

Maneuver Walkthrough #2 Summary

Actions

- FDG - Run +/- 1 degree repointing maneuver error - determine effects on Napoleon plot
- FDG - Test Orbital laptop - see if login still valid
- FDG - 3 runs for ADV2/ADV3 abort scenarios
 - 1) Aborted ADV2 ;
ADV3 600s at 6/17 1100 (change duration of ADV3)
ADV4 on 25th
 - 2) Aborted ADV2 :
ADV3 as planned : 6/17 1100, same duration uploaded in original ADV3 ATS
ADV4 @ 6/17 1330 UTC, 600s
possible TCM on June 25
 - 3) Aborted ADV2 & ADV3
ADV4 & ADV5 on 25th
- Jim - come up with a curve for spin down time vs fuel mass - spin down rate as a function of fuel remaining
- Mark/Ken - Description of why the June 5 repointing maneuver is anticipated to be similar duration as the June 24 repointing maneuver
- Ryan - Proc Change : Upload ADV2 & ADV3 ATS at same time
- Ryan - Proc Change : If abort ADV2, delete 5N & 22N thruster ENABLE commands from both ADV2 & ADV3 (4 commands)
- Sean - What telemetry criteria to predict how far into future we are power positive

Anomalies

1. FC Reset 143s into ADV1Info
 - Info
 - no tlm during reset - no stored FC tlm
 - burn is 143-153s, can't know exact timing - [anomaly recovery process proceeded assuming we do not know the burn duration. From 5/19 FC Reset sim we saw we would have the exact duration of the burn for an FC Reset because the ACE stores that info. In the event of an ACE Reset we would know the duration of the burn to within 10s because of the back orbit TLM data storage rate in FC Burn mode](#)
 - can get pressure profile & temperature profile
 - no insight into why FC reset
 - Recovery
 - Contingency recovery CAR
 - Another burn needed (TCM - June 25, ADV4 - June 17)
 - ADV2 time same, duration stays 600s
 - ADV3 time same, duration 600s

- Need to have a TCM not ADV4
 - use PVT to figure out how much fuel was burned - use burn profile to figure out how long it would burn to lose that much mass
 - OD will give delta-V assessment
 - Redo Napoleon plot for shortened burn - define required precision for TCM (if scenario is so delightful long term we can have an ADV4 - only if can tolerate a ton of uncertainty)
 - Deliver new ephems, change contact schedule as needed, evaluate ADV2,3 w/i viewperiods
2. ADV1 low performance
- Info
 - 10% low burn by OD after 2 contacts
 - Spacecraft bus telemetry shows all nominal
 - Recovery
 - Monitor OD solution - trust solution on 6/13
 - Determine new scale factor that is 0.9
 - 2 options - Verify with pressure to figure out which of two it is
 - low flow & thrust (see below)
 - leaks (low thrust but correct flow - evaluate fuel remaining at end of burn series)
 - Another burn needed (TCM - June 25, ADV4 - June 17)
 - ADV2 time same, duration stays 600s
 - ADV3 time same, duration increased 600s
 - Evaluate the need for a TCM or ADV4 - ADV4 may be more likely because we will have the post-ADV1 calibration
 - Deliver new ephems, change contact schedule as needed, evaluate ADV2,3 w/i viewperiod
3. Bad Doppler / No Doppler
- FDG diagnoses bad
 - Call USN, schedule up emergency passes with another station - don't be afraid of AUS/AK at apogee
 - Add backup contacts if needed
 - can still hold to the timeline in this scenario
4. Abort ADV2
- During ADV2 pass where the decision to abort is made
 - Delete timed commands for Thruster ENABLE for 5N & 22N for ADV2 & ADV3 - both need to be done at the same time
 - If Decide to proceed with ADV3 missed burn plan
 - Add contact prior to ADV3 - upload changes
 - **If decide to go with ADV3 (as planned) & ADV4 (600s)**
 - **Upload same 5N & 22N ENABLE commands that were deleted (same commands from original ATS)**

