

TEGA High-Temp Ramp TA-1 for Blank Oven

Change Bars are relative to TEGA_High-T_OFB_test_on_TA0_v4_r1.doc

Reconciled with block:

Objectives:

The purpose of this run is to look for organics and CO₂ release to determine the nature of the system blank for organic compounds. After warm up, we will collect residual data for 7 minutes followed by 15 minutes for the atmosphere and 15 minutes for the carrier gas. We then take 10 minutes to flush the gas out of the oven 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 before the ramp returns to low temperatures. The procedure shuts off the manifold heater when the oven and shield are at high temperatures to avoid drawing too much current from the lander; we do not turn it back on as we used to do when we analyzed cal gas at the end of a run. A procedure similar to this was run on TA-0. That ramp was shortened a lot by removing the atmosphere test and some other things. This run will be longer.

Configuration:

The control of flow via the carrier valve is not possible due to a hardware problem. We will begin the run with the carrier valve in the open position and leave it there throughout the run. We will regulate the flow with a duty cycle control on the bypass and oven inlet valves (depending on where we want the gas to flow).

Remember that TA7 is shorted, so any gas flow through TA1 will happen through TA7 also.

Constraints:

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

Filaments used: 1, LOW Emission

SW Version (386): V515

SW Version (EGA): V321

Sweep and hop mode version(s): MODE TABLE V125.

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

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Supermodes running in ramp: 6, 4 & 7.

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Inputs:

Multiplier Voltage: __3300

Calibration Set: 3

Ch 4 Calibration Voltage: 2800

Calibrate Channels: 1, 4

Select TA #: 1

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Cal Tank Temperature: -99

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. 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
- 4.5 Set EGA emission on delay to 5 seconds
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
 - 6.2. Calls **tega_ega_prep, filament-1 (r9)**
 - 6.2.1.1. Sets JPlate 0 to -107V
 - 6.2.1.2. Sets Jplate 1 to -92V
 - 6.2.1.3. Pause 5 seconds
 - 6.2.1.4. Set MV 3300V Pause 1 sec
 - 6.2.1.5. Ion Pump ON
 - 6.2.1.6. Start SM1, pause 1 sec
 - 6.2.1.7. Emission ON
 - 6.2.1.8. Pause 2 Minutes
 - 6.2.1.9. Stop SM 1
 - 6.25 Pause 2 minutes (provides time for ion pump to stabilize)
 - 6.3. Change engineering transmit to 10 secs
 - 6.3.1. IF pass thru = 1, emission current will change to HIGH

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6.4. Call tega_ega_calibration_scans, exit at 3300V

- 6.4.1. calibration_set ____3____
- 6.4.2. hi_emission____LOW____
- 6.4.3. cal_channels____1, 4____
- 6.4.4. cal_voltage____3300V____
- 6.4.5. cal_4_voltage____2800V____
- 6.4.6. exit_voltage____3300V____

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. Exit at 3300V
- 6.9.1.1.5. Stop SM 2
- 6.9.1.1.6. Run Sweep 38

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

7. Set emission on (as insurance)

(IF pump nudge is YES Steps 8 to 10 are followed, if NO skip to 11)

8. Change to HIGH Emission

9. Pause 5 minutes

10. Change to LOW Emission

11. Set EGA manifold heater to +35 C

12. Set TA manifold heater to +65 C

13. Calibrate EGA: CALL tega_ega_calibration_scans (set = 3, exit=3300 V)

13.1.1. calibration_set ____3____

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13.1.2. hi_emission _____ LOW _____
13.1.3. cal_channels _____ 1, 4 _____
13.1.4. cal_voltage _____ 3300V _____
13.1.5. cal_4_voltage _____ 2800V _____
13.1.6. exit_voltage _____ 3300V _____

14. Start Supermode 6: Soil volatiles

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15. Select Oven TA 1 (TWEAKABLE)

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16. Change pressure monitoring to timer 1

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18. Set timer 5 to 8 s (to control on-off times of inlet or bypass valves for flow regulation)

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18.1. EEprom sequence has ratio of 1:15 so we will get 8 seconds open and 120 seconds closed

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19. Set parameters to allow ramp to control no valves.

