11651 - Is the atmosphere of the hottest known transiting exoplanet evaporating?

Cycle: 17, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Carole A. Haswell (PI) (ESA Member)	**Open University**	**C.A.Haswell@open.ac.uk**
Dr. Peter J. Wheatley (CoI) (ESA Member)	The University of Warwick	p.j.wheatley@warwick.ac.uk
Dr. Leslie Hebb (CoI) (ESA Member)	University of St. Andrews	leslie.Hebb@st-andrews.ac.uk
Prof. Andrew Cameron (CoI) (ESA Member)	University of St. Andrews	acc4@st-andrews.ac.uk
Dr. Cynthia Froning (CoI) (AdminUSPI)	University of Colorado at Boulder	cfroning@casa.colorado.edu
Mr. Andrew Carter (CoI) (ESA Member)	Open University	a.carter@open.ac.uk
Dr. Benoit Loeillet (CoI) (ESA Member)	Laboratoire d'Astrophysique de Marseille	benoit.loeillet@oamp.fr
Dr. Christiane Helling (CoI)	University of St. Andrews	ch80@st-andrews.ac.uk
Dr. Luca Fossati (CoI) (ESA Member)	Open University	lf3452@openmail.open.ac.uk

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) WASP-12	COS/NUV	5	21-Dec-2009 21:03:49.0	yes
02	(1) WASP-12	COS/NUV	5	21-Dec-2009 21:03:56.0	yes

10 Total Orbits Used

ABSTRACT

WASP-12 is the hottest and the largest currently known transiting exoplanet. It has the shortest orbital period and is the closest to its host star. Previous spectacular HST observations revealed that the atmosphere of HD 209458b appears to be evaporating away, though this interpretation has recently been questioned. We propose ultraviolet observations of WASP-12 to learn whether it is in a state of hydrodynamic `blow-off' as the work on HD 209458b would suggest. We will obtain a precise radius for the planet, free from systematic errors caused by the earth's atmosphere. We will use our data to hone models of exoplanet atmospheres.

OBSERVING DESCRIPTION

We will take time-series spectroscopy with the COS/NUV TIMETAG mode using G285M at the 2676 setting, chosen to cover the Mg II 2800 A triplet. Using the COS ETC, we estimate that we will obtain a S/N between 11 and 7 in 120 sec (spectrum binned to 1 A). TIMETAG observing mode will allow us to flexibly bin our spectrum in wavelength and/or time to address different science questions. We require two visits, each with five orbits to fuly cover all four contact points and to cover the pre and post transit phases. The HST visibility window for WASP-12 is 54 mi. The observations need to be made at tightly specified phase intervals in order to cover the entire exoplanet transit.

Visit

Proposal 11651, Visit 01, completed Tue Dec 22 02:04:00 GMT 2009

Diagnostic Status: Warning

Scientific Instruments: COS/NUV

Special Requirements: BETWEEN 01-OCT-2008:14:33:34 AND 27-JUN-2010:14:33:34; Period 1.0914152 D AND ZERO-PHASE HJD2454474.04723

Diagnostics

(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN
(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN
(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN
(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN
(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN

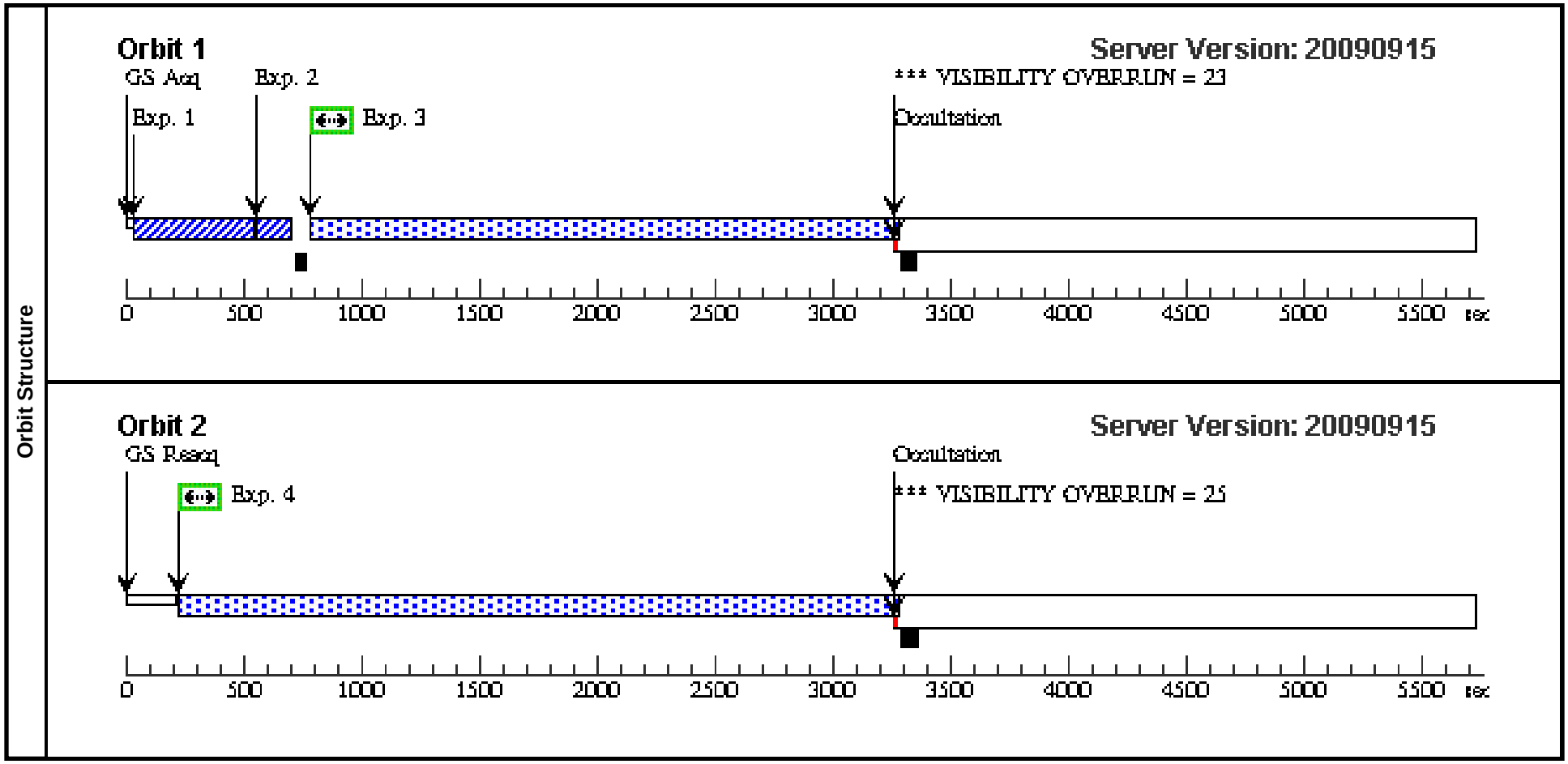
Fixed Targets

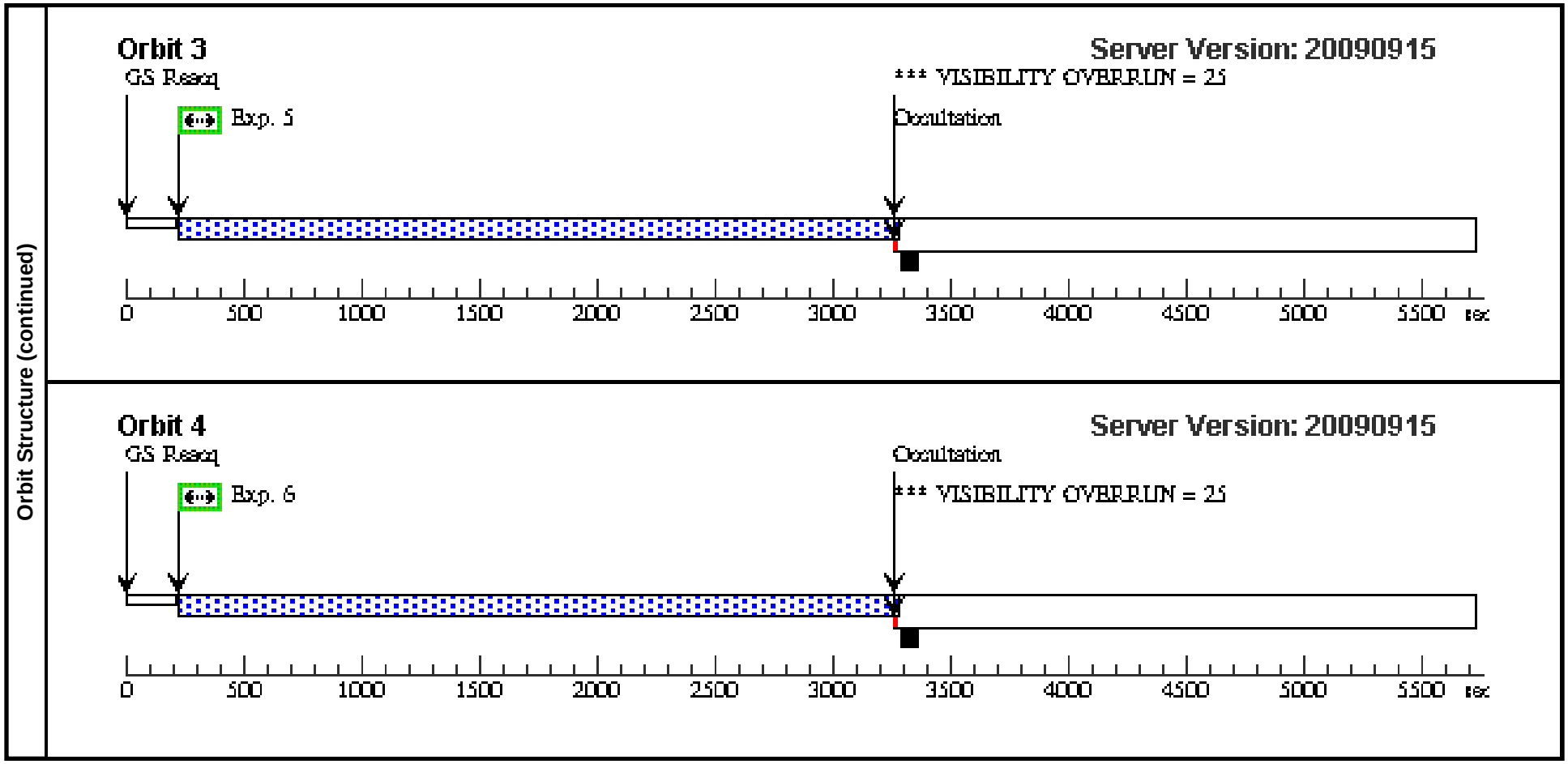
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WASP-12	RA: 06 30 32.7900 (97.6366250d) Dec: +29 40 20.40 (29.67233d) Equinox: J2000	Proper Motion RA: -0.0006s/yr Proper Motion Dec: -0.0078"/yr Epoch of Position: 2000	V=11.58+/-0.01 B=12.1 R=11.2. Coordinates have been rounded.	Reference Frame: ICRS

