



EV & ROVER PROCEDURES

Relevant to: Both Teams

NASA SUITS
2025-26 Challenge

NASA SUITS EVA and Rover Procedures

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

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Notes:

This document will likely undergo several more revisions as we do dry runs in preparation for test week. NASA SUITS aims to have each test session run for 45-minutes. This allows time on each end of the window to setup and to transition from group to group. Therefore, the PR and Spacesuit portions will each take about 25-minutes with a few cutoffs. The reasoning for the cutoffs is to prevent teams from getting stuck and allowing other functionalities to be showcased, i.e. “Something isn’t working, and we are behind, so in order to see your other functionalities, let’s move on.”

Change Log:

1. Modify PR Team timeline to be more real-world accurate. Add verbal aspects to checklists for design evaluators to confirm procedures, add cover page. -RE

General Test Timeline

Both the rover and EV teams will begin their procedures at the same time. The following procedures are done concurrently but are **not** dependent on one another. Cutoff times are fluid for each station, but 50 min is hard stop.

PR	Ideal start time	Time to complete
Pre-Nav Checklist	0	3 min
Navigate to LTV last known location	3 min	3 min
Initial ping and calculate search area	8 min	2 min
Execute search procedure, find LTV	10 min	10 min
Showcase EVA monitoring functionality	17 min	3 min
Navigate back to home base	20 min	4 min
Arrive at home base	25 min	N/A

EV	EVA ET Ideal	Time to complete
EVA Egress <ul style="list-style-type: none">• Connect UIA to DCU• Start Depress• Prep O2 Tanks• End Depress, Check Switches and Disconnect	0 min	6 min
Navigate to LTV location	6 min	4 min
LTV Repair <ul style="list-style-type: none">• Complete system scan and restart• Identify and repair issues with the LTV	10 min	10 min
Navigate to PR location	20 min	3 min
Ingress <ul style="list-style-type: none">• Connect UIA to DCU• EMU config• Disconnect	23 min	2 min
EVA completion	25 min	N/A

Procedures

CAPCOM:

- *Reset all UIA switches to Down Position*
- *Reset all DCU switches to Back Position*
- *Reset LTV Task Board to pre-repair settings*
- *START Rover Telemetry*
- *START EVA Telemetry (at EVA start time)*
- *Announce scenario start, give go to begin*

Pressurized Rover

1. Begin Pre-Navigation Checklist
2. Pilot verbally confirm battery level is > 95%
3. Pilot verbally confirm O2 levels are > 95%
4. Pilot verbally confirm O2 pressure is > 2900 psi
5. Pilot verbally confirm PR Cabin Pressure is > 3.95 psi
6. Pilot verify PR headlights are operational by manually switching lights to ON then to OFF, verbally confirm success
7. Pilot drop pin at current location, verbally confirm success
8. Drop pin at LTV last known location, verbally confirm success
9. Verbally announce completion of checklist

Navigate to LTV last known location (5 min)

1. Begin navigation to LTV last known location
 - a. *Demonstrate pathfinding and autonomous navigation capability*
2. Upon arrival, verify PR has come to a complete stop
3. Announce successful completion of stop
4. Check telemetry data and look for any off-nominal values

Initial ping and calculate search area (2 min)

1. Send first ping, analyze the incoming RSSI (signal strength)
2. Calculate a search area based on the previous speed and heading data
3. Set pin for next ping location and calculate safest path of navigation
4. Review consumables, calculate point of no return

Execute search procedure, find LTV (7 mins)

1. Begin navigation to next ping point
2. Upon arrival, verify PR has come to a complete stop
3. Send ping and wait for new RSSI value, verify new value update based on “Time Since Last Ping”
4. Calculate next ping location based on received LTV telemetry
5. Repeat steps 1-4 until successful acquisition of LTV
6. Set pin at exact location of LTV

Showcase EVA monitoring functionality (3 min)

1. Display EVA telemetry values and note any values not within range
2. Monitor EVA video feed

Navigate back to home base (5 min)

