



14217 - Neptune's Evolving Inner Moons and Ring-Arcs

Cycle: 23, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) NEPTUNE	WFC3/UVIS	1	29-Jul-2016 13:19:46.0	yes
02	(1) NEPTUNE	WFC3/UVIS	1	29-Jul-2016 13:19:48.0	yes
03	(1) NEPTUNE	WFC3/UVIS	2	29-Jul-2016 13:19:49.0	yes
04	(1) NEPTUNE	WFC3/UVIS	1	29-Jul-2016 13:19:51.0	yes

5 Total Orbits Used

ABSTRACT

This program will address three key science goals related to the rings and inner moons of Neptune. (1) We will recover S/2004 N 1, Neptune's 14th moon, whose discovery was announced by STScI in 2013. This 8-10 km moon orbits between the much larger moons Larissa and Proteus, raising questions about its origin and orbital stability. Measurements from Cycle 23 will supplement the only existing measurements from 2004-2005 and 2009, giving us necessary confirmation of the discovery and providing much stricter constraints on the moon's orbital elements. (2) We will locate Naiad, the innermost known moon, whose orbital position appears to have jumped by 81 degrees in orbital longitude between 2002 and 2004. New measurements will determine whether (a) the 2002 measurements were erroneous, or (b) the moon follows a highly perturbed orbit. If the latter, our

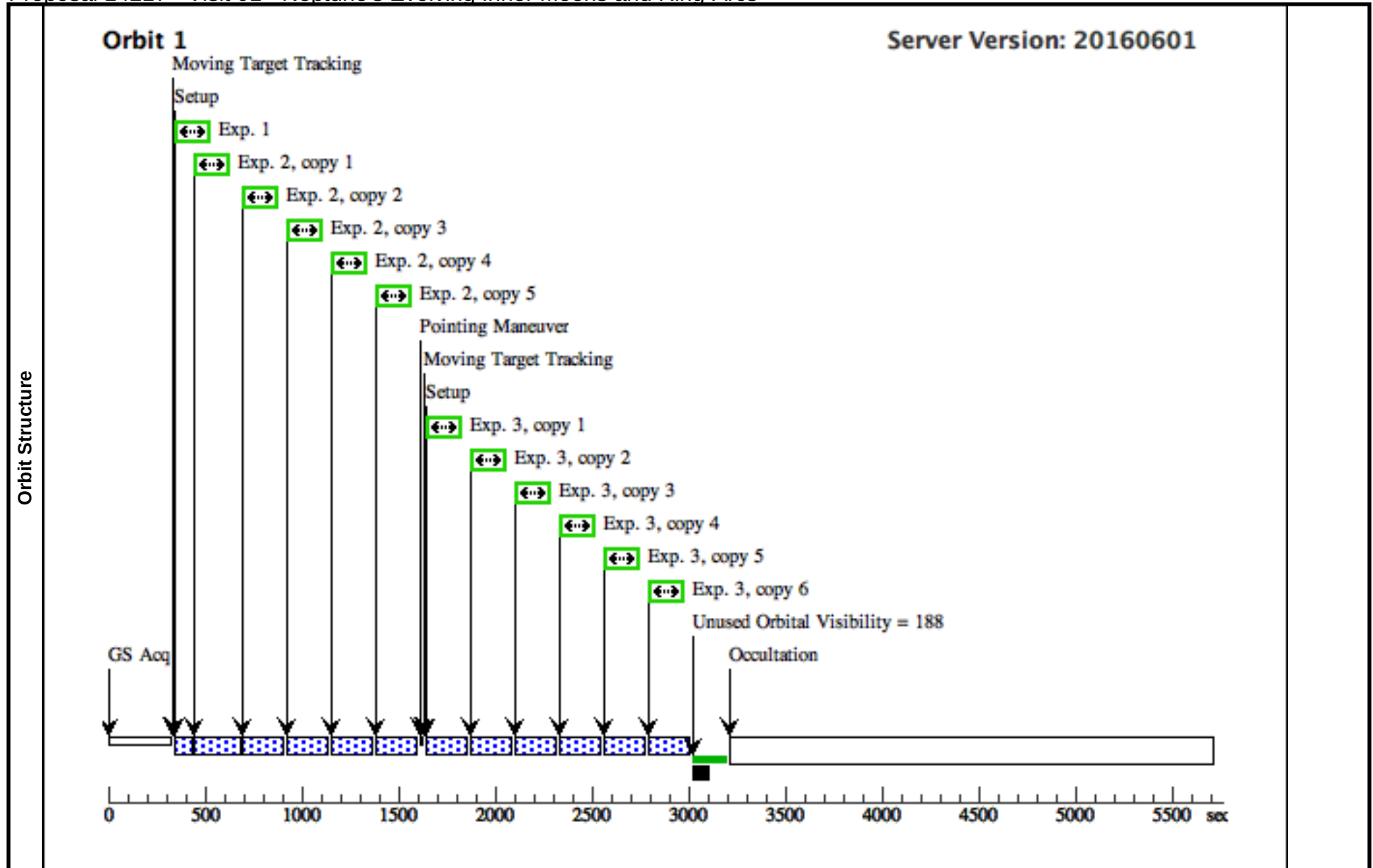
measurements will place strong constraints on the nature of these unknown perturbations. (3) We will revisit the arc system embedded in the Adams ring of Neptune. The leading arcs have disappeared since the 1989 Voyager flyby; the trailing arcs have been more stable, although they appear to be fading slowly. We will investigate this unexplained trend, and also seek out evidence for other subtle changes in the rings, by obtaining the first rotationally complete, visual-band profile of the ring-arcs since 1989.

