

# ICKEPS 2012 Challenge Domain: Planning Solar Array Operations on the International Space Station

## Problem Specification

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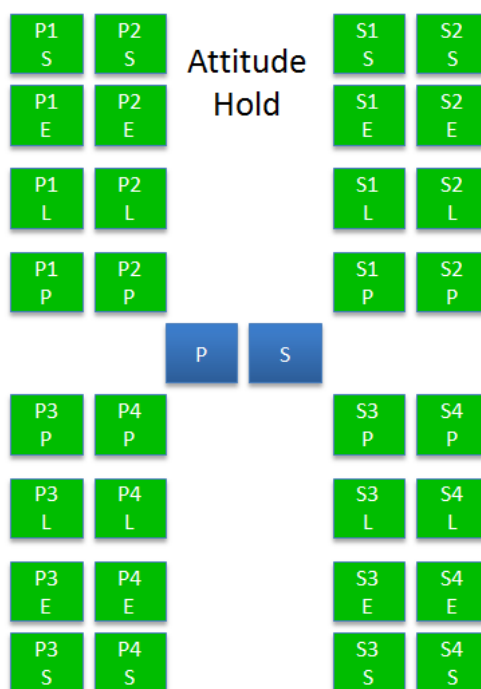
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## Easy Problems

### Easy Problem 1

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Attitude Hold	-27	355.0 357.3 358.0	XVV /LVLH	N	9

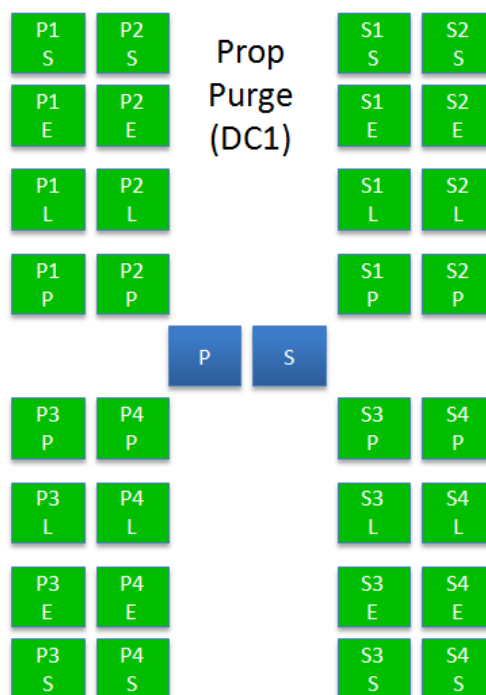
#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/08:30	R	ISS-SM	N/A	N/A
2	170/06:00 170/08:30	P	ISS-CMG	N/A	N/A
3	170/06:00 170/08:30	Y	ISS-CMG	N/A	N/A



## Easy Problem 2

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/08:30 170/13:30	Prop Purge (DC1)	-27	355.0 357.3 358.0	XVV /LVLH	N	9

#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/08:30 170/13:30	R	ISS-SM	N/A	N/A
2	170/08:30 170/13:30	P	Docked	Prog	DC1
3	170/08:30 170/13:30	Y	Docked	Prog	DC1



### Easy Problem 3

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/13:30 171/5:00	Reboost	30	5.1 357.2 0.0	XVV /LVLH	N	15

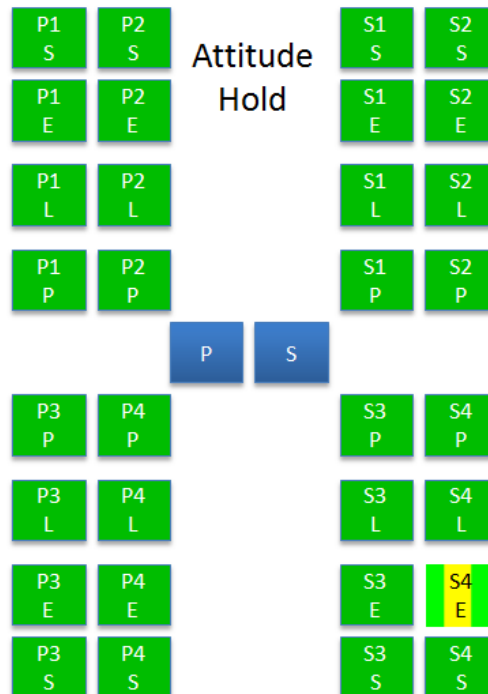
#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/13:30 171/5:00	R	ISS-SM	N/A	N/A
2	170/13:30 171/5:00	P	ISS-CMG	N/A	N/A
3	170/13:30 171/5:00	Y	ISS-CMG	N/A	N/A