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20. Call sequence to open carrier valve 20 times.

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**Remember to turn on current monitoring to shut down manifold heater
(we do not need to turn it back on)**

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21. Start Ramp (TWEAKABLE) Ramp should have control of NO valves

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21.1. Ramp Segments File _____

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Measure residuals for 7 minutes (ramp goes to SM 7)

22. Pause for Delay-1 (0 sec;) - TWEAKABLE

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23. Run Heater Init (tega_init_heater_control)

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Execute Sequence 24 B to increase readings on temperature regulation.

23.1.1. TA Manifold +65C

23.1.2. Plumbing 1 +65C

23.1.3. Plumbing 2 +35C

23.1.4. Transfer Tube +75C

23.1.5. EGA Plumbing +45C

23.1.6. EGA manifold to +35 C

23.1.7. Wedge Heater @ 10% duty cycle

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24. Pause for Delay-2 (439 sec;) - TWEAKABLE

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Measure atmosphere for 15 minutes (ramp calls SM 4)

(get 30 seconds of SM4 here)

25. Open TA sample valve to sample atmosphere – (30 seconds after B55)

26. Pause 2 minutes

27. Close TA sample valve to seal in atmosphere

28. Pause 30 seconds

29. Stop SM 4

30. Start SM 7

31. Call sequence **TBD** to regulate gas flow via bypass valve - 44B

32. Pause for **Delay 3** (717 sec;) - TWEAKABLE

Measure carrier gas then flow gas through oven and ramp temperature (SM 6)

33. Open TA sample valve to release atmosphere and to sample carrier gas

34. Pause 1 minute to measure pure carrier gas via bypass

35. Stop flow regulation via bypass valve

36. Change timer 5 to 16 seconds (16 seconds on, 240 seconds off)

37. Open oven outlet valve

38. Call sequence **TBD** to regulate gas flow via oven inlet valve 46B

39. Pause 30 seconds to watch initial gas flow through oven

40. Stop SM6

41. Start SM7

42. Pause for **Delay-4** (5240 sec)

43. Stop regulation via oven inlet valve

Flow via bypass for 15 minutes

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<#>Call sequence to regulate gas flow via bypass valve¶
¶
<#>Pause for **pre_cal_tank_delay** (795 sec;) - TWEAKABLE¶

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Deleted: <#>Stop SM6 (query again re: moving 32 and 33 to between 37 and 38 with 30 sec delay)¶
<#>Start SM7¶

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44. Change timer 5 to 8 seconds (8 seconds on, 120 seconds off)

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45. Call sequence **TBD** to regulate gas flow via bypass valve 44B

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46. Close oven outlet valve

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47. Pause for **Delay-5** (895 seconds)

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48. Stop regulation via bypass (so pressure in CML can drop)

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49. Pause 5 minutes

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50. Close TA Sample valve

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51. Wait for ramp to complete (timeout **TBD**) - TWEAKABLE

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Ramp Ends as Follows:

SM 6 running

Carrier open and Calibration Closed

Inlet & Outlet closed

TA Sample closed with carrier in CML volume

Bypass closed

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52. Close Carrier valve 20 times

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Shut down

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53. Run tega_disable_heater_control (Turn all remaining heaters off)

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54. Stop SM 6

55. CLOSE GEC Vent Valve

56. Turn off EGA: CALL tega_ega_off

EGA Shutdown:

Multiplier Voltage OFF

Wait 5 secs

Emission Off

Wait 5 secs

Ion Pump Control OFF

Activate Sequence 7A to turn the EGA OFF

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57. Turn off TEGA: CALL tega_power_off

TEGA High-Temp Ramp TA-1 for Blank Oven

Turn off the third TEGA switch
Turn off the second TEGA switch
Turn off the first TEGA switch
FPGA Dump – Aker Valve state