1. Set a pin at the starting point (home base)
2. Calculate the optimal path using the provided map of the DUST lunar environment
3. Navigate back to home base, showcase autonomous navigation if possible

CAPCOM

- *Stop Rover Telemetry*

EVA

CAPCOM:

- *Monitor UIA Switches*

Connect UIA to DCU and start Depress (2 min)

1. UIA and DCU: EV1 verify umbilical connection from UIA to DCU
2. UIA: EV-1, EMU PWR – ON
3. DCU: BATT – UMB
4. UIA: DEPRESS PUMP PWR – ON

Prep O2 Tanks (3 min)

1. UIA: OXYGEN O2 VENT – OPEN

2. HMD: Wait until both Primary and Secondary OXY tanks are < 10psi
3. UIA: OXYGEN O2 VENT – CLOSE
4. DCU: OXY – PRI
5. UIA: OXYGEN EMU-1 – OPEN
6. HMD: Wait until EV1 Primary O2 tank > 3000 psi
7. UIA: OXYGEN EMU-1 – CLOSE
8. DCU: OXY – SEC
9. UIA: OXYGEN EMU-1 – OPEN
10. HMD: Wait until EV1 Secondary O2 tank > 3000 psi
11. UIA: OXYGEN EMU-1 – CLOSE
12. DCU: OXY – PRI

END Depress, Check Switches and Disconnect (3 min)

1. HMD: Wait until SUIT Pressure and O2 Pressure = 4
2. UIA: DEPRESS PUMP PWR – OFF
3. DCU: BATT – LOCAL
4. UIA: EV-1 EMU PWR - OFF
5. DCU: Verify OXY – PRI
6. DCU: Verify COMMS – A
7. DCU: Verify FAN – PRI
8. DCU: Verify PUMP – CLOSE
9. DCU: Verify CO2 – A
10. EV1 disconnect UIA and DCU umbilical
11. DCU: Verify comms are working between DCU and PR.
 - a. “EV1 to PR, comm check, can you hear me?”
 - b. PR respond appropriately.

Navigate to LTV location (4 min)

1. Drop pin and determine best path to reach the LTV
2. Verify the path has been generated
3. Exit airlock and begin navigation to LTV
4. Navigate to LTV
5. Showcase navigation interface and use of AI assistant

(Your team can create procedures to guide your EV in how to use the HMD.)

LTV Repair (7 min)

CAPCOM:

- *Monitor LTV errors section in CAPCOM*
1. Announce arrival to LTV site over comms
 - a. “Arrived at site, beginning LTV analysis.”
 2. Perform analysis of LTV, this is good opportunity to showcase your AI assistant by asking it to analyze
 3. Upon analysis, look up the relevant repair procedures for the diagnosed errors
 4. Conduct the necessary repairs on the LTV until all errors repaired
 5. Perform initial startup of the LTV, report successful repair on comms.
 - a. “LTV repair complete, returning to PR”

Navigate to PR Location (3 min)

1. Drop pin and determine best path to reach the PR
2. Verify the path has been generated
3. Begin navigation to the PR

EVA Ingress (4 min)

1. UIA and DCU: EV1 connect UIA and DCU umbilical (Connect UIA to DCU and start depress)
2. UIA: EV-1 EMU PWR – ON
3. DCU: BATT – UMB
4. UIA: OXYGEN O2 VENT – OPEN (Vent O2 tanks)
5. HMD: Wait until both Primary and Secondary OXY tanks are < 10psi
6. UIA: OXYGEN O2 VENT – CLOSE
7. DCU: PUMP – OPEN (Empty water tanks)
8. UIA: EV-1 WASTE WATER – OPEN
9. HMD: Wait until water EV1 Coolant tank is < 5%
10. UIA: EV-1, WASTE WATER – CLOSE
11. UIA: EV-1 EMU PWR – OFF (Disconnect UIA from DCU)
12. DCU: EV1 disconnect umbilical

CAPCOM

- *Stop EV Telemetry*

- *Prep for next team*
 - *Reset PR to home base*
 - *Reset LTV errors, and physical task board*
 - *Verify DCU and UIA are in default state*