JPSS-1 Post Launch Test (PLT) and Integrated Mission Timeline (IMT) Snapshot

August 8, 2016

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NASA Flight Operations

Agenda

- What is a PLT?
- PLT and IMT Status
- Orbit Raising Campaign Summary
- Open Items
- Overall Power On and Door Deployment Sequence
- JPSS LEO&A Timeline
- Back-up (PLT List)

What is a Post Launch Test (PLT)?

- Operational testing that starts shortly after launch and continues until operations handover to OSPO (during LEO&A)
  - Includes tests on spacecraft bus, instruments, and science data
  - Characterization, ops testing, and on-orbit validation (not verification) of requirements
  - Executed in accordance with the PLT Management Plan (472-00373)
- What makes a PLT
  - A more formal planning and reporting of the test data and its analysis will benefit normal/sustaining operations. (e.g. trending, TDRS C&T angle characterization)
  - There is potential for change of performance from ground tests due either to the launch environment or space v. ground environment. (e.g. vibration sensitive)
  - Unable to validate performance or characterize on the ground. (e.g. instrument noise, star tracker performance)

PLT and IMT Status

- Instrument and System Post Launch Test (PLT) Peer Reviews are complete and included NOAA and NASA science representation
- The majority of instrument PLTs have been exercised in JCTs, with the remaining ones scheduled for JCT-4
- Integrated Mission Timeline
  - Days 9 – 52 (Instrument activation through doors open) have been thoroughly reviewed and rehearsed (with the exception of maneuvers)
    - Doors closed stored commanding sequences are still in work
  - Days 53 – 90 have not been thoroughly reviewed, and typically are scheduled where they occurred on NPP
    - Science teams are working with us to better define/schedule this timeframe
  - All existing instrument PLTs have been accounted for in the IMT, however some are not assigned a date yet
  - This presentation is a snapshot of our current status and is subject to change
  - Orbit Raising Campaign is heavily dependent on launch date and has impacts to instrument commissioning activities (see next slide)

Orbit Raising Campaign Summary

- A meeting was held on August 1st to communicate to instrument vendor and science stakeholders the orbit raising campaign scenarios
- Target injection altitude is 10 km lower than the operational altitude
  - 13 seconds / orbit different if 10 km lower (3 minutes per day)
  - The time it takes J1 to lap NPP is 35 days
- Final orbit day varies based on launch time/date, launch vehicle performance, and desired time between burns
  - Current launch date of 3/16/17 results in on orbit on L+19 days
  - 3 Day Burn Cadence results in on orbit:
    - Best case: L+18 days
    - Worst case: L+50 days
  - 6 Day Burn Cadence results in on orbit:
    - Best case: L+30 days
    - Worst case: L+62 days
  - High Separation Altitude likely increases the wait time and could lead to on orbit on L+70 days (3 day burn cadence)
- The scenarios are on a 16 day repeat cycle
- This presentation is assumes a January 20 launch date, which is almost the worst case scenario

Open Items

- Orbit raising implications
  - Instrument vendors and scientists have been asked to think about whether doors opening and subsequent activities need to be delayed until all orbit raising burns are complete (or possibly just inclination burn complete)
- VIIRS Nadir door opening will move
  - It currently occurs at the end of outgassing right before CRD (Day 43)
  - It may move up to 2 weeks after VIIRS activation (like NPP; ~Day 23)
  - It may move past CRD opening for stray light calibration
  - Direction from NOAA Science is needed
- J1/NPP Cross-calibration
  - Of 13 of 16 cases, J1 will fly under S-NPP for a few days
  - However, orbit raising will begin *after* the overlap; and therefore instrument doors will likely be closed (ATMS is exception)
  - We have no current requirement for cross-calibration

Overall Power On and Door Deployment Sequence

- Power ON
  1. OMPS
  2. VIIRS
  3. ATMS
  4. CrIS
  5. CERES

- Door Deployment
  1. ATMS (no doors)
  2. VIIRS NAD
  3. CrIS
  4. VIIRS CRD
  5. CERES
  6. OMPS

Cool down at same time

No Change since NPP

JPSS-1 LEO&A Timeline

Launch **(000:00:00 MET/020:09:47:07 GMT)**

Autonomous Initialization,
Ref: SER 2359479
- S/C Separation from Launch Vehicle (LV) **(000:57:30 MET, 020:10:54:30 GMT)**
- Autonomous Initialization **(00:57:31)**
- Set ADCS Acquire Sun state **(00:58:16)**
- Inst Survival heaters enabled **(00:58:48)**
- Solar Array deploy **(01:02:57 to 1:06:58)**
- Comm CBM starts **(01:07:02)**
- Redundant S/A deploy **(02:08 to 02:13)**

Autonomous Initialization

0 (0 MET)

- Cmd Path Verification (hi rate) with TDRSS Side 1& 2
- Enable Command Randomization
- Cmd Path Verification (lo rate) with GND Side 1& 2
- Verify post ACBM Config (S/C Power Positive)
- 32K Tlm check via GND
- GND TLM Downlink Test – DSU Dump
- Reset Separation TMONs
- Cmd Path Verification (hi rate) with GND Side 1& 2
- 16k Tlm check with TDRSS
- BEGIN configuring select heaters to Operational Settings
- Mnvr to Primary Sun Vector
- Initiate S/C Roll (nominal Sun Acq Mode)