- **Delete timed commands for changing heater setpoints back to 16/18**
 - **Upload ATS for ADV4**
 - If decide to go with 600s ADV3
 - Make sure contact is before cat bed heaters turn on
 - Delete all timed commands
 - Timed command to turn transmitter off
 - Upload new ADV3 ATS
- 5. FC Reset during ADV4
 - Info on anomaly - FC Reset in ADV4
 - ADV3 burned the full 457.4s as planned
 - ADV4 burned 286.464s then FC Reboot put S/C into Contingency State
 - thrusters disabled upon entrance to Contingency
 - all stored commands deleted
 - Tank pressures look nominal for burn durations
 - ACS nominal
 - Immediate Recovery (same pass)
 - Contingency Recovery Procedure :
 - Upload time tagged STX OFF command
 - Contingency State Diagnostics script
 - Turn off 5N cat bed htrs
 - set thrust time 0 (5N)
 - set dv thrust 0.1 (22N)
 - set htr points to 16/18
 - Redo Step 15 of Orbit maintenance procedure
 - Next Pass recovery
 - Rest of Contingency Recovery Procedure

Supporting Materials - on SFTP site

- /IBEX/Delta-V/Maneuver-Walkthrough-2/Burn Plan Comparisons.pptx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/Pre Spin Down Eclipse Profile.pptx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/CAR - contingency_state_recovery_7-18-11.docx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/CAR - missed_dv2_7-17-11.docx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/ibex_solar_calc_v4 - post june 5 inert man_Rehearsal2.xlsm
- /IBEX/Delta-V/Maneuver-Walkthrough-2/Spinup_MAC_Approval_Walkthrough2.pptx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/IBEX_Manuever_Timeline_Plan4-cr5.xlsx (pre-rehearsal version)
- /IBEX/Delta-V/Maneuver-Walkthrough-2/Sun Angle June 2011.jpg
- /IBEX/Delta-V/Maneuver-Walkthrough-2/MAC-Checklist-preSpinUp-r5-MW2.doc
- /IBEX/Delta-V/Maneuver-Walkthrough-2/MAC-Checklist-preADV1_r2-MW2.doc
- /IBEX/Delta-V/Maneuver-Walkthrough-2/MAC-Checklist-preADV2_r2-MW2.doc

- /IBEX/Delta-V/Maneuver-Walkthrough-2/MAC-Checklist-preTCM-r2-MW2.doc
- /IBEX/Delta-V/Maneuver-Walkthrough-2/MAC-Checklist-preSpinDown-r2-MW2.doc

Maneuver Walkthrough #2 Summary

Actions

- FDG - Run +/- 1 degree repointing maneuver error - determine effects on Napoleon plot
- FDG - Test Orbital laptop - see if login still valid
- FDG - 3 runs for ADV2/ADV3 abort scenarios
 - 1) Aborted ADV2 ;
 - ADV3 600s at 6/17 1100 (change duration of ADV3)
 - ADV4 on 25th
 - 2) Aborted ADV2 :
 - ADV3 as planned : 6/17 1100, same duration uploaded in original ADV3 ATS
 - ADV4 @ 6/17 1330 UTC, 600s
 - possible TCM on June 25
 - 3) Aborted ADV2 & ADV3
 - ADV4 & ADV5 on 25th
- Jim - come up with a curve for spin down time vs fuel mass - spin down rate as a function of fuel remaining
- Mark/Ken - Description of why the June 5 repointing maneuver is anticipated to be similar duration as the June 24 repointing maneuver
- Ryan - Proc Change : Upload ADV2 & ADV3 ATS at same time
- Ryan - Proc Change : If abort ADV2, delete 5N & 22N thruster ENABLE commands from both ADV2 & ADV3 (4 commands)
- Sean - What telemetry criteria to predict how far into future we are power positive

Anomalies

6. FC Reset 143s into ADV1Info
 - Info
 - no tlm during reset - no stored FC tlm
 - burn is 143-153s, can't know exact timing - [anomaly recovery process proceeded assuming we do not know the burn duration. From 5/19 FC Reset sim we saw we would have the exact duration of the burn for an FC Reset because the ACE stores that info. In the event of an ACE Reset we would know the duration of the burn to within 10s because of the back orbit TLM data storage rate in FC Burn mode](#)
 - can get pressure profile & temperature profile
 - no insight into why FC reset
 - Recovery
 - Contingency recovery CAR
 - Another burn needed (TCM - June 25, ADV4 - June 17)

