metallic debris at all times. There are many ways to do this, including:**

- Using an enclosed electronics box
- Using a wet-dry vac to collect metal shavings during robot chassis work
- Routinely cleaning the floor to prevent debris from being kicked up into the robot's electronics