First Shift

- Perform S/A Drive Checkout
- Start GPS-1 Activation: Power ON GPS
- SCP Power configuration
- Complete GPS activation/monitor convergence
- Open Prop Latch Valve 1
- **Earth Point Mode** O010
- Turn On/Enable Star Trackers
- Solar Array uses Measured Sun Vector

Second Shift

- Load Early Routine CSM
- Open Prop Latch Valve 2
- Load CBM DBA1/2
- Prim/Rdnt Cat Bed heater verification
- Transition to **Mission-Point Mode** O015
- DBA-1 Deploy Mid-Hinge
- DBA-1 Deploy Base-Hinge
- DBA-2 Deploy Mid-Hinge
- DBA Deploy complete
- Primary Cat Bed heater verification

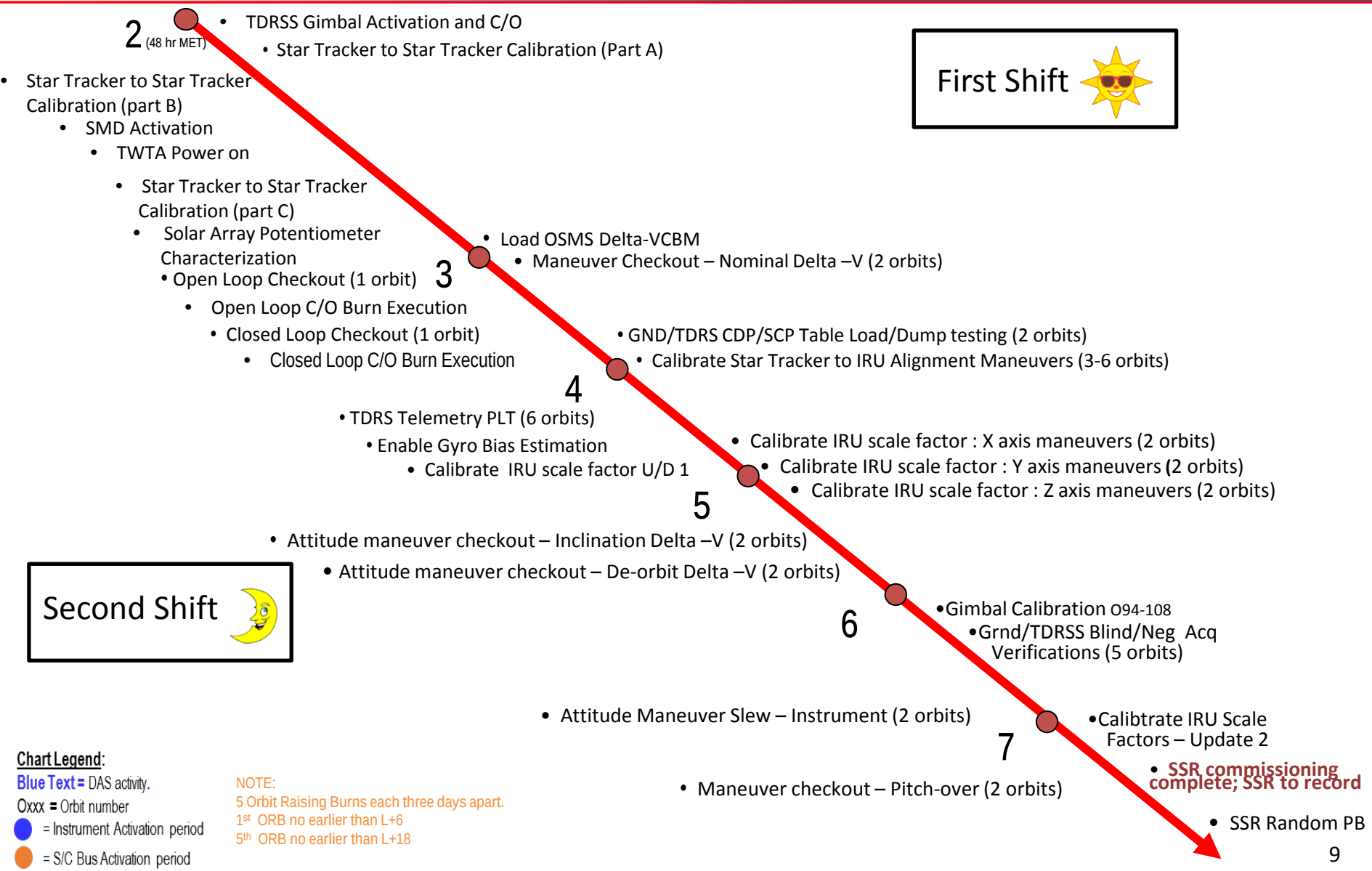
1 (24hr MET)