OBSERVING DESCRIPTION

Five single-orbit visits to Neptune are spaced out over time to obtain complete orbital coverage of Naiad, S/2004 N 1, and the Adams ring. Each visit contains eleven long exposures through filter F350LP to detect the small moons and faint rings. A single, unsaturated exposure of Neptune is included in each visit for geometric and photometric reference. A dither step is inserted half-way through each orbit so that the influence of hot pixels can be suppressed. All visits are oriented such that Neptune's pole is roughly aligned with the Y-axis of the CCD. This is necessary so that the saturation bloom is separated from the rings and moons, which extend primarily to the right and left. However, we use a slightly different roll angle for each visit because this will help us to separate out the rings from the pattern of glare surrounding Neptune. Based on SAA constraints, four visits have been modified to be split across consecutive SAA-affected orbits.

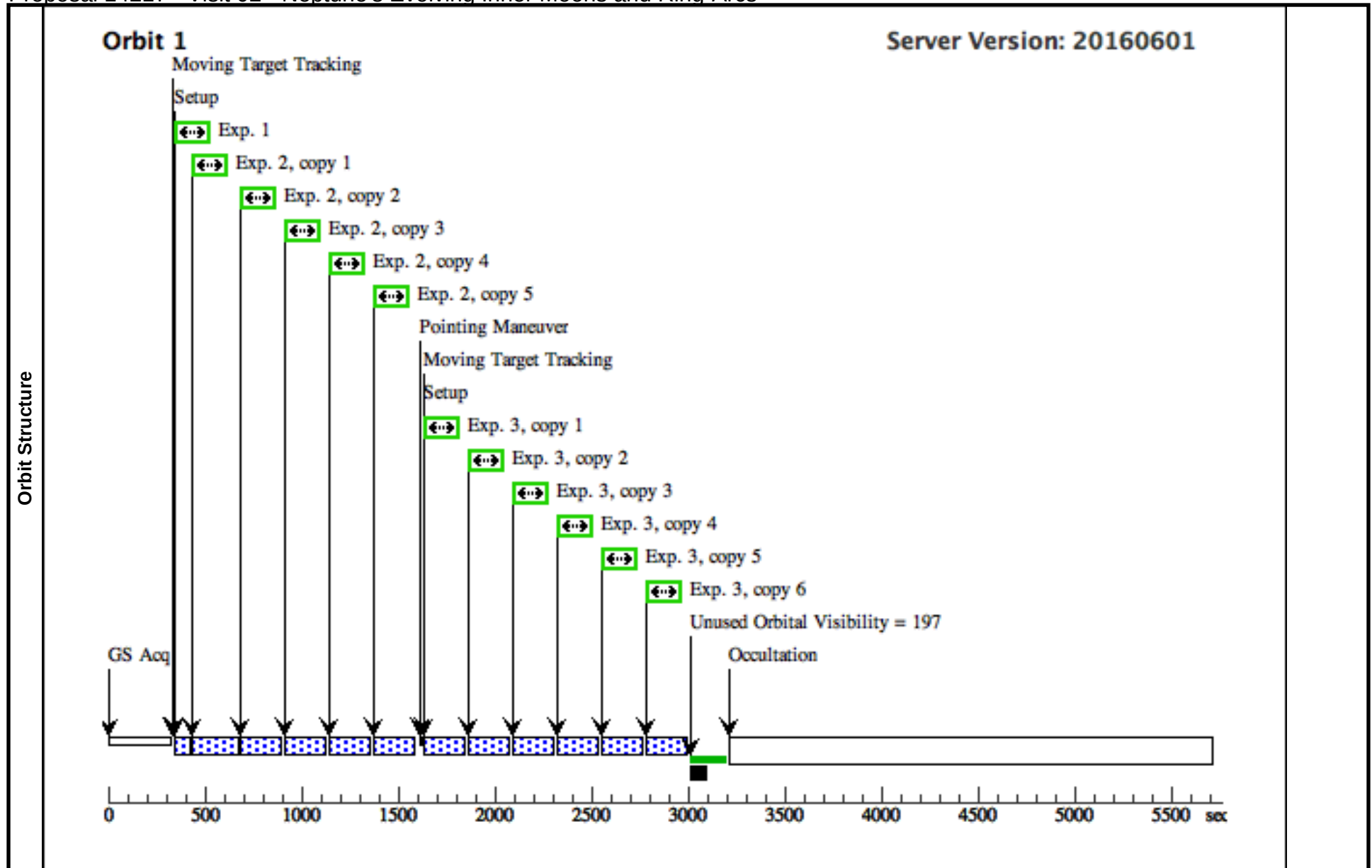
Proposal 14217 - Visit 01 - Neptune's Evolving Inner Moons and Ring-Arcs

Visit	Proposal 14217, Visit 01, implementation										Fri Jul 29 17:19:51 GMT 2016
	Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 271D TO 273 D; ORIENT 91D TO 93 D; BETWEEN 2016.244:06:00:00 AND 2016.244:09:30:00 <i>Comments: Neptune oriented with its pole oriented 9 degrees counterclockwise from the Y-axis. This visit is split across two consecutive SAA-affected orbits. A dither shift of 5 pixels along the X and Y axes occurs half-way through the visit. Time intervals between HST orbits have been selected to sample Naiad, S/20014 N 1 and the Adams ring at a full range of orbital longitudes. This visit is timed to place S/20014 N 1 and the arcs on the east side of Neptune.</i>										
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center				
	(1)	NEPTUNE	STD=NEPTUNE				NOT ECL P PARTIAL OF NEPTUNE EARTH BY TRITON FROM EARTH				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	F775W 10s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=11	POS TARG 0,0	Sequence 1-2 Non-Int in Visit 01	10 Secs (10 Secs)		
									[==>]		[1]
	2	F350LP, 5 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-2 Non-Int in Visit 01	175 Secs X 5 (875 Secs)		
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	3	F350LP, 6 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.197,0.212	Sequence 3-3 Non-Int in Visit 01	175 Secs X 6 (1050 Secs)		
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Proposal 14217 - Visit 02 - Neptune's Evolving Inner Moons and Ring-Arcs