## Easy Problem 4

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Attitude Hold	27	355.0 357.3 358.0	XVV /LVLH	N	9

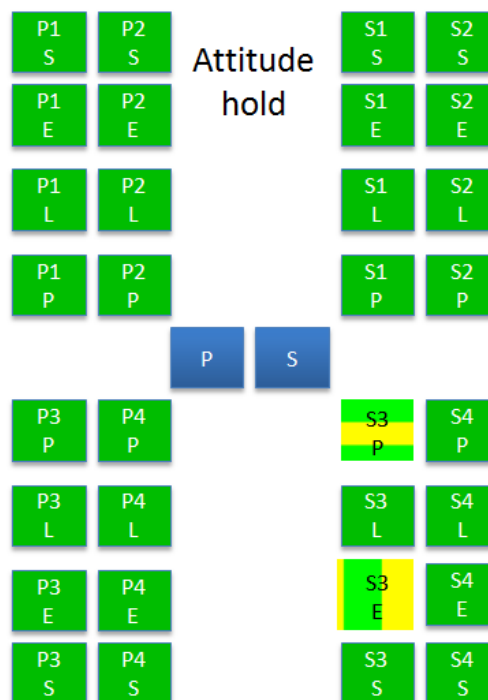
#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/08:30	R	ISS-SM	N/A	N/A
2	170/06:00 170/08:30	P	ISS-CMGG	N/A	N/A
3	170/06:00 170/08:30	Y	ISS-CMGG	N/A	N/A



## Easy Problem 5

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Attitude Hold	28	355.0 357.3 358.0	XVV /LVLH	N	9

#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/08:30	R	ISS-SM	N/A	N/A
2	170/06:00 170/08:30	P	ISS-CMGG	N/A	N/A
3	170/06:00 170/08:30	Y	ISS-CMGG	N/A	N/A



## Easy Problem 6

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Attitude Hold	27	355.0 357.3 358.0	XVV /LVLH	N	9
2	170/8:30 170/10:00	Reboost	28	65.1 287.2 0.0	XVV /LVLH	N	9

#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/13:30	R	ISS-SM	N/A	N/A
2	170/06:00 170/13:30	P	Docked	Soyuz	FGB
3	170/06:00 170/13:30	Y	Docked	Soyuz	FGB