- COMM Secure Mode
- CDP Activation
- SSR on, begin commissioning
- Rdnt Catbed heater verification
- **Configure SSR-1 for Early Ops**
- HRD Tx1 Activation
- Grnd Gimbal Activation and C/O

Chart Legend:
Blue Text = DAS activity.
Oxxx = Orbit number
= Instrument Activation period
= S/C Bus Activation period

Based on **January 20th, 2017 Launch Date**

JPSS-1 LEO&A Timeline



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NOTE:
5 Orbit Raising Burns each three days apart.
1st ORB no earlier than L+6
5th ORB no earlier than L+18

JPSS-1 LEO&A Timeline

8 (MET)

- KA-Band Antenna Alignment Part A/B O111
- SMD SSR Sequential Dump thru GND O113

9

- KA-Band Antenna Alignment Part A/B
- **OMPS Activation and Aliveness (PWR/SH Mode) O131**
- OMPS Initiate_Decon_Default (OG) O132
- Spacewire Bus Initialization O133
- CrIS Activation of Warm-Up Heaters O134
- **VIIRS Initial Turn-On All A-Side Configuration O134-135**

First Shift

- Release VIIRS RTA Launch Locks on SC Side 1 O136
- Apply VIIRS RTA Stow Power O136
- Enable VIIRS Auto Trans to Safe Due to Missed TOD Pkts & Critical Tlm Failure O136
- Transition VIIRS to Operational-Day Mode & Synch C/O
- Enable VIIRS Survival Heater Interlock)O137
- VIIRS Load Stored Cmd Tbl w Day/Night Transitions and SDMS Collects (Table ID 2) O139
- VIIRS Transition to Op Night/Day/SDSM Cal@
- VIIRS Transition to Operational Day @O139

1st VIIRS SDSM cal

Full ATMS science data available

10

- **ATMS Activation (Electronics) O139**
- ATMS Functional Evaluation - Video Test & Timing O140
- ATMS Functional Evaluation End O141
- CrIS Transition from Survival to Safe Mode O143
- **CERES Initial Operations Power ON O145**

- CERES Diag Patch and mem dump O146
- CERES Initial Gimbal Motion O148
- OMPS Functional Checkout/Verification O149/150
- CrIS SSM Scan Mirror at ICT O152
- CrIS Begin Outgas O152

Second Shift

Active Outgassing Begins

11

- CrIS Dsbl W/U Htr, Arm W/U Htr TMON O152
- CERES FSW Uploads O154-157

- FSW CSM CMD delete O158
- SVL/FCA Antenna C/O O159-163
- SMD dwnlnk Antenna MC-2/TR-3 O163 - 167

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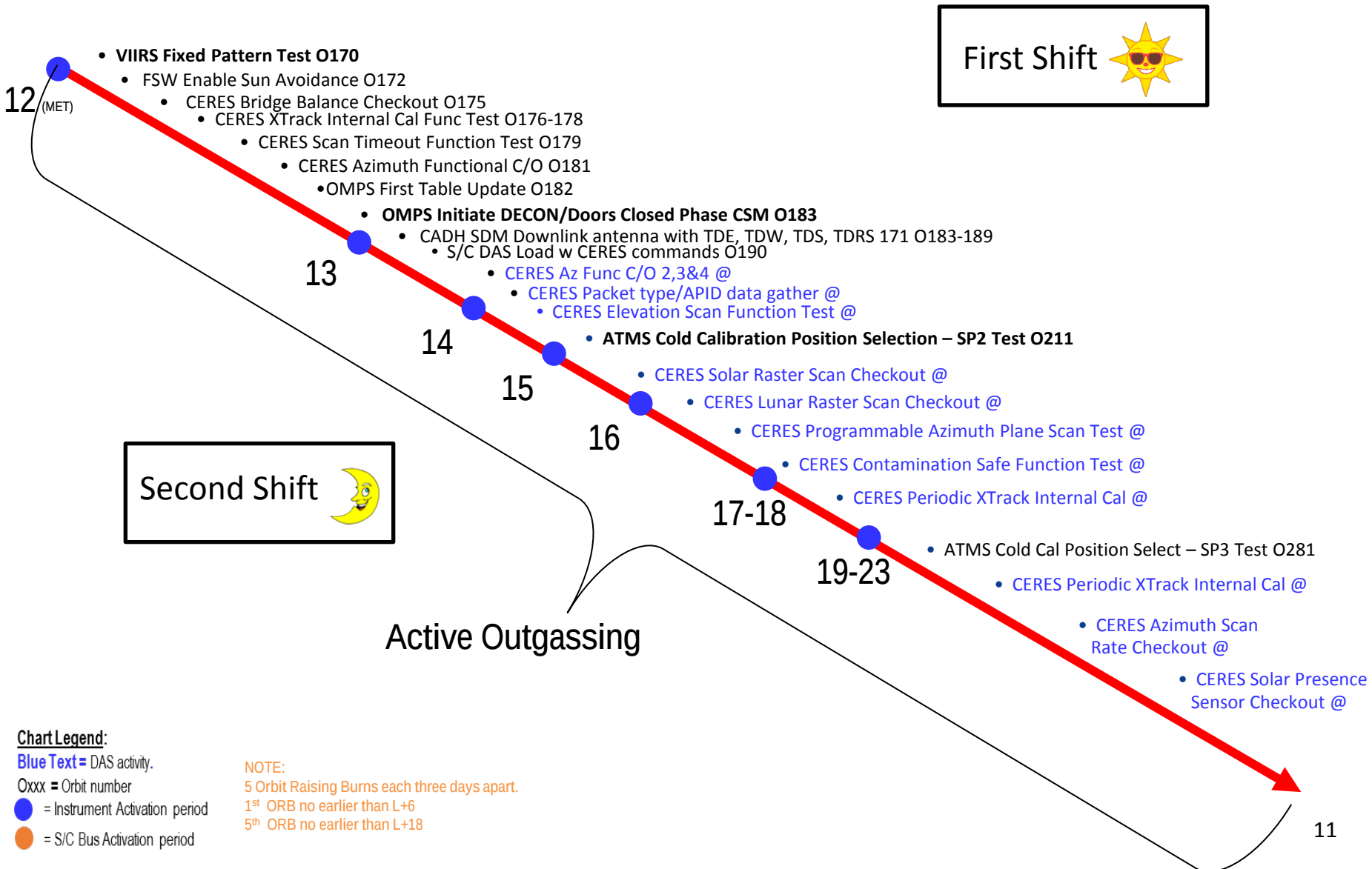