Visit	Proposal 14217, Visit 02, implementation										Fri Jul 29 17:19:52 GMT 2016
	Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 289D TO 291 D; ORIENT 109D TO 111 D; BETWEEN 2016.246:07:30:00 AND 2016.246:10:30:00 Comments: Neptune oriented with its pole 9 degrees clockwise from the Y-axis. This visit is split across two consecutive SAA-affected orbits. A dither shift of 5 pixels along the X and Y axes occurs half-way through the visit. Time intervals between HST orbits have been selected to sample Naiad, S/20014 N 1 and the Adams ring at a full range of orbital longitudes. This visit is timed to place S/20014 N 1 on the east side of Neptune and the arcs on the west side.										
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center				
	(1)	NEPTUNE	STD=NEPTUNE				NOT ECL P PARTIAL OF NEPTUNE EARTH BY TRITON FROM EARTH				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	F606W 1s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F606W	FLASH=11	POS TARG 0.,0.	Sequence 1-2 Non-Int in Visit 02	1 Secs (1 Secs)		
									[==>]		[1]
	2	F350LP, 5 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-2 Non-Int in Visit 02	175 Secs X 5 (875 Secs)		
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	3	F350LP, 6 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.197,0.212	Sequence 3-3 Non-Int in Visit 02	175 Secs X 6 (1050 Secs)		
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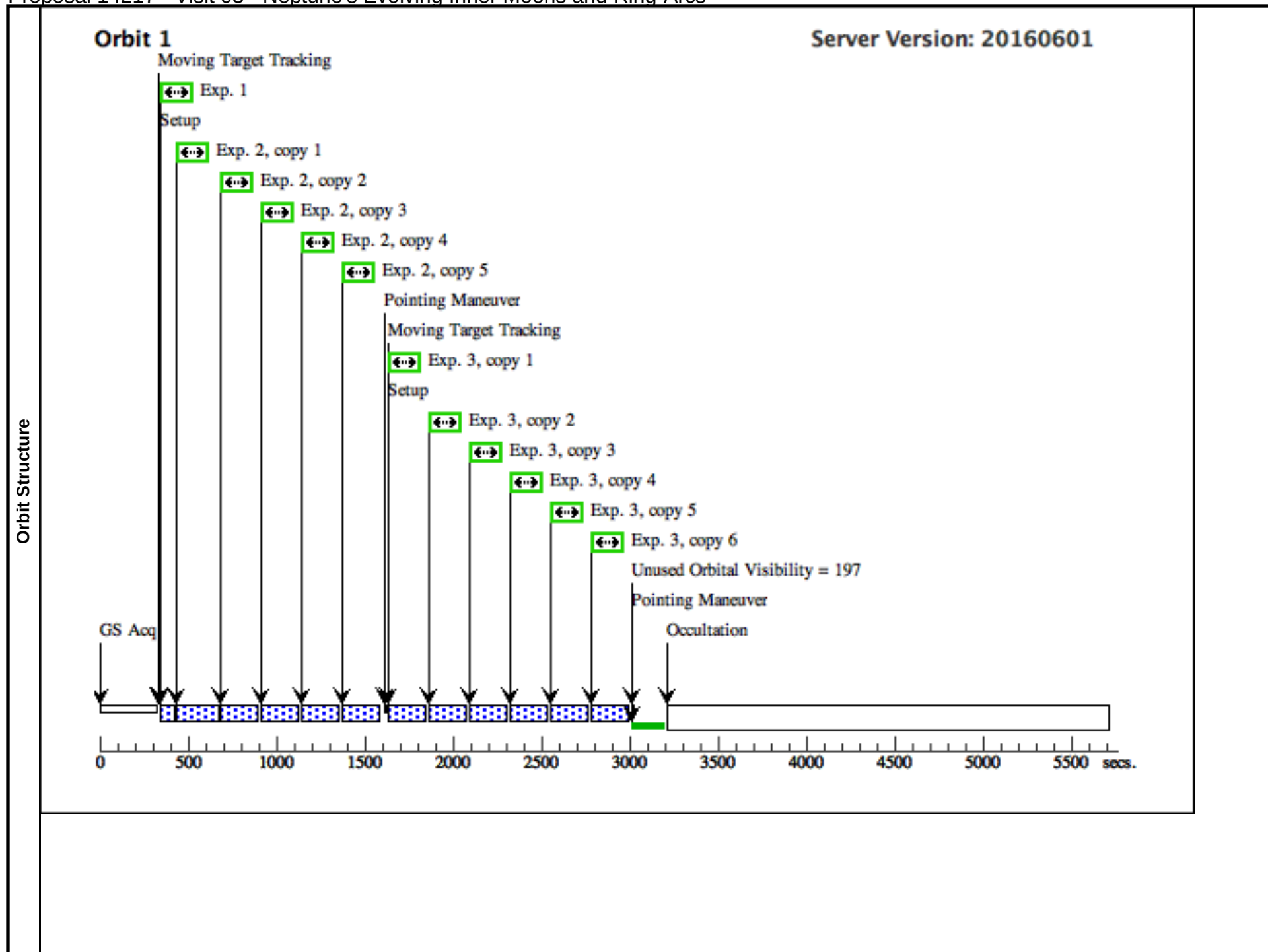


