

TEGA Mid-Temp Soil

Reconciled with block: [tega_mid_temp_ramp/r31](#) [ta7 \(As Run Sol 90\)](#)_____

Objectives:

Power on and perform the medium-temperature ramp on the “Burned Coals” sample from Burned Alive. 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 -40 C and runs to + 125 C at 20 K/min followed by a 65 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.

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)

Inputs:

Multiplier Voltage: __3300

Calibration Set: 3

Ch 4 Calibration Voltage: 2800

Pump Nudge needed: NO

Pre-heat duration: 45 minutes

Calibrate Channels: 1,3,4

Oven Close Time 20 mins

Select TA #: 7

TA# for Check: 0

Emission: **Low**

Cal Tank Temperature: +0C

Filament: 1

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Constraints:

Will USE TA 7

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 12; Sweeps 37, and 38.

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

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) Or Preheat delay
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)

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- 7.1. Calls **tega_ega_prep, filament-1**
 - 7.1.1.1.Sets JPlate 0 to -107V
 - 7.1.1.2.Sets Jplate 1 to -92V
 - 7.1.1.3.Pause 5 seconds
 - 7.1.1.4.Set MV 3300 (input variable)
 - 7.1.1.5.Ion Pump ON
 - 7.1.1.6.Start SM 1, pause 1 sec
 - 7.1.1.7.Emission ON
 - 7.1.1.8. Pause 2 Minutes
 - 7.1.1.9. Stop SM 1

- 7.2. Pause 2 minutes (provides time for pump to stabilize)

- 7.3. Change engineering transmit to 10 secs
 - 7.3.1. IF pass thru = 1, emission current will change to HIGH

- 7.4. Call tega_ega_calibration_scans
 - 7.4.1. calibration_set _____3_____
 - 7.4.2. hi_emission_____LOW_____
 - 7.4.3. cal_channels_____1,3,4_____
 - 7.4.4. cal_voltage_____3300V_____
 - 7.4.5. cal_4_voltage_____2800V_____
 - 7.4.6. exit_voltage_____3300V_____

- 7.5. Start SM 3

- 7.6. Pause 20 minutes

- 7.7. Stop SM 3

- 7.8. Pause 1 minute

- 7.9. Calls **tega_ega_gain**
 - 7.9.1.1.1. Start SM 2
 - 7.9.1.1.2. Pause 1 minute
 - 7.9.1.1.3. Set MV 2600 – 3400V (1 minute per voltage)
 - 7.9.1.1.4. Exit at 3300_V (input variable)
 - 7.9.1.1.5. Stop SM 2
 - 7.9.1.1.6. Run Sweep 38

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

(IF pump nudge is YES Steps 13 to 15 are followed, if NO skip to 16)

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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. Turn off TA_T_heater_Temp – Don't collect
15. Calibrate EGA: CALL tega_ega_calibration_scans
 - 15.1.1. calibration_set _____ 3 _____
 - 15.1.2. hi_emission _____ LOW _____
 - 15.1.3. cal_channels _____ 1,3,4 _____
 - 15.1.4. cal_voltage _____ 3300V _____
 - 15.1.5. cal_4_voltage _____ 2800V _____
 - 15.1.6. exit_voltage _____ 3300V _____
16. Start Supermode 7: Soil volatiles (3300 V)
17. Select Oven TA_7__
18. Start Ramp (**TWEAKABLE**)
 - 18.1. Ramp Segments File: _____
- 19. Pause for pre_heater_delay (1901 seconds, ~ 32 mins) – TWEAKABLE**
- 20. Set TA Manifold regulation heater to 65C**
21. Run Heater Init (tega_init_heater_control)
 - Execute Sequence 24 B to increase readings on temperature regulation.
 - 21.1.1. TA Manifold +65C
 - 21.1.2. Plumbing 1 +65C
 - 21.1.3. Plumbing 2 +35C
 - 21.1.4. Transfer Tube +75C
 - 21.1.5. EGA Plumbing +45C
 - 21.1.6. EGA manifold to +35 C
 - 21.1.7. Wedge Heater @ 10% duty cycle
22. Pause for **pre_sweep_1_delay (107 seconds) - TWEAKABLE**

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23. Stop SM 6
24. Start Sweep 38 (Sweep of carrier gas)
25. Start Supermode 7: Soil volatiles (3300 V)
26. Pause for **pre_sweep_2_delay** (3781 secs) - **TWEAKABLE**
27. Stop SM 7 immediate
28. Run Sweep Mode 38 (on held gas)
29. Start Supermode 6: Soil volatiles (3300 V)
- 30. Pause for pre_cal_tank_delay** (1318 secs, ~ 42 mins) - **TWEAKABLE**
31. Start Cal Tank heater to +0C(turn up engineering readings)
 - 31.1. Set Cal Tank to Timer 1
32. Pause for post_cal_tank_delay (2270 secs, ~ 38 mins) - **TWEAKABLE**
33. Turn OFF Cal Tank Heater
34. Wait for ramp to complete (timeout 1577 secs,) – **TWEAKABLE**
 - Ramp Ends as Follows:
 - 34.1.1. SM 6 running
 - 34.1.2. Carrier and Calibration Closed
 - 34.1.3. Inlet & Outlet closed
 - 34.1.4. TA Sample Closed
 - 34.1.5. Bypass OPEN

Shut down

35. Run tega_disable_heater_control (Turn all remaining heaters off)
36. Close bypass valve
37. Stop SM 6
38. CLOSE GEC Vent Valve
39. Turn off EGA: CALL tega_ega_off

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- 39.1.1.1.** EGA Shutdown:
 - 39.1.2. Multiplier Voltage OFF
 - 39.1.3. Wait 5 secs
 - 39.1.4. Emission Off
 - 39.1.5. Wait 5 secs
 - 39.1.6. Ion Pump Control OFF
 - 39.1.7. Activate Sequence 7A to turn the EGA OFF

- 40. Turn off TEGA: CALL tega_power_off
 - 40.1.1. Turn off the third TEGA switch
 - 40.1.2. Turn off the second TEGA switch
 - 40.1.3. Turn off the first TEGA switch
 - 40.1.4. FPGA Dump – Aker Valve state