

 **UNIVERSITY OF GEORGIA**
Small Satellite Research Laboratory

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General ESD Workbench Procedures

Please Don't Shock Our Multi-Thousand Dollar Electronics



Revision Table

Changes	Authors	Version
[2017/07/24] Submit for PMR2	David Cotten	2.0.0
[2017/07/22] Review of document before core leadership review for PMR2.	Adam King	1.1.0
[2017/05/22] Revised procedures so clean room procedures could be created. Updated information with NVIDIA Jetson TX1 Development Kit Safety Guide document.	Adam King	1.0.1
[2017/02/12] Removal of "Exceptional Procedures," replaced with "notify Electronics Team Lead;" Initial release.	Adam King	1.0.0
[2017/02/06] Initial draft completed.	James Roach	0.0.1

Purpose

This document serves to act as a guide to access the ESD Workbench in a way that will mitigate risk to electronic components both outside and inside of the Clean Room.

Disclaimer

In order to mitigate damage to electronics components, it is important that all procedures outline herein be followed. If manufacturer procedures differ for a component than what is outline in the document, follow those procedures instead.

Before Entering the ESD Area.

1. **Ensure all needed files and documentation are uploaded.** You may have files on your local machine that you will need to perform your ESD Workbench-related tasks. Ensure that these are uploaded to a central repository that can be accessed from the ESD computer, such as Google Drive or Ryver.
2. **Stage all needed electronics components.** The area on the black tables behind the ESD Workbench is the staging area for electronics components. Ensure that anything that will be brought to the ESD Workbench area is within reach on this area. This includes staging the device with which you will take pictures of your progress.
3. **Remove any static-inducing clothing.** This includes removing any and all gloves, furry jackets, beanies, watches, wristbands, bracelets, etc. This step is also meant to encompass rolling up your sleeves, securing any long necklaces, and even securing any loose hair on your head.
4. **Log your visit.** This includes logging the date, your first and last name, the time you are coming into the ESD area, and the task you will be working on.

After Entering the ESD Area.

1. **Visually inspect grounding.** This is necessary to ensure that you will actually be grounded during your visit at the workbench. Visually ensure that all electrostatic wristbands are connected to the pinwheel under the front of the desk, and visually ensure that the pinwheel under the front of the desk is connected to the rubber mat. If these connections are incorrect, faulty, or malfunctioning, please contact the Electronics Team Leader.
2. **Visually inspect the workspace.** This includes visually ensuring all equipment appears as normal. If anything appears out of the ordinary or looks like it may be short circuiting, please immediately follow **Steps 3 and 5** before quickly (but not hastily or recklessly) disconnecting the power from malfunctioning components. Furthermore, if any issues arise during any of the following processes, please notify the Electronics Team Leader.
3. **Connect your electrostatic wristband.** Be sure to secure the wristband tight enough for the metal to make contact with your bare wrist, but not so tight as to cut off blood flow. This is to remain in contact with your skin for the entirety of your visit at the workbench.
4. **Start the computer,** if computer is off (it shouldn't be). This will be required to work with some of the electronics components. If you would like to boot into Ubuntu, please follow the on-screen instructions immediately after restarting the computer. Press the "DEL" key at the boot screen, then select the Ubuntu drive to boot to.
5. **Ground yourself to the desk.** To do this, simply touch the casing of the desktop, then touch one of the front corners of the ESD bench for one second, being sure not to touch any of the electronics components before you are grounded. If components have been added to the staging area.
6. **Move staged components to the workbench.** Make room on the ESD workbench before moving components over. Any components placed in the staging area should now be moved to the ESD Workbench, making sure not to collide with another electronics components. Once the component has been added to the workbench, ground yourself again to the desk.
7. **Ensure header savers are connected.** These should already be connected to all headers that are used on any and all components and wiring that are engineering model or flight model components or wiring. Repeated connecting and disconnecting of ports will cause degradation, possibly leading to mechanical or electrical failure. If no header savers are connected, please notify the Electronics Team Leader, either verbally or via Slack.
8. **Ground your components.** Always discharge any residual static electricity that may be present by touching a non-conducting edge of the kit first. Never touch components, pins, or connectors without the wrist strap attached and grounded. From this step forward, you are no longer allowed to touch any component or device that has not been grounded, especially anything outside of the ESD workbench.
9. **Begin your task(s).** Do not connect or disconnect any cables or perform maintenance or reconfiguration of any electronics device during an electrical storm or when the device is powered on. Electronics should be powered down and the power removed before plugging or unplugging devices or add-on modules into any headers. Never force a connector into a port. Check for obstructions on the port. If the connector and port don't join with reasonable ease, they probably don't match. Make sure that the connector matches the port and that you have positioned the connector correctly in relation to the port. Do not connect or disconnect power adapter with wet hands. Do not use conductive tools that could bridge live parts. Do not make mechanical or electrical modifications to any equipment. Use electronics products with only

approved equipment and/or accessories. If manufacturer procedures differ for a component than what is outline in the document, follow those procedures instead.

10. **Record your progress**, if needed. Any modifications to the layout or wiring of electronic components should be documented. Take any necessary pictures from the required angles to record all relevant information. Usually, a picture from directly above the components will suffice, but sometimes other angles (such as from the side) will be necessary to properly display all needed wiring/ setup details. *DO NOT DROP YOUR PHONE ON THE SETUP.*
11. **Leave a note**, if needed. If you intend to leave your work connected, please leave a note explaining what the setup entails and why it should be left connected, i.e. “Jetson TX1 with Raspberry Pi, testing overnight.”
12. **Unplug from power source**. If not leaving components for testing overnight, shutdown the component as the manufacturer describes, then unplug from power source.
13. **Disconnect all wires**, if needed/desired.
14. **Unstage electronic components**. Items such as engineering models should remain on the ESD Workbench at all times, however components such as Arduinos or Raspberry Pis may be desired to work with outside of the ESD area. In this case, such components should be unstaged from the ESD area.
15. **Disconnect ESD wristband**. After this step, do not touch anything on the ESD workbench without starting at **Step 1**.

Citations

Clyde Space. ADCS Motherboard Interface Control Document. ICD-25-01232, Rev E. 21 Nov 2016.

Source Code: <<https://github.com/jhroach14/I2C-Master>>