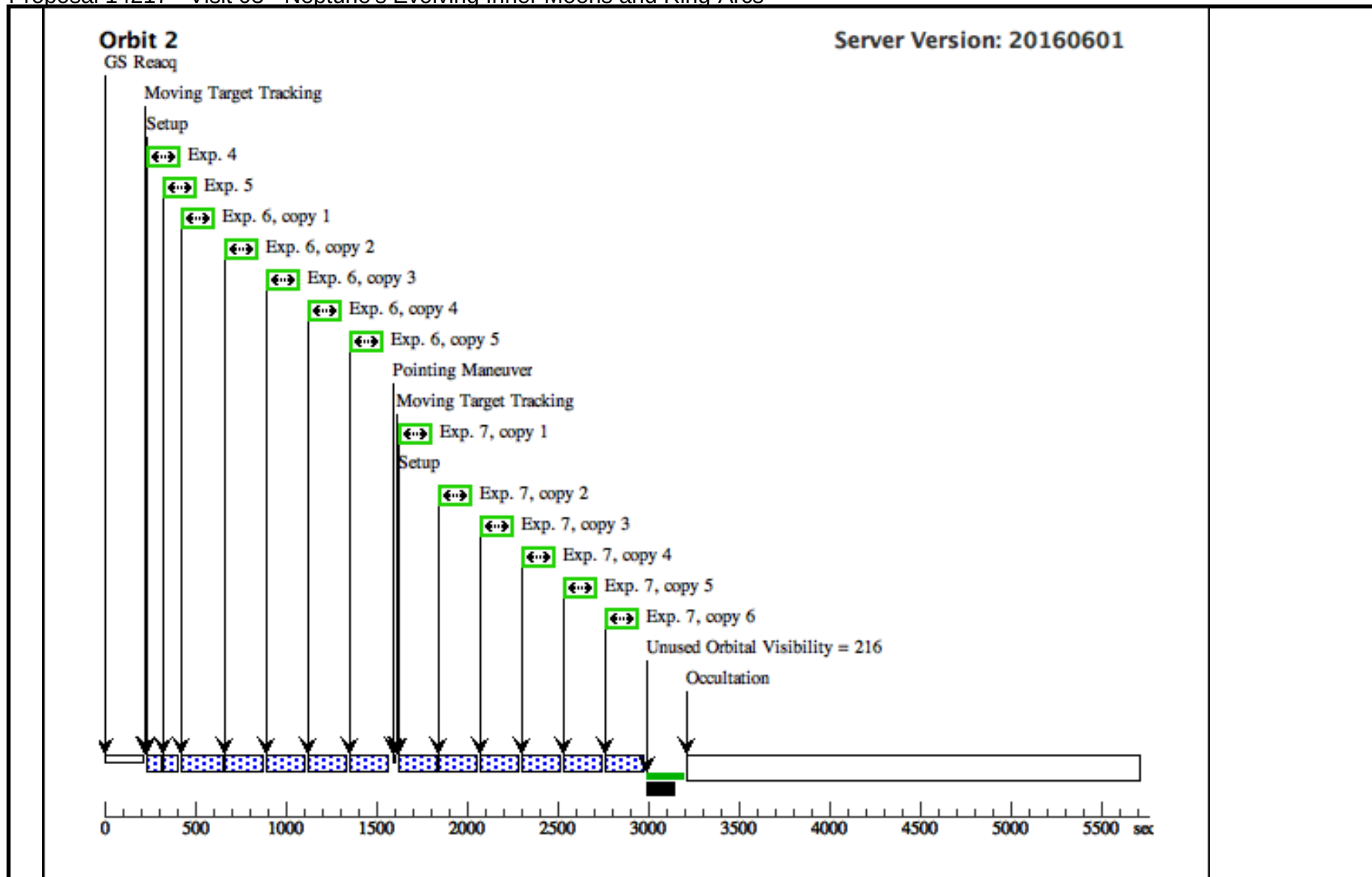
Proposal 14217 - Visit 03 - Neptune's Evolving Inner Moons and Ring-Arcs