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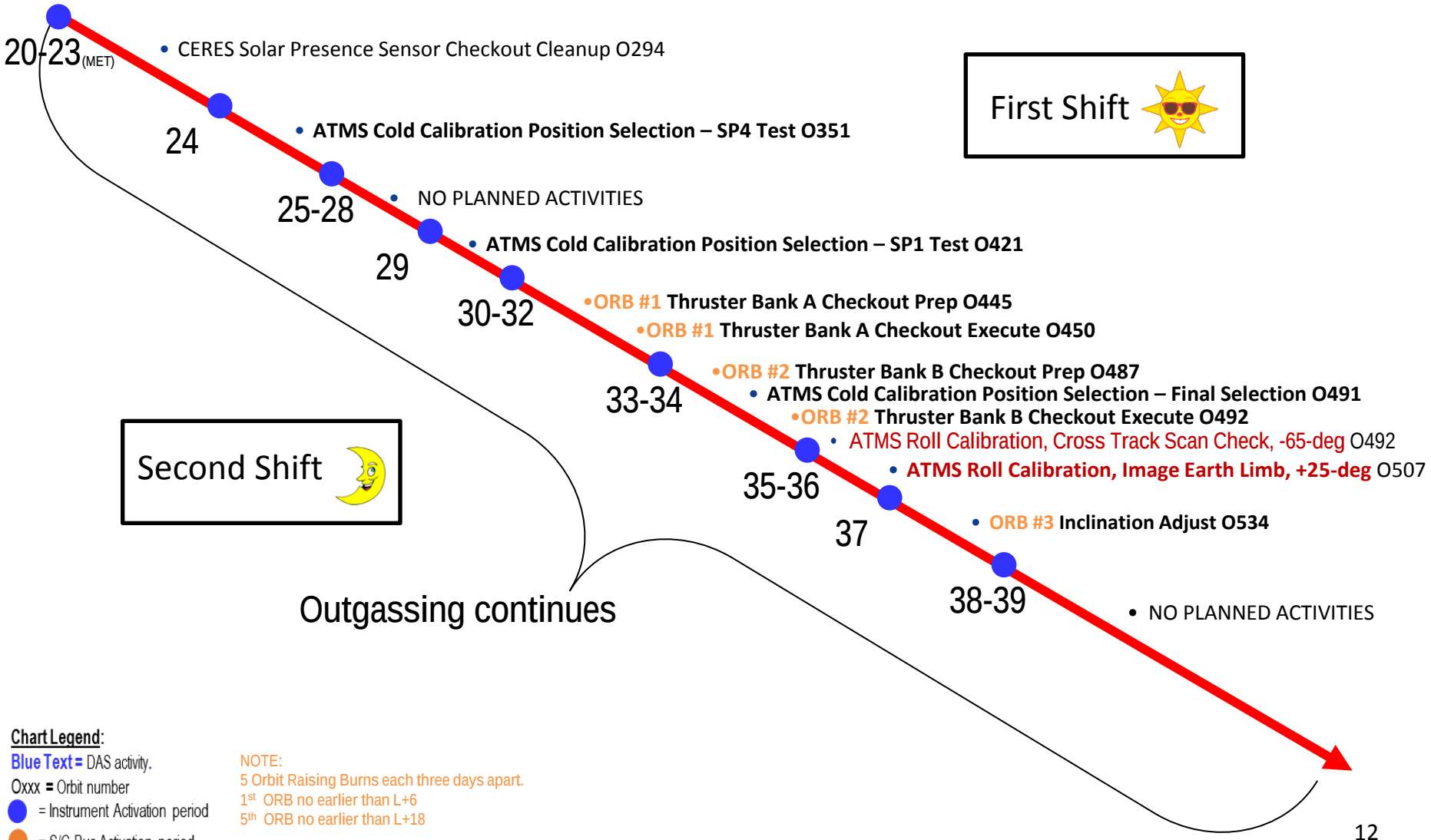