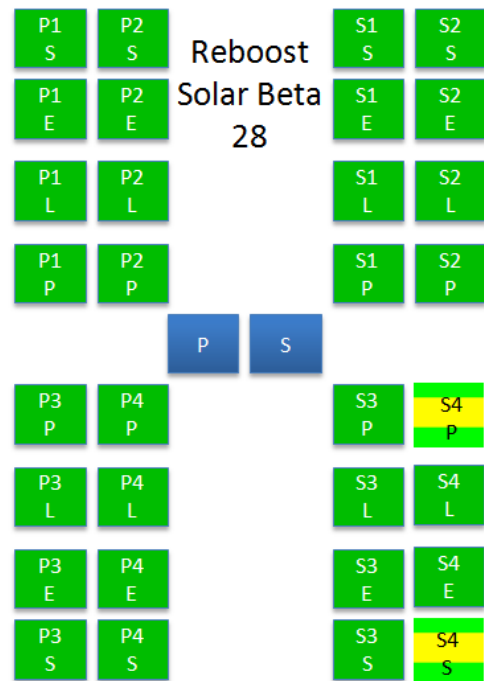
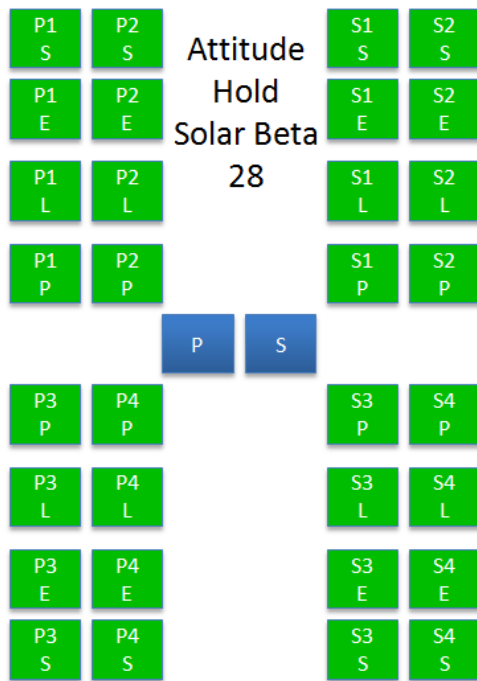
## Easy Problem 7

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Attitude Hold	27	355.0 357.3 358.0	XVV /LVLH	N	9
2	170/8:30 170/10:00	Reboost	28	65.1 287.2 0.0	XVV /LVLH	N	9

#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/13:30	R	ISS-SM	N/A	N/A
2	170/06:00 170/13:30	P	Docked	Soyuz	FGB
3	170/06:00 170/13:30	Y	Docked	Soyuz	FGB