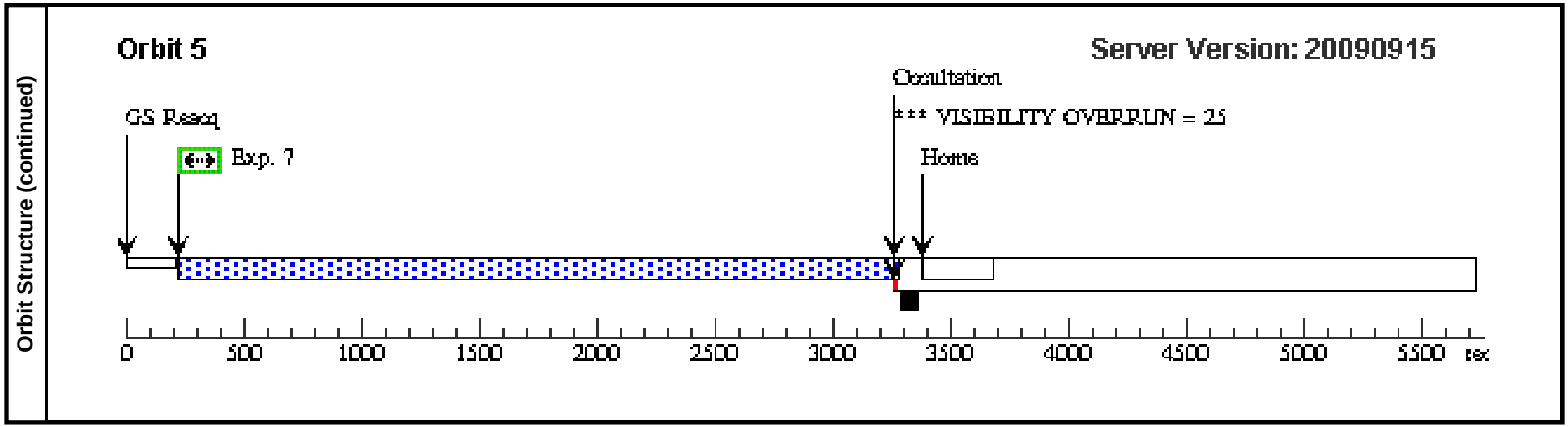
Comments: Coordinates from USNO-B1.0 catalog.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	Target acquisition ACQ/SEARCH	(1) WASP-12	COS/NUV, ACQ/SEARCH, PSA	MIRRORB	SCAN-SIZE=2	PHASE 0.8542891 TO 0.855918		16 Secs *[==>]*	***[1]***
Comments: ETC ID #COS69602 gives t_exp=15.6 sec for S/N = 40 in NUV imaging PSA/MIRRORB for a G0 V star with B=12.1.									
2	Target Acquisition ACQ/IMAGE	(1) WASP-12	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				16 Secs *[==>]*	***[1]***
Comments: ETC ID #COS69602 gives t_exp=15.6 sec for S/N = 40 in NUV imaging PSA/MIRRORB for a G0 V star with B=12.1.									
3	First orbit science exposure	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2676 A	BUFFER-TIME=5000			2334 Secs *[==>]*	***[1]***
Comments: Buffer time recommended by ETC (run ID #COS9176) is 8091 sec. Multiplied by 2/3 for safety gives 5394 sec. I rounded down to 5000 sec since we're well over an orbit anyway.									
4	Second orbit	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2676 A	BUFFER-TIME=5000			3043 Secs *[==>]*	***[2]***
5	Third orbit	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2676 A	BUFFER-TIME=5000			3043 Secs *[==>]*	***[3]***
6	Fourth orbit	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2676 A	BUFFER-TIME=5000			3043 Secs *[==>]*	***[4]***
7	Fifth orbit	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2676 A	BUFFER-TIME=5000			3043 Secs *[==>]*	***[5]***


Orbit Structure
Orbit 1
Server Version: 20090915
GS Acq
Exp. 2
*** VISIBILITY OVERRUN = 23
Exp. 1
Exp. 3
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Orbit 2
Server Version: 20090915
GS Reacq
Occultation
Exp. 4
*** VISIBILITY OVERRUN = 25
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec


Orbit Structure (continued)
Orbit 3
Server Version: 20090915
GS Reacq
*** VISIBILITY OVERRUN = 25
Exp. 5
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Orbit 4
Server Version: 20090915
GS Reacq
Occultation
Exp. 6
*** VISIBILITY OVERRUN = 25
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec


Orbit Structure (continued)
Orbit 5
Server Version: 20090915
Occultation
*** VISIBILITY OVERRUN = 25
GS Reacq
Exp. 7
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 11651, Visit 02, scheduling Tue Dec 22 02:04:01 GMT 2009

Diagnostic Status: Warning

Scientific Instruments: COS/NUV

Special Requirements: BETWEEN 01-OCT-2008:14:33:34 AND 27-JUN-2010:14:33:34; Period 1.0914152 D AND ZERO-PHASE HJD2454474.04723

Diagnostics

(Visit 02) Warning (Orbit Planner): VISIBILITY OVERRUN

(Visit 02) Warning (Orbit Planner): VISIBILITY OVERRUN

(Visit 02) Warning (Orbit Planner): VISIBILITY OVERRUN

(Visit 02) Warning (Orbit Planner): VISIBILITY OVERRUN

(Visit 02) Warning (Orbit Planner): VISIBILITY OVERRUN

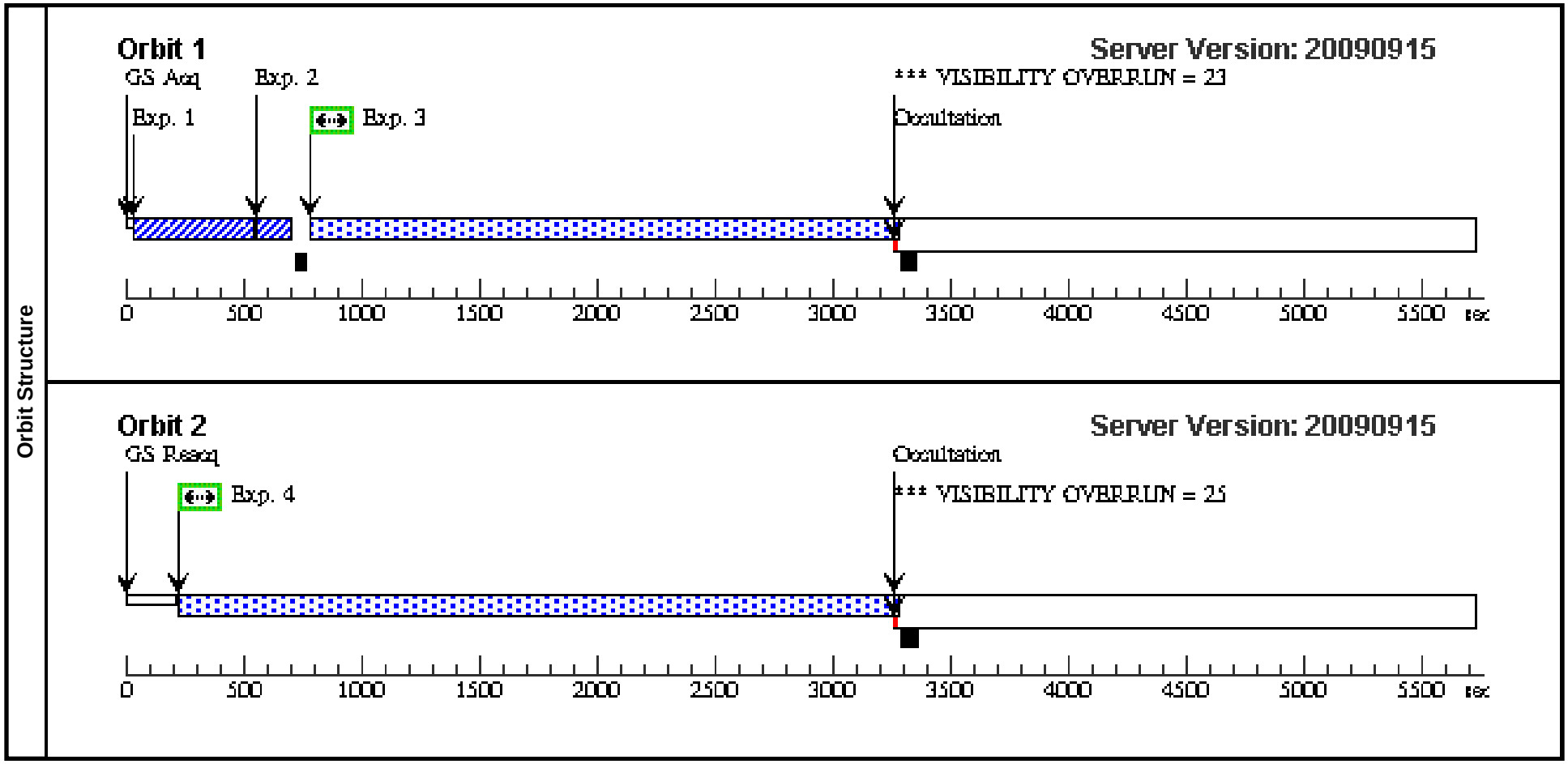
Fixed Targets

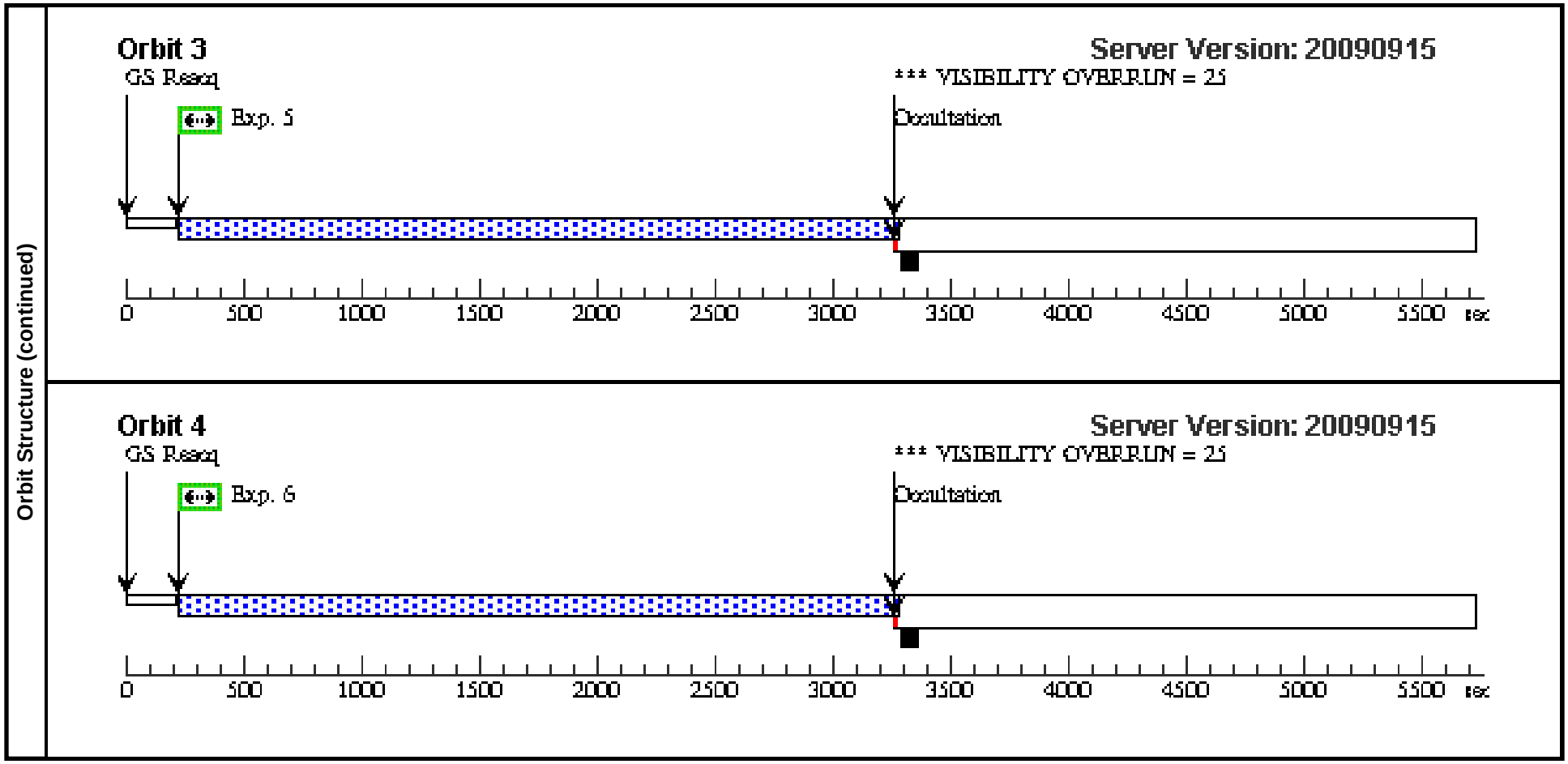
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WASP-12	RA: 06 30 32.7900 (97.6366250d) Dec: +29 40 20.40 (29.67233d) Equinox: J2000	Proper Motion RA: -0.0006s/yr Proper Motion Dec: -0.0078"/yr Epoch of Position: 2000	V=11.58+/-0.01 B=12.1 R=11.2. Coordinates have been rounded.	Reference Frame: ICRS