Visit	Proposal 14217, Visit 03, implementation Fri Jul 29 17:19:52 GMT 2016					
	Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 283D TO 285 D; ORIENT 103D TO 105 D; BETWEEN 2016.246:17:00:00 AND 2016.246:20:00:00 <i>Comments: Neptune oriented with its pole 3 degrees clockwise from the Y-axis. This is a two-orbit visit. A dither shift of 5 pixels along the X and Y axes occurs half-way through each orbit. Time intervals between HST orbits have been selected to sample Naiad, S/20014 N 1 and the Adams ring at a full range of orbital longitudes. This visit is timed to place S/20014 N 1 and the arcs on the west side of Neptune.</i>					
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window
	(1)	NEPTUNE	STD=NEPTUNE			NOT ECL P PARTIAL OF NEPTUNE EARTH BY TRITON FROM EARTH

Proposal 14217 - Visit 03 - Neptune's Evolving Inner Moons and Ring-Arcs

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F606W, 1s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F606W	FLASH=11	POS TARG 0,0	Sequence 1-3 Non-Int in Visit 03	1 Secs (1 Secs)	
									[==>]	[1]
	2	F350LP, 5 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-3 Non-Int in Visit 03	175 Secs X 5 (875 Secs)	
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	3	F350LP, 6 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.197,0.212	Sequence 1-3 Non-Int in Visit 03	175 Secs X 6 (1050 Secs)	
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									[==>(Copy 6)]	[1]
	4	F775W 10s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=11	POS TARG 0,0	Sequence 4-7 Non-Int in Visit 03	10 Secs (10 Secs)	
									[==>]	[2]
	5	F475W, 8s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F475W	FLASH=11	SAME POS AS 4	Sequence 4-7 Non-Int in Visit 03	8 Secs (8 Secs)	
									[==>]	[2]
	6	F350LP, 5 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 4	Sequence 4-7 Non-Int in Visit 03	175 Secs X 5 (875 Secs)	
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									[==>(Copy 5)]	[2]
	7	F350LP, 6 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.197,0.212	Sequence 4-7 Non-Int in Visit 03	175 Secs X 6 (1050 Secs)	
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Proposal 14217 - Visit 04 - Neptune's Evolving Inner Moons and Ring-Arcs

Visit	Proposal 14217, Visit 04, implementation										Fri Jul 29 17:19:52 GMT 2016
	Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 277D TO 279 D; ORIENT 97D TO 99 D; BETWEEN 2016.247:09:00:00 AND 2016.247:12:00:00 Comments: Neptune oriented with its pole oriented 3 degrees counterclockwise from the Y-axis. This visit is split across two SAA-affected orbits. A dither shift of 5 pixels along the X and Y axes occurs half-way through the visit. Time intervals between HST orbits have been selected to sample Naiad, S/20014 N 1 and the Adams ring at a full range of orbital longitudes. Times to place S/20014 N 1 on the west side of Neptune and the arcs on the east side.										
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center				
	(1)	NEPTUNE	STD=NEPTUNE				NOT ECL P PARTIAL OF NEPTUNE EARTH BY TRITON FROM EARTH				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	F775W, 10s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=11	POS TARG 0.,0.	Sequence 1-2 Non-Int in Visit 04	10 Secs (10 Secs)		
									[==>]		[1]
	2	F350LP, 5 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-2 Non-Int in Visit 04	175 Secs X 5 (875 Secs)		
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	3	F350LP, 6 x 175s	(1) NEPTUNE	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.197,0.212	Sequence 3-3 Non-Int in Visit 04	175 Secs X 6 (1050 Secs)		
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