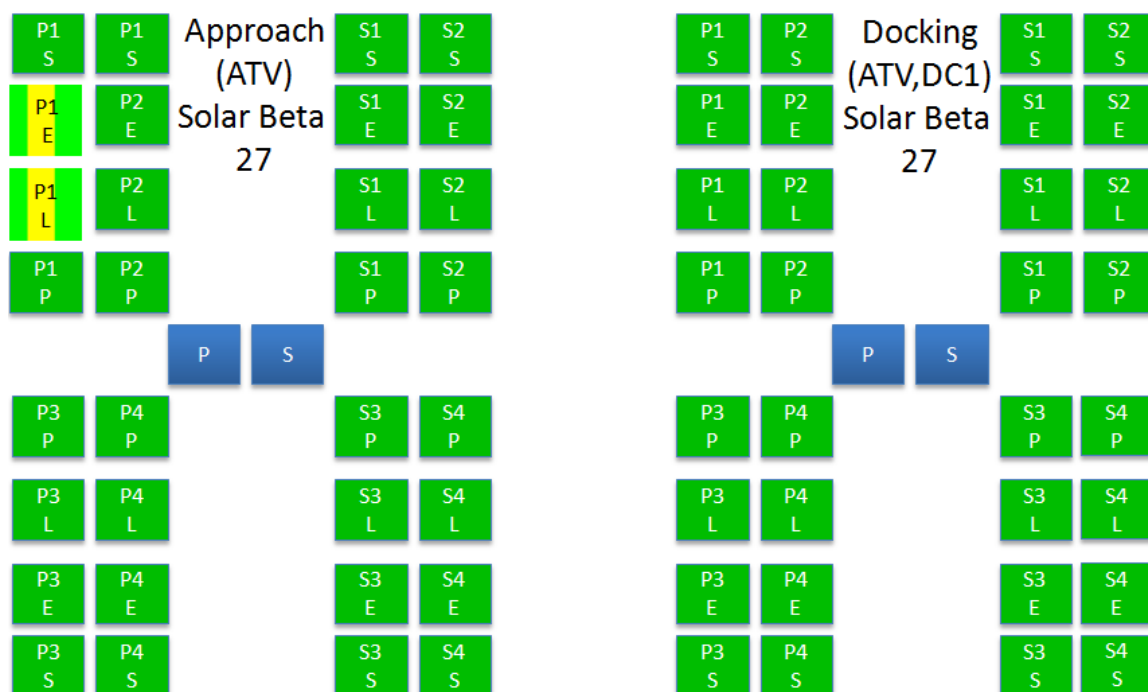


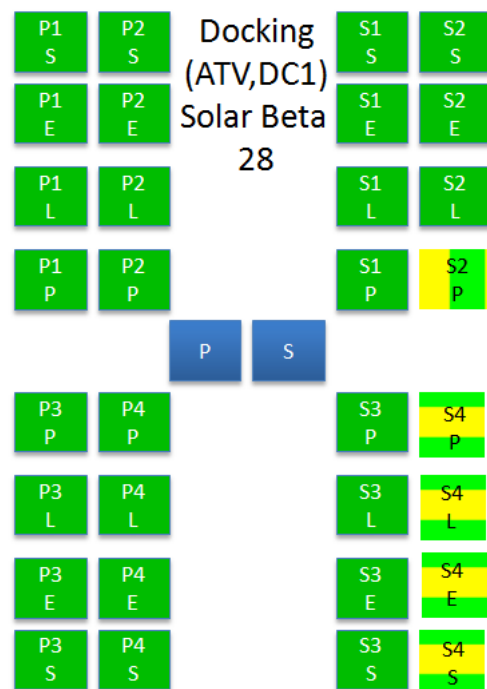
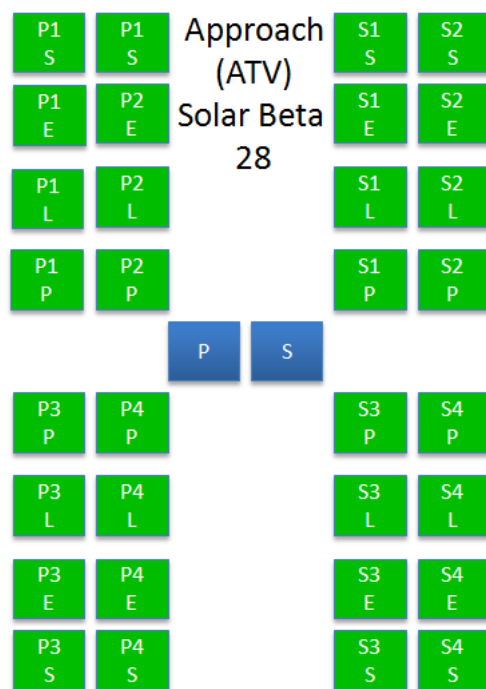
## Medium Problems

### Medium Problem 1

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Approach (ATV)	27	355.0 357.3 358.0	XVV /LVLH	N	9
2	170/8:30 170/10:00	Docking (ATV,DC1)	28	65.1 287.2 0.0	XVV /LVLH	N	9

#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/13:30	R	ISS-SM	N/A	N/A
2	170/06:00 170/13:30	P	Docked	Soyuz	FGB
3	170/06:00 170/13:30	Y	Docked	Soyuz	FGB