Comments: Coordinates from USNO-B1.0 catalog.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	Target acquisition ACQ/SEARCH	(1) WASP-12	COS/NUV, ACQ/SEARCH, PSA	MIRRORB	SCAN-SIZE=2	PHASE 0.828342 TO 0.829758		16 Secs *[==>]*	*[1]*
Comments: ETC ID #COS69602 gives t_exp=15.6 sec for S/N = 40 in NUV imaging PSA/MIRRORB for a G0 V star with B=12.1.									
2	Target Acquisition ACQ/IMAGE	(1) WASP-12	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				16 Secs *[==>]*	*[1]*
Comments: ETC ID #COS69602 gives t_exp=15.6 sec for S/N = 40 in NUV imaging PSA/MIRRORB for a G0 V star with B=12.1.									
3	First orbit science exposure	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2695 A	BUFFER-TIME=5000			2334 Secs *[==>]*	*[1]*
Comments: Buffer time recommended by ETC (run ID #COS9176) is 8091 sec. Multiplied by 2/3 for safety gives 5394 sec. I rounded down to 5000 sec since we're well over an orbit anyway.									
4	Second orbit	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2695 A	BUFFER-TIME=5000			3043 Secs *[==>]*	*[2]*
5	Third orbit	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2695 A	BUFFER-TIME=5000			3043 Secs *[==>]*	*[3]*
6	Fourth orbit	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2695 A	BUFFER-TIME=5000			3043 Secs *[==>]*	*[4]*
7	Fifth orbit	(1) WASP-12	COS/NUV, TIME-TAG, PSA	G285M 2695 A	BUFFER-TIME=5000			3043 Secs *[==>]*	*[5]*


Orbit Structure
Orbit 1
Server Version: 20090915
GS Acq
Exp. 2
*** VISIBILITY OVERRUN = 23
Exp. 1
Exp. 3
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Orbit 2
Server Version: 20090915
GS Reacq
Occultation
Exp. 4
*** VISIBILITY OVERRUN = 25
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec


Orbit Structure (continued)
Orbit 3
Server Version: 20090915
GS Reacq
*** VISIBILITY OVERRUN = 25
Exp. 5
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Orbit 4
Server Version: 20090915
GS Reacq
*** VISIBILITY OVERRUN = 25
Exp. 6
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Orbit Structure (continued)