- ADV2 time same, duration stays 600s
- ADV3 time same, duration 600s
- Need to have a TCM not ADV4
 - use PVT to figure out how much fuel was burned - use burn profile to figure out how long it would burn to lose that much mass
 - OD will give delta-V assessment
- Redo Napoleon plot for shortened burn - define required precision for TCM (if scenario is so delightful long term we can have an ADV4 - only if can tolerate a ton of uncertainty)
- Deliver new ephems, change contact schedule as needed, evaluate ADV2,3 w/i viewperiods

7. ADV1 low performance

- Info
 - 10% low burn by OD after 2 contacts
 - Spacecraft bus telemetry shows all nominal
- Recovery
 - Monitor OD solution - trust solution on 6/13
 - Determine new scale factor that is 0.9
 - 2 options - Verify with pressure to figure out which of two it is
 - low flow & thrust (see below)
 - leaks (low thrust but correct flow - evaluate fuel remaining at end of burn series)
 - Another burn needed (TCM - June 25, ADV4 - June 17)
 - ADV2 time same, duration stays 600s
 - ADV3 time same, duration increased 600s
 - Evaluate the need for a TCM or ADV4 - ADV4 may be more likely because we will have the post-ADV1 calibration
 - Deliver new ephems, change contact schedule as needed, evaluate ADV2,3 w/i viewperiod

8. Bad Doppler / No Doppler

- FDG diagnoses bad
- Call USN, schedule up emergency passes with another station - don't be afraid of AUS/AK at apogee
- Add backup contacts if needed
- can still hold to the timeline in this scenario

9. Abort ADV2

- During ADV2 pass where the decision to abort is made
 - Delete timed commands for Thruster ENABLE for 5N & 22N for ADV2 & ADV3 - both need to be done at the same time
- If Decide to proceed with ADV3 missed burn plan
 - Add contact prior to ADV3 - upload changes
 - **If decide to go with ADV3 (as planned) & ADV4 (600s)**

- **Upload same 5N & 22N ENABLE commands that were deleted (same commands from original ATS)**
 - **Delete timed commands for changing heater setpoints back to 16/18**
 - **Upload ATS for ADV4**
 - If decide to go with 600s ADV3
 - Make sure contact is before cat bed heaters turn on
 - Delete all timed commands
 - Timed command to turn transmitter off
 - Upload new ADV3 ATS
10. FC Reset during ADV4

- Info on anomaly - FC Reset in ADV4
 - ADV3 burned the full 457.4s as planned
 - ADV4 burned 286.464s then FC Reboot put S/C into Contingency State
 - thrusters disabled upon entrance to Contingency
 - all stored commands deleted
 - Tank pressures look nominal for burn durations
 - ACS nominal
- Immediate Recovery (same pass)
 - Contingency Recovery Procedure :
 - Upload time tagged STX OFF command
 - Contingency State Diagnostics script
 - Turn off 5N cat bed htrs
 - set thrust time 0 (5N)
 - set dv thrust 0.1 (22N)
 - set htr points to 16/18
 - Redo Step 15 of Orbit maintenance procedure
- Next Pass recovery
 - Rest of Contingency Recovery Procedure

Supporting Materials

- /IBEX/Delta-V/Maneuver-Walkthrough-2/Burn Plan Comparisons.pptx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/Pre Spin Down Eclipse Profile.pptx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/CAR - contingency_state_recovery_7-18-11.docx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/CAR - missed_dv2_7-17-11.docx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/ibex_solar_calc_v4 - post june 5 inert man_Rehearsal2.xlsm
- /IBEX/Delta-V/Maneuver-Walkthrough-2/Spinup_MAC_Approval_Walkthrough2.pptx
- /IBEX/Delta-V/Maneuver-Walkthrough-2/IBEX_Manuever_Timeline_Plan4-cr5.xlsx (pre-rehearsal version)
- /IBEX/Delta-V/Maneuver-Walkthrough-2/Sun Angle June 2011.jpg
- /IBEX/Delta-V/Maneuver-Walkthrough-2/MAC-Checklist-preSpinUp-r5-MW2.doc

- /IBEX/Delta-V/Maneuver-Walkthrough-2/MAC-Checklist-preADV1_r2-MW2.doc
- /IBEX/Delta-V/Maneuver-Walkthrough-2/MAC-Checklist-preADV2_r2-MW2.doc
- /IBEX/Delta-V/Maneuver-Walkthrough-2/MAC-Checklist-preTCM-r2-MW2.doc
- /IBEX/Delta-V/Maneuver-Walkthrough-2/IBEX-ManeuverWalkthrough2-Notes.doc