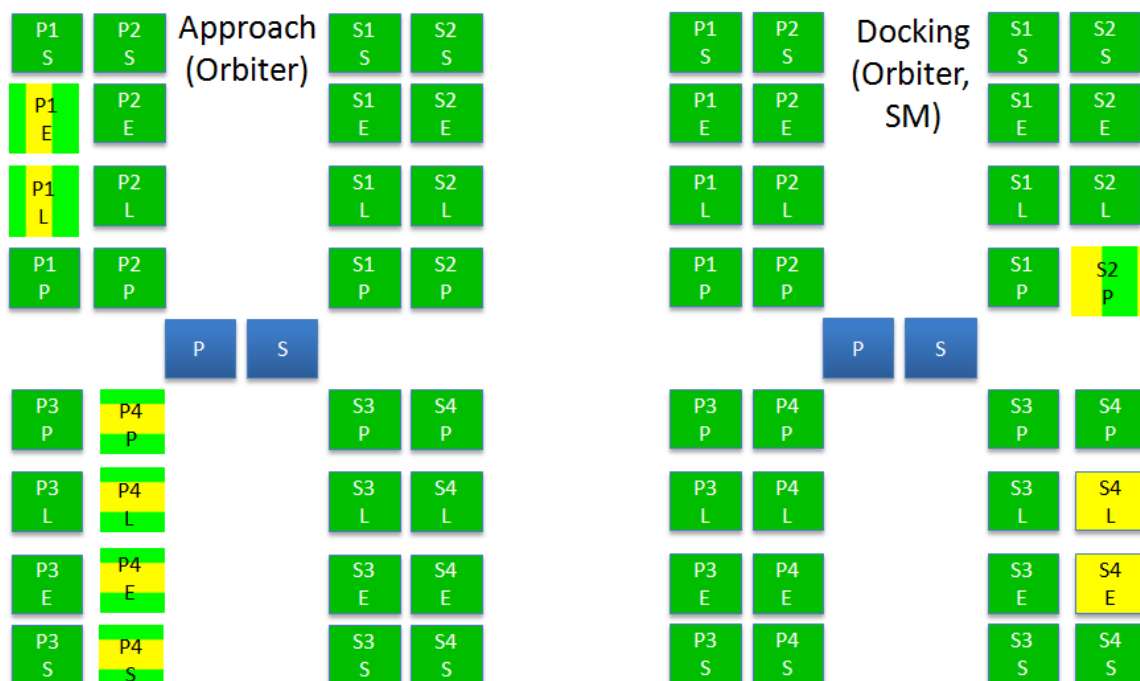




## Medium Problem 2

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Approach (Orbiter)	30	355.0 357.3 358.0	XVV /LVLH	N	9
2	170/8:30 170/10:00	Docking (Orbiter, SM)	30	65.1 287.2 0.0	XVV /LVLH	N	9

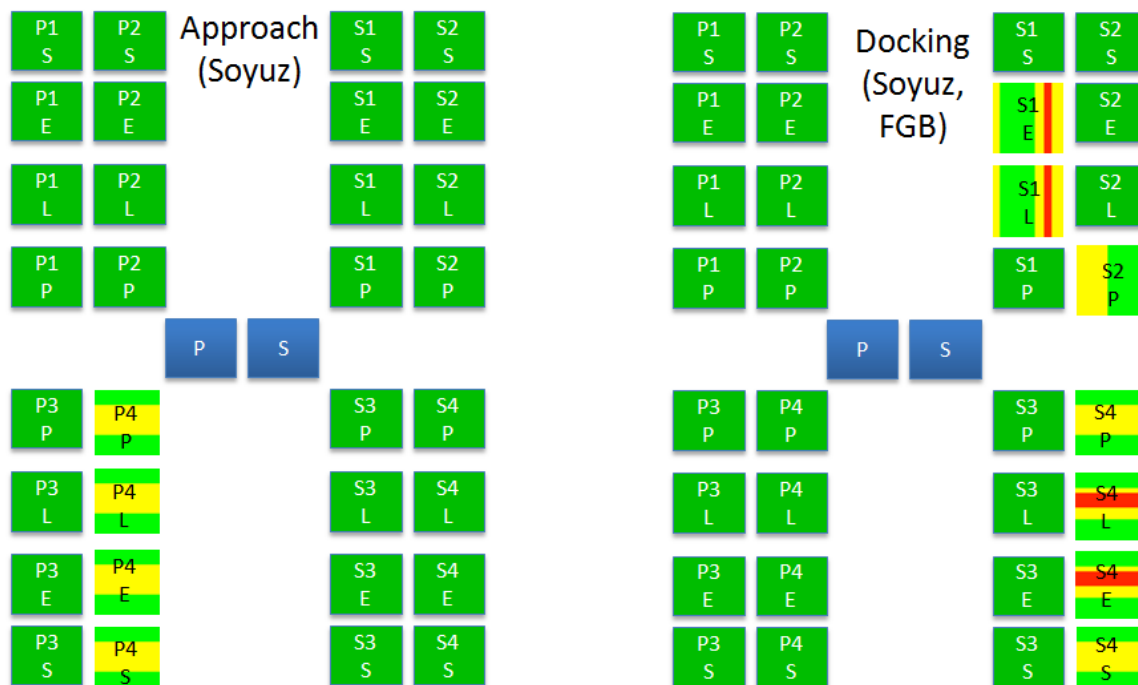
#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/13:30	R	ISS-SM	N/A	N/A
2	170/06:00 170/13:30	P	ISS-SM	N/A	N/A
3	170/06:00 170/13:30	Y	ISS-SM	N/A	N/A



