LTV REPAIR PROCEDURES

Relevant to: EV Teams

NASA SUITS
2025-26 Challenge

NASA SUITS LTV Repair Procedures

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This document **will** be updated ahead of test week in May 2026.

Contents

Notes:

This document will likely undergo several more revisions as we do dry runs in preparation for test week, this implies the potential inclusion of additional errors and procedures. NASA SUITS aims to have a physical activity box with various panels and mock sensors for the EV to troubleshoot and repair. This physical box is representative of the Lunar Terrain Vehicle (LTV) External Control Panel and will be referred to as the “LTV Task Board”. Each item within the LTV Task Board will have a unique procedure for troubleshooting and repair, this document contains each of those procedures. These procedures are to be retrieved by your Artificial Intelligence Assistant (AIA), and during Test Week, your assigned Design Evaluator will be the one performing the procedures. Given the tentative state of these procedures, we recommend not storing them yet, only reference them for understanding how the challenge will proceed.

Change Log:

1. Flesh out initial tentative LTV Repair procedures, add cover page, general formatting, write *Notes* and *Procedures* section, override example errors with planned errors -RE

Procedures

The primary task during the test session for EV Teams will be to repair the LTV systems that were damaged during the loss of communication. The following procedures will detail how to Exit Recovery Mode (ERM), Restart the navigation (NAV) system, as well as repair the LTV for each of the errors that could be indicated. These errors will vary in criticality, and as per the 25-26 Mission Description, some fixes may be omitted if the time remaining is low. Subsequently, your AIA may be able to triage which errors to attempt to fix first. Additionally, as these procedures are iterated, they will become very verbose, and your AIA may shorten the steps in the procedures if able to do so while keeping critical information pertinent to the task.

The error codes below may be displayed on a 7-segment display and currently do not correspond to TSS errors, this may change in the future.

Exit Recovery Mode (ERM)

1. Identify power bus systems are nominal, off nominal power bus distribution is indicated by “Err. P”, resolve if necessary
2. Identify passive heat generation is nominal, off nominal is indicated by “Err. H”, resolve if necessary
3. Restart the navigation system
4. Identify vehicle backup fuse systems are nominal, off nominal is indicated by “Err. F”, resolve if necessary
5. Once all critical systems are confirmed nominal, you may repair any non-critical systems if able
6. Prepare autonomous navigation systems for safe return to home
7. ERM complete

NAV Restart

1. Locate the NAV Control Panel by identifying a rectangular box with a green light in the top-left corner
2. Flip the primary control switch under the green light to the far left, entering “HAND” mode. Verify mode switch by confirming the indicator light is blue
3. Identify the autonomous communication algorithm switch, labeled “COMM”
4. Turn the switch to the “SEC” position, and verify mode switch by confirming the indicator light is blue

5. Identify the “LIDAR RESET” button
6. Flush and restart the LIDAR system by depressing this button for 5 seconds. The indicator will light red, and all indicators will blink to confirm the reset is primed
7. Identify the “NAV RESET” button
8. Flush and restart the NAV System by depressing this button for 5 seconds. The indicator will light red, and all indicators will blink to confirm the reset is primed
9. Enact the reset by turning the primary control switch to the “OFF” position, wait for 10 seconds
10. Turn the primary control switch to the “AUTO” position, verify mode switch by confirming indicator light is green

Autonomous NAV Return to Home

1. Locate the NAV Control Panel by identifying a rectangular box with a green light in the top-left corner
2. Flip the primary control switch under the green light to the far left, entering “HAND” mode. Verify mode switch by confirming the indicator light is blue
3. Identify the autonomous systems indicators toggle switch labeled “ASITS”
4. Turn this switch to the “ON” position, verify mode switch by confirming the indicator light is yellow and the remaining indicators are on
5. Identify the autonomous navigation system lock labeled “ANAV BLOCK”
6. Turn this switch to the “ON” position, verify mode switch by confirming the indicator light is blue
7. Identify the manual return to home switch labeled “ANAV RTH”
8. Turn this switch to the “ON” position, verify mode switch by confirming the indicator light is blue
9. Identify the autonomy confidence adjustment dial labeled “ACA”
10. Turn this dial counterclockwise to manually reduce the confidence of the autonomous navigation algorithm
11. Turn the “ANAV BLOCK” switch to the “OFF” position
12. Turn the “ASITS” switch to the “OFF” position
13. Turn the primary control switch to the “AUTO” position, verify mode switch by confirming indicator light is green

