

TEGA Mid-Temp Soil

Reconciled with block: [tega_mid_temp_ramp/r29](#)_____

Objectives:

Power on and perform the medium-temperature ramp on an ice sample that had been previously heated via a low-temperature ramp. The purpose of this run is mainly to help decompose any possible oxidizing agent that might be on the soils. It also looks for gas release on the way up to the hold temperature. After warm up, we will collect background data for 5 minutes inside the ramp. The ramp proper starts at -60 C and runs to + 175 C at 20 K/min followed by a 60 minute hold to decompose the oxidants. We do not capture a gas sample at the high temperature hold; we continuously monitor the gas composition with time during the hold.

This procedure also checks for leaks in the manifold, leaks in the oven, and checks the pressure in the supply tanks (simply by looking at the step rise in pressure with each pulse).

Note this run will be entirely at low emission.

Note also that this run has no mass-to-voltage calibration after the one done right after warm up.

Configuration:

Low-temperature ramp has been completed previously.

Need to make sure we do not begin too early in the morning PRIOR to the TA manifold temperature greater than or equal to -40C for a duration of at least 40 minutes. (TBR)

Constraints:

Will USE TA 0

Review: LT Results. Did the water evaporate enough or do we need to repeat LT? _ _ _

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 V123.

Super modes and Sweep modes used: Supermodes 1, 2, 3, 4, 6, 7. and 10; Sweeps 37, and 38.

Supermodes running in ramp: 4, 6, 7 and 12

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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)
3. Call Sequence 30A
4. Pause 30 seconds (to be sure the delayed-command list is empty)
5. Turn on EGA
 - 5.1.1. TEGA/FSW:EGA:Change EGA State
 - 5.1.2. Restore the modes from EEPROM 0
 - 5.1.3. EGA Commands:Restore Mode
6. OPEN GEC Vent Valve
7. Warm up EGA: **CALL tega_ega_emission_warmup** (filament 1, emission low, cal set 3)
 - 7.1.1. Note: IF pass through was selected as HIGH, calibration set **CANNOT** equal 3
 - 7.2. Calls **tega_ega_prep, filament-1**
 - 7.2.1.1.Sets JPlate 0 to -107V
 - 7.2.1.2.Sets Jplate 1 to -92V
 - 7.2.1.3.Start SM 1 pause 1 sec
 - 7.2.1.4.Set MV 2800V Pause 1 sec
 - 7.2.1.5.Ion Pump ON Pause 1 sec
 - 7.2.1.6.Pause 30 seconds
 - 7.2.1.7.Emission ON
 - 7.2.1.8.Pause 2 Minutes
 - 7.2.1.9.Stop SM 1
 - 7.3. Pause 2 minutes
 - 7.4. Change engineering transmit to 10 secs
 - 7.4.1. IF pass thru = 1, emission current will change to HIGH
 - 7.5. Call tega_ega_calibration_scans (emission low, cal set 3, exit = 3200V)
 - 7.6. Start SM 3
 - 7.7. Pause 20 minutes

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7.8. Stop SM 3

7.9. Pause 1 minute

7.10. Calls **tega_ega_gain**

7.10.1.1.1. Start SM 2

7.10.1.1.2. Pause 1 minute

7.10.1.1.3. Set MV 2600 – 3400V (1 minute per voltage)

7.10.1.1.4. Remain at 3200V

7.10.1.1.5. Stop SM 2

7.10.1.1.6. Run Sweep 38

EGA is warmed up and ready to go (54 mins)

8. Go to HIGH emission (attempting to make sure ion pump fires prior to ramp starting)

9. Pause 5 minutes

10. Go to LOW emission

11. Execute sequence 24A (Changes engineering readings for heater control)

12. Set EGA manifold heater to +35 C

13. Set TA manifold heater to -10 C

14. Calibrate EGA: CALL tega_ega_calibration_scans (set = 3, exit=3200 V)

15. Start Supermode 7: Soil volatiles (3200 V)

16. Select Oven TA_0__

17. Start Ramp (**TWEAKABLE**)

17.1. Ramp Segments File:_____

18. Pause for **pre_heater_delay** (1901 seconds, ~ 32 mins) – **TWEAKABLE**

19. **Set TA Manifold regulation heater to 65C**

20. Run Heater Init (tega_init_heater_control)

Execute Sequence 24 B to increase readings on temperature regulation.

20.1.1. TA Manifold +65C

20.1.2. Plumbing 1 +35C

20.1.3. Plumbing 2 +35C

20.1.4. Transfer Tube +75C

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20.1.5. EGA Plumbing +45C

20.1.6. EGA manifold to +35 C

20.1.7. Wedge Heater @ 10% duty cycle

21. Pause for **pre_sweep_1_delay** (107 seconds) - **TWEAKABLE**
22. Stop SM 7
23. Start Sweep 38 (Sweep of carrier gas)
24. Start Supermode 6: Soil volatiles (3200 V)
25. Pause for **pre_sweep_2_delay** (3781 secs) - **TWEAKABLE**
26. Stop SM 6 immediate
27. Run Sweep Mode 38 (on held gas)
28. Start Supermode 7: Soil volatiles (3200 V)
29. Pause for **pre_cal_tank_delay** (1318 secs, ~ 42 mins) - **TWEAKABLE**
30. Start Cal Tank heater to **+10C**(turn up engineering readings)
 - 30.1. Set Cal Tank to Timer 1
31. Pause for **post_cal_tank_delay** (2270 secs, ~ 38 mins) - **TWEAKABLE**
32. Turn OFF Cal Tank Heater
33. Wait for ramp to complete (timeout 1650 secs, ~ 27.5 mins) – **TWEAKABLE**

Ramp Ends as Follows:

33.1.1. SM 6 running

33.1.2. Carrier and Calibration Closed

33.1.3. Inlet & Outlet closed

33.1.4. TA Sample Closed

33.1.5. Bypass OPEN

Shut down

34. Run **tega_disable_heater_control** (Turn all remaining heaters off)
35. Close bypass valve

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- 36. Stop SM 6
- 37. CLOSE GEC Vent Valve
- 38. Turn off EGA: CALL tega_ega_off
 - 38.1.1.1.** EGA Shutdown:
 - 38.1.2. Multiplier Voltage OFF
 - 38.1.3. Wait 5 secs
 - 38.1.4. Emission Off
 - 38.1.5. Wait 5 secs
 - 38.1.6. Ion Pump Control OFF
 - 38.1.7. Activate Sequence 7A to turn the EGA OFF
- 39. Turn off TEGA: CALL tega_power_off
 - 39.1.1. Turn off the third TEGA switch
 - 39.1.2. Turn off the second TEGA switch
 - 39.1.3. Turn off the first TEGA switch
 - 39.1.4. FPGA Dump – Aker Valve state