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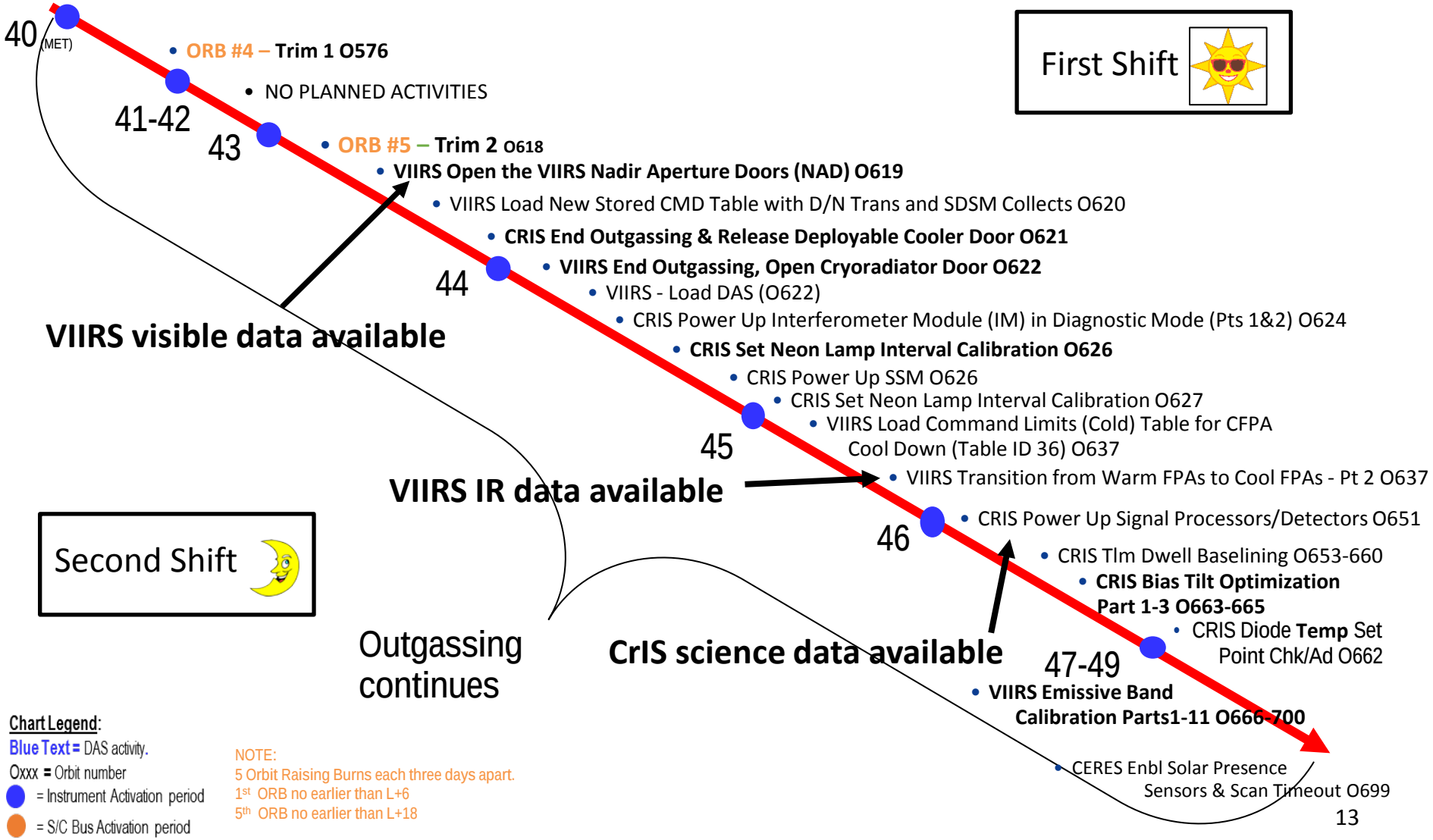