Fuse error (Err. F)

1. Locate the fuse box by identifying a gray rectangular housing with copper fuses visible behind a white protective barrier
2. Remove the protective barrier by unlatching protective locks and lifting the barrier out
3. Locate the fuse disconnect by identifying the protruding handle towards the top of the housing
4. Pull this handle to disconnect the fuse circuit
5. Use the provided fuse-puller tool to safely remove the burnt fuse and properly discard
6. Locate the replacement fuse
7. Using the fuse-puller tool, place the new fuse in the grips of the tool
8. Insert the fuse into the empty slot, moderate force may be required

9. Reinsert the fuse disconnect in the proper orientation
10. Replace the white protective barrier and latch protective locks

Comms error (Err. C)

1. Locate the irregular shaped antenna and surrounding rectangular control box
2. Switch primary control switch to “OFF” position
3. Wait 10 seconds for high-voltage capacitance to drain
4. Switch to “HAND” position
5. Locate the dials under manual frequency adjustment labeled “FCA”
6. Rotate the dials slightly making note of indicator color changes
7. Rotate dials in varying order until indicator is bright green
8. Once sufficient frequency is achieved, switch the primary control switch to the “AUTO” position

Power Subsystem Bus Error (Err. S)

1. Locate the Power Override Panel for Subsystems, labeled “POPS” on the right side of the main control panel
2. Verify each system isolation switch is turned to the “OFF” position
3. If any system isolation switch is turned “ON”, check the corresponding distribution cable
4. If a cable is deemed loose, fully remove the cable from its socket
5. Firmly reinsert the cable into its socket
6. Turn the system isolation switch to the “OFF” position
7. Wait 5-10 seconds to verify the system does not self-isolate again
8. Verify the error has cleared before proceeding

Main Power Bus Error (Err. P)

1. Locate the power distribution bus on the right side of the main control panel
2. Check for any loose cables
3. If a cable is deemed loose, locate the power distribution toggle switch, and turn it to the safe secondary mode, labeled “SEC”
4. Fully remove the cable from its socket
5. Firmly reinsert the cable into its socket
6. Locate the power distribution test button labeled “TEST”
7. Depress this button and verify the relevant indicator lights green
8. Switch the power distribution toggle switch to the primary mode, labeled “PRI”
9. Verify the error has cleared before proceeding

Dust Sensor Error (Err. d)

1. Locate the dust sensor by identifying a cylindrical white housing smaller than the palm of a hand
2. Rotate the sensor body counterclockwise to unscrew it from its base and stow properly
3. Locate the replacement sensor and twist the protective cap counterclockwise to remove it, you may put the protective cap on the broken dust sensor
4. Insert the replacement sensor into the base and rotate clockwise until moderately tight

Heat Generating Reaction Error (Err. H)

1. Locate the passive heating module by identifying a white cylindrical module with a handle protruding
2. Identify the color of the reaction indicator light labeled “RIL”
3. If the RIL is red, follow steps 4-7, otherwise skip to 8:
4. Begin restarting the reaction process by pulling the handle directly outwards until the entire assembly has been removed
5. Locate the replacement assembly, verify the reaction rods on the end are intact
6. Align the handle within the tick marks located on the cylindrical housing
7. Firmly insert the assembly, verify the RIL has changed to green
8. If the RIL is blue, locate the Xenon purge button labeled “PURGE”
9. Depress this button until the RIL turns green