TEGA Pristine Atmosphere Procedure

Reconciled with block: tega_atmos R____

Objectives:
Power on and acquire an EGA atmospheric sample. This procedure is for the first, pristine atmosphere sample and is aimed at getting our best possible data on H_2O ($18O/^{16}O$ and D/H). It has no cal gas analysis and no outgassing of the TA manifold. A large part of the run is done entirely on high emission. We have 60 minutes to measure the background and 90 minutes to measure the atmosphere. At the end we have 20 minutes on low emission to watch the effect of count rates losses on the mass-44 peak. We will first take an atmosphere sample via the TA Sample inlet so that we can measure mass 44. (The count rate of mass 44 is too high using the atmosphere inlet and high emission to permit analysis.)

Configuration:

First Surface Phase Sample will have been delivered to TEGA. However, no ramps will have been run on the sample until this activity is complete.

Constraints:

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

Review data from Surface Phase Cover Retract Ion Pump to verify residuals are low enough to run instrument modes on HIGH emission

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

Filaments used: 1

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, 4, 5 and 10; Sweeps 37 and 38.

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

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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

5. OPEN GEC Vent Valve

6. Start Heater Regulation EGA Manifold -20C

7. Start Heater Regulation TA Manifold -20C

8. Warmup EGA: CALL tega_ega_emission_warmup

    8.1. Calls **tega_ega_prep, filament 1-**
        8.1.1.1.Sets JPlate 0 to -110V
        8.1.1.2.Sets Jplate 1 to -92V
        8.1.1.3.Start SM 1 pause 1 sec
        8.1.1.4.Set MV 2800V Pause 1 sec
        8.1.1.5.Ion Pump ON Pause 1 sec
        8.1.1.6.Emission ON
        8.1.1.7.Pause 2 Minutes
        8.1.1.8.Stop SM 1

    8.2. Change Emission Current to **HIGH** – PASS IN PARAMETER

    8.3. Change calibration OFFSET

    8.4. Wait 1 minute

    8.5. Start SM 3

    8.6. Pause 20 minutes

    8.7. Stop SM 3

    8.8. Pause 1 minute

    8.9. Calls **tega_ega_gain**
        8.9.1.1.1. Start SM 2
        8.9.1.1.2. Pause 1 minute
        8.9.1.1.3. Set MV 2600 – 3400V (1 minute per voltage)
        8.9.1.1.4. Remain at 3200V
        8.9.1.1.5. Stop SM 2

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8.9.1.1.6. Run Sweep 38

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

9. Call tega_ega_calibration_scans (Set =1, exit = 3200V)

Begin background determination

10. Start SM 5 (Atmosphere HIGH Emission)

11. Pause 60 minutes (time is to be tweakable)

12. Stop SM 5

13. Call tega_ega_calibrations_scans (Set 1, Exit = 3200V)

14. Start SM 10 (Atmosphere; No H_2O)

15. Pause 5 minutes (to get residual data on new calibration

Do a quick measurement of the atmosphere via the TA Sample inlet to get mass 44 on scale.

16. Open TA sample inlet

17. Pause 5 minutes

18. Close TA sample inlet

19. Stop SM 10

20. Start SM 5 (Atmosphere HIGH Emission)

21. Open ATM Aker Valve

22. Pause 90 minutes (5400 Secs)

23. Stop SM 5

24. Change to LOW Emission

25. Change calibration OFFSET

26. Start SM 4 (ATM Low emission)

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27. Pause 2 minutes

28. Stop SM 4

29. Call tega_ega_calibrations_scans (set 3, emission low)

30. Start SM 4 (ATM, Low emission)

31. Pause 2 minutes

32. Stop SM 4

Take a full sweep of the atmosphere composition

33. Run Sweep 38

34. Start SM 4 (ATM, Low Emission)

35. Close ATM Valve

36. Close GEC Vent Valve

37. Pause 10 minutes (to watch decay of gas in atmosphere CML volume)

Flush atmosphere from Sample CML volume.

38. Set Carrier gas to regulate at 35 mbar (3500 dn)

39. Pause 10 minutes (to watch increase in N_2 in TA CML volume)

40. Turn Off Heaters: Call tega_disable_heater_control
    40.1. Only heaters that will have been regulating are TA Manifold and EGA Manifold

41. Stop regulation of Carrier gas

42. Stop SM 4

43. Close Sample

44. Close Bypass

45. Close ATM sample valve

    45.1. Take a dump to confirm closed

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Shut down

46. Turn off EGA: CALL tega_ega_off
    - 46.1.1.1. EGA Shutdown:
    - 46.1.2. Multiplier Voltage OFF
    - 46.1.3. Wait 5 secs
    - 46.1.4. Emission Off
    - 46.1.5. Wait 5 secs
    - 46.1.6. Ion Pump Control OFF
    - 46.1.7. Activate Sequence 7A to turn the EGA OFF

47. Turn off TEGA: CALL tega_power_off
    - 47.1.1. Turn off the third TEGA switch
    - 47.1.2. Turn off the second TEGA switch
    - 47.1.3. Turn off the first TEGA switch
    - 47.1.4. FPGA Dump – Aker Valve state