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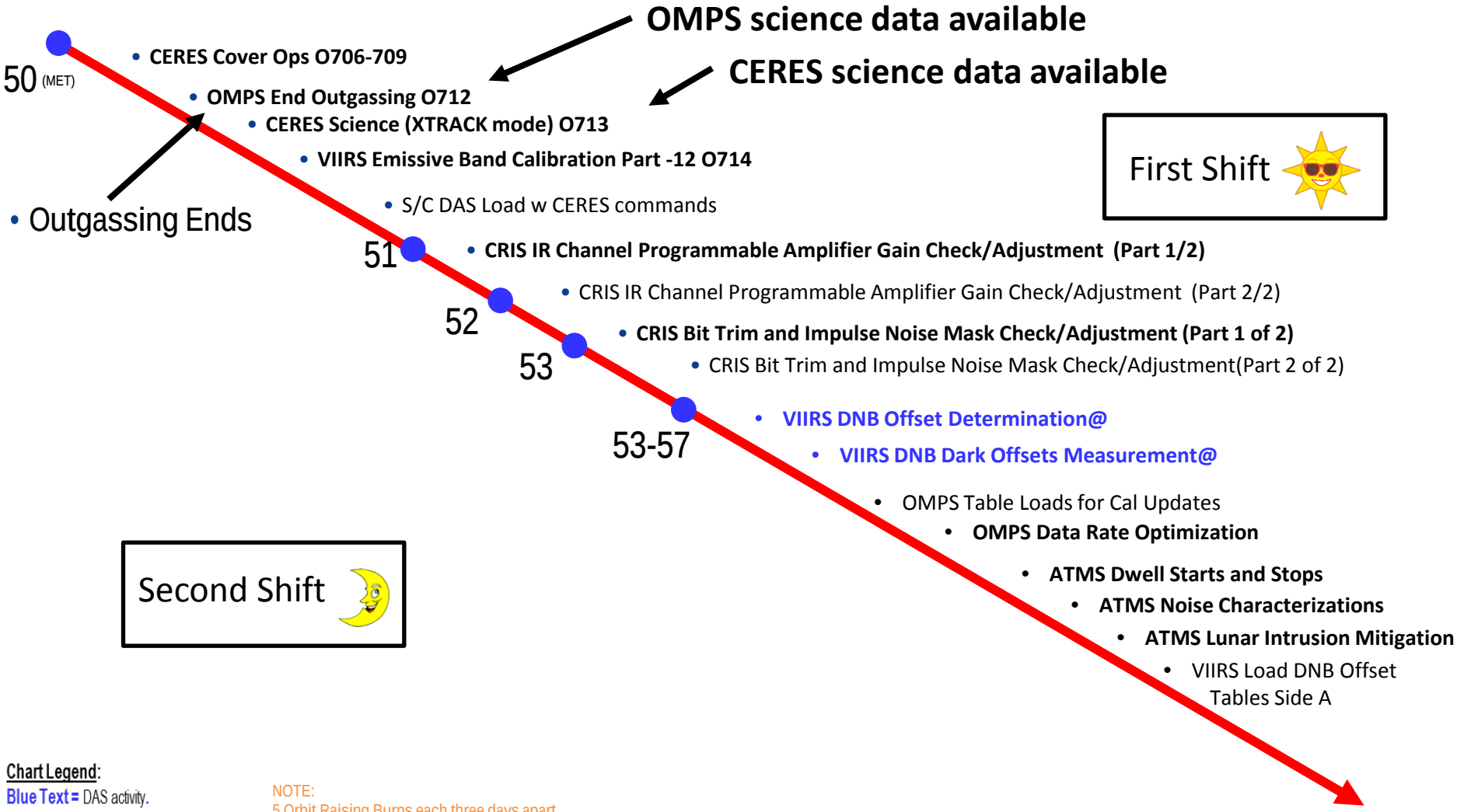

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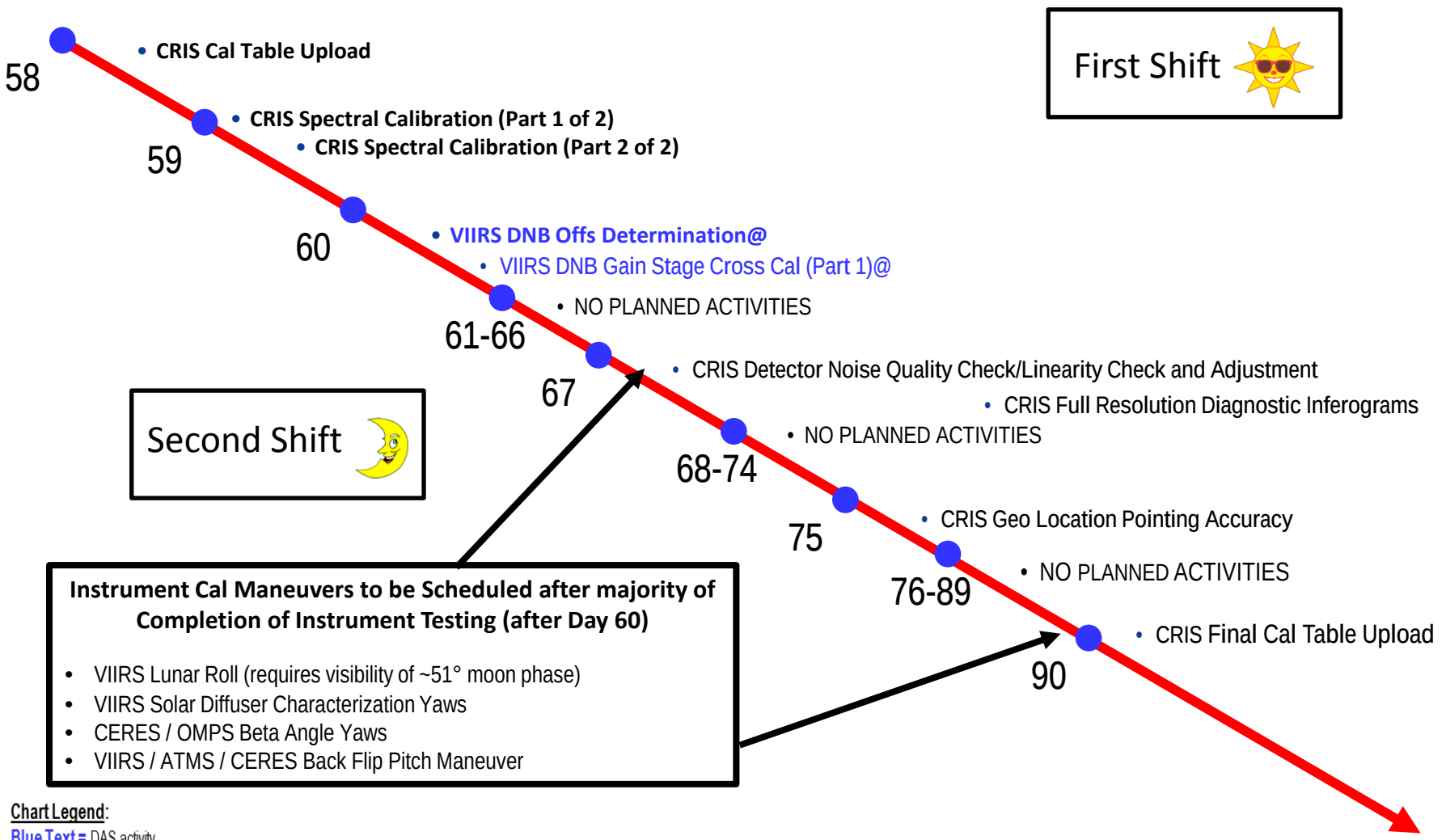

