

TEGA High-Temp Soil

Reconciled with block: [tega_high_temp/R43](#)

Objectives:

Power on and perform the full high-temperature ramp on a soil/ice sample that had been previously heated via a mid-temperature ramp. The purpose of this run is to look for the enthalpy associated with decomposition of altered minerals and to measure the gases given off by the decompositions. After warm up, we will collect background data for 30 minutes then begin the ramp. The ramp starts at -60 C and runs to + 1000 C at 20 K/min followed by a 5 minute hold to measure the heat capacity of the oven before the ramp returns to low temperatures. We also measure the heat capacity at low temperature (where it should be a more sensitive measurement. The procedure also shuts off the manifold heater when the oven and shield are at high temperatures to avoid drawing too much current from the lander.

Configuration:

Mid-temperature ramp has been completed previously.

Constraints:

Review data from Checkout II to confirm dN numbers for regulation in activity block and ramp segments.

Gas(es) used: Carrier and Calibration. Mars atmosphere will also be collected through the TA Sample valve.

Filaments used: 1, LOW Emission

SW Version (386): V513

SW Version (EGA): V321

Sweep and hop mode version(s): MODE TABLE V117.

Super modes and Sweep modes used: Supermodes 1, 2, 3, 6, 7. and 10; Sweeps 37, and 38.

Supermodes running in ramp: 6, 7 & 10

Note: TEGA is checked to see if TEGA is safed. If so, abort self to end activity

1. Turn ON TEGA – Call TEGA_power_on
 - 1.1.1. TEGA_MAIN1_PWR "ON"
 - 1.1.2. TEGA_MAIN2_PWR "ON"
 - 1.1.3. TEGA_MAIN3_PWR "ON"
 - 1.1.4. Start the TEGA 386 FSW
2. Pause 3 Minutes (collect engineering data at a high rate before turning down)

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3. Call Sequence 30A

4. Turn on EGA

- 4.1.1. TEGA/FSW:EGA:Change EGA State
- 4.1.2. Restore the modes from EEPROM 0
- 4.1.3. EGA Commands:Restore Mode

5. OPEN GEC Vent Valve

6. Warm up EGA: CALL tega_ega_emission_warmup (filament 1, emission low, cal set 3)

- 6.1.1. Note: IF pass through was selected as HIGH, calibration set CANNOT equal 3

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6.2. Calls **tega_ega_prep, filament-1**

- 6.2.1.1. Sets JPlate 0 to -110V
- 6.2.1.2. Sets Jplate 1 to -92V
- 6.2.1.3. Start SM 1 pause 1 sec
- 6.2.1.4. Set MV 2800V Pause 1 sec
- 6.2.1.5. Ion Pump ON Pause 1 sec
- 6.2.1.6. Emission ON
- 6.2.1.7. Pause 2 Minutes
- 6.2.1.8. Stop SM 1

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6.3. Change engineering transmit to 10 secs

- 6.3.1. IF pass thru = 1, emission current will change to HIGH

6.3.2. MV exits at 3200V)

6.4. Wait 1 Minute

6.5. Start SM 3

6.6. Pause 20 minutes

6.7. Stop SM 3

6.8. Pause 1 minute

6.9. Calls **tega_ega_gain**

- 6.9.1.1.1. Start SM 2
- 6.9.1.1.2. Pause 1 minute
- 6.9.1.1.3. Set MV 2600 – 3400V (1 minute per voltage)
- 6.9.1.1.4. Remain at 3200V
- 6.9.1.1.5. Stop SM 2
- 6.9.1.1.6. Run Sweep 38

TEGA High-Temp Soil**EGA is warmed up and ready to go (54 mins)**

7. Set EGA manifold heater to +35 C
8. Set TA manifold heater to -20 C
9. Calibrate EGA: CALL tega_ega_calibration_scans (set = 3, exit=3200 V)
10. Start Supermode 7: Soil volatiles (3200 V)
11. Select Oven TA___ (**TWEAKABLE**)

Remember to turn on current monitoring to shut down manifold heater**12. Start Ramp (TWEAKABLE)**

12.1. Ramp Segments File: _____

13. Pause for pre_heater_delay (1980 sec; 33 minutes) - TWEAKABLE**14. Run Heater Init (tega_init_heater_control)**

Execute Sequence 24 B to increase readings on temperature regulation.

14.1.1. TA Manifold +65C

14.1.2. Plumbing 1 +35C

14.1.3. Plumbing 2 +35C

14.1.4. Transfer Tube +75C

14.1.5. EGA Plumbing +45C

14.1.6. EGA manifold to +35 C

14.1.7. Wedge Heater @ 10% duty cycle

15. Pause for pre_sweep_1_delay (450 sec; 7.5 minutes) - TWEAKABLE**16. Stop SM 7****17. Start Sweep 38 (Sweep of carrier gas)****18. Start Supermode 7: Soil volatiles (3200 V)****19. Pause for pre_sweep_2_delay (4640 sec; 77.3 min) - TWEAKABLE****20. Stop SM 7 immediate****21. Run Sweep Mode 38 (on held gas)****22. Start Supermode 7: Soil volatiles (3200 V)**

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23. Pause for **pre_cal_tank_delay** (175 sec; 2.9 min) - **TWEAKABLE**
24. Start Cal Tank heater to 99 (= off) (**TBR**)(turn up engineering readings)
 - 24.1. Set Cal Tank to Timer 1
25. Pause for **post_cal_tank_delay** (2400 sec; 40 min)
26. Turn OFF Cal Tank Heater
27. Wait for ramp to complete (timeout 1117) - **TWEAKABLE**

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Ramp Ends as Follows:

- 27.1.1. SM 6 running
- 27.1.2. Carrier and Calibration Closed
- 27.1.3. Inlet & Outlet closed
- 27.1.4. TA Sample Closed
- 27.1.5. Bypass OPEN

Shut down

28. Run **tega_disable_heater_control** (Turn all remaining heaters off)
29. Close bypass valve
30. Stop SM 6
31. CLOSE GEC Vent Valve
32. Turn off EGA: **CALL tega_ega_off**
 - 32.1.1.1. EGA Shutdown:**
 - 32.1.2. Multiplier Voltage OFF
 - 32.1.3. Wait 5 secs
 - 32.1.4. Emission Off
 - 32.1.5. Wait 5 secs
 - 32.1.6. Ion Pump Control OFF
 - 32.1.7. Activate Sequence 7A to turn the EGA OFF
33. Turn off TEGA: **CALL tega_power_off**
 - 33.1.1. Turn off the third TEGA switch
 - 33.1.2. Turn off the second TEGA switch
 - 33.1.3. Turn off the first TEGA switch
 - 33.1.4. FPGA Dump – Aker Valve state