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Back-up – PLT List

Instrument PLTs (1 of 2)

Instrument	Document Number	Test Name	POC
ATMS	472-00614	ATMS Activation	Eric Graham
ATMS	472-00615	ATMS Trending	Eric Graham
ATMS	472-00616	ATMS Dynamic Range	Ed Kim \ Joseph Lyu
ATMS	472-00617	ATMS Noise Characterization	Eric Graham
ATMS	472-00638	ATMS Radiometric Sensitivity	Ed Kim \ Joseph Lyu
ATMS	472-00TBD	ATMS Enviornmental Characterization	Ed Kim \ Joseph Lyu
ATMS	472-00618	ATMS Pointing Angles	Eric Graham
ATMS	472-00619	ATMS Cold Calibration Position Selection	Eric Graham
ATMS	472-00620	ATMS Functional Evaluation - Video Test & Timing	Eric Graham
ATMS	472-00591	ATMS Lunar Intrusion Mitigation	Eric Graham
ATMS	472-00621	ATMS Geolocation	Ed Kim \ Joseph Lyu
ATMS	472-00592	ATMS Center Frequency Stability	Ed Kim
ATMS	472-00593	ATMS Dwell parameter	Eric Graham
CERES	472-00622	CERES Activation	Tony Salerno \ Adhemar Rivera
CERES	472-00623	CERES Trending	Tony Salerno \ Adhemar Rivera
CERES	472-00624	CERES Geolocation/Pointing Accuracy	Chris Brown
CERES	472-00625	CERES Bridge Balance	Tony Salerno \ Adhemar Rivera
CERES	472-00626	CERES El scan test	Tony Salerno \ Adhemar Rivera
CERES	472-00686	CERES Science Trending	Kory Priestly
CERES	472-00628	CERES Solar Raster Scan	Tony Salerno \ Adhemar Rivera
CERES	472-00629	CERES Lunar Raster	Tony Salerno \ Adhemar Rivera
CERES	472-00630	CERES Azimuth Checkout	Tony Salerno \ Adhemar Rivera
CERES	472-00631	CERES SPS checkout	Tony Salerno \ Adhemar Rivera
CrIS	472-00632	CrIS Activation	Mike Stager \ Jason Osmann
CrIS	472-00633	CrIS Trending	Mike Stager \ Jason Osmann
CrIS	472-00634	CrIS Noise Characterization	Dave Johnson
CrIS	472-00636	CrIS Geolocation/Pointing Accuracy	Dave Johnson \ Mike Stager

Instrument PLTs (2 of 2)

Instrument	Document Number	Test Name	POC
CrIS	472-00637	CrIS Jitter Performance	Dave Johnson
CrIS	472-00639	CrIS Bias Tilt Optimization	Mike Stager \ Jason Osmann
CrIS	472-00675	CrIS PCE Telemetry Dwell and Baselining	Mike Stager \ Jason Osmann
CrIS	472-00676	CrIS Diode temperature Set Point Check and Adjustment	Mike Stager \ Jason Osmann
CrIS	472-00677	CrIS Bit Trim and Impulse Noise Mask Checks and Adjustments	Mike Stager \ Jason Osmann
CrIS	472-00679	CrIS Programmable Amplifier Gain Check and Adjustment	Mike Stager \ Jason Osmann
CrIS	472-00680	CrIS Detector Linearity Check	Mike Stager \ Jason Osmann
CrIS	472-00641	CrIS Laser Stability	Mike Stager \ Jason Osmann
CrIS	472-00642	CrIS Full Resolution Diagnostic Interferograms	Dave Johnson \ Mike Stager
OMPS	472-00643	OMPS Activation	Eric Graham
OMPS	472-00644	OMPS Data Rate Characterization	Tom Kelly \ Glen Jaross
OMPS	472-00645	OMPS Trending	Eric Graham
OMPS	472-00687	OMPS Science Trending	Tom Kelly \ Glen Jaross
OMPS	472-00646	OMPS Noise Characterization	Tom Kelly \ Glen Jaross
OMPS	472-00647	OMPS Dynamic Range	Tom Kelly \ Glen Jaross
OMPS	472-00648	OMPS Calibration	Tom Kelly \ Glen Jaross
OMPS	472-00649	OMPS Geolocation/Pointing Accuracy	Tom Kelly \ Glen Jaross
VIIRS	472-00650	VIIRS Activation	Jodi Vezzeti \ Helena Smith
VIIRS	472-00651	VIIRS Trending	Jodi Vezzeti \ Helena Smith
VIIRS	472-00652	VIIRS Dynamic Range and Linearity Verification	Kurt Thome
VIIRS	472-00653	VIIRS DNB Offset Determination	Jodi Vezzeti \ Helena Smith
VIIRS	472-00654	VIIRS Solar Diffuser Calibration	Jodi Vezzeti \ Helena Smith
VIIRS	472-00655	VIIRS Geolocation/Pointing Accuracy	Kurt Thome \ Slawomir Blonski
VIIRS	472-00657	VIIRS DNB Gain Stage Cross Calibration and Dark Offsets Measurement	Jodi Vezzeti \ Helena Smith
VIIRS	472-00658	VIIRS Electronic Cross Talk Evaluation	Jodi Vezzeti \ Helena Smith
VIIRS	472-00659	VIIRS Lunar Calibration and Sector Rotation	Jodi Vezzeti \ Helena Smith
VIIRS	472-00660	VIIRS Emissive Band Calibration	Jodi Vezzeti \ Helena Smith
VIIRS	472-00661	VIIRS Fixed Pattern test	Jodi Vezzeti \ Helena Smith
VIIRS	472-00635	VIIRS FPA Electronics Self-Test	Jodi Vezzeti \ Helena Smith
VIIRS	472-00673	VIIRS Cryoradiator Door Opening	Jodi Vezzeti \ Helena Smith
VIIRS	472-00688	VIIRS Nadir Door Openeing	Jodi Vezzeti \ Helena Smith

System PLTs

Title	Test Description	POC
Pitch offset (backflip) for instrument calibration	Perform back-flip over 1/3 of orbit entirely in eclipse.	Andy Lopatin
ATMS Cross Track Scan Check	Roll to -65° to acquire data during crossing of the Earth's limb. Stay at -65° roll angle for 4 minutes to allow scan across cold space. Return to Earth view orientation.	Andy Lopatin / Ed Kim
ATMS Image Earth Limb	Roll far enough (max +25°) so that main lobes of outermost beams are well off earth limb. During maneuver, acquire data during limb crossing and deep space view. Stay at final roll angle for 5 minutes and return to Earth view orientation. Must be done before CrIS cooler shade & VIIRS CRD deployments.	Andy Lopatin / Ed Kim
VIIRS Lunar Calibration	Start after VIIRS is commissioned at first moon phase of ~51°. Approximately 8-9 rolls per year performed on daylight side of orbit, roll of -14° or less allows VIIRS to image moon.	Jodi Vezzetti / Kurt Thome
VIIRS Solar Diffuser Characterization	15 yaws at different yaw angles (max -20° to max +20°) in consecutive orbits. Yaws are performed in sunrise and begin dwell for 10 minutes in sun.	Jodi Vezzetti / Kurt Thome
CERES Solar Cal / Interference / Glint Evaluation & OMPS Solar Diffuser Goniometric Cal	12-14 yaws at different angles between -14.5° and 14.5°. Requires 35 minutes at the slewed angle, 30 minutes in sunlight before the northern terminator crossing and 17.5 minutes in eclipse.	Andy Lopatin / Tom Kelly / Glen Jaross / Kory Priestly
SEU Trending	Roll up report of all the SEU detections seen during the 90 days, instrumets and SC.	Rich Kavanagh
Concurrent Operations (Proof of Concept Putting JPSS-1 & NPP on the Same String)	Plan ~2 day proof of concept putting JPSS-1 & NPP on the same string. (Some time after ~L+68 when instruments are 'operationally ready'.) Plan to include a 'worst case' day, eg DAS load day. Plan to move JPSS-1 to the same string as NPP prior to handover.	Rich Kavanagh
Spacecraft Jitter Characterization	Characterize S/C jitter caused by all instruments and mechanisms	Jeremy Meduvsky