### Medium Problem 3

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Approach (Soyuz)	42	355.0 357.3 358.0	XVV /LVLH	N	17
2	170/8:30 170/10:00	Docking (Soyuz, FGB)	42	65.1 287.2 0.0	XVV /LVLH	N	17

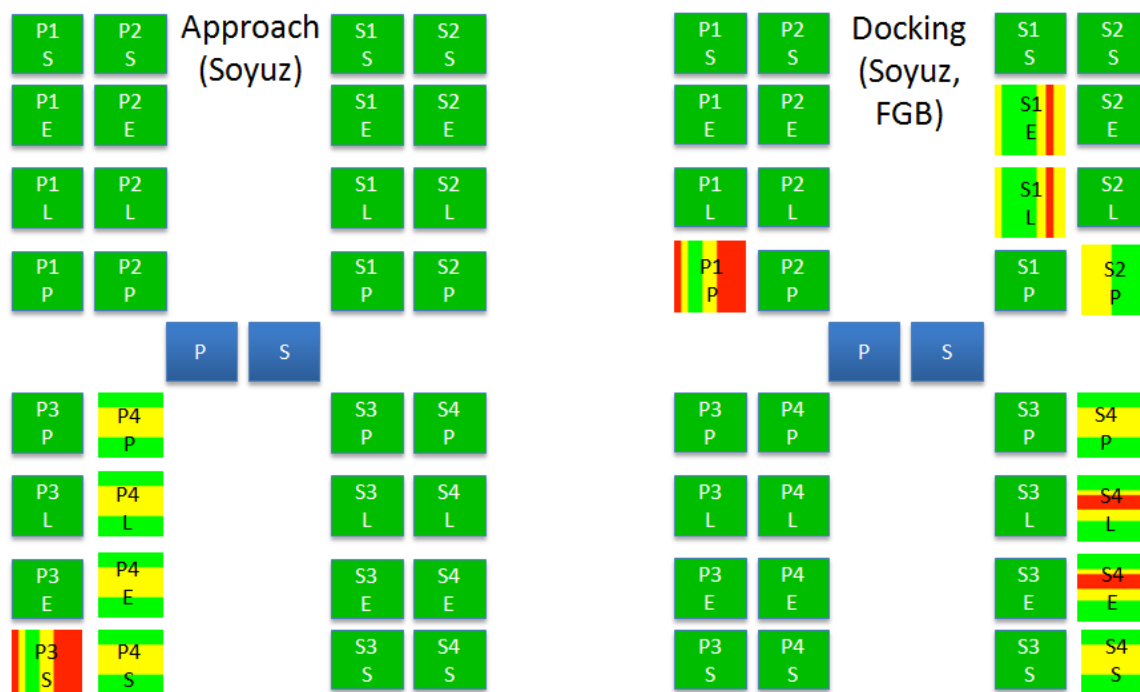
#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/13:30	R	Docked	Orbiter	DC1
2	170/06:00 170/13:30	P	Docked	Orbiter	DC1
3	170/06:00 170/13:30	Y	Docked	Orbiter	DC1



### Medium Problem 4

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Approach (Soyuz)	60	355.0 357.3 358.0	XVV /LVLH	N	17
2	170/8:30 170/10:00	Docking (Soyuz, FGB)	60	65.1 287.2 0.0	XVV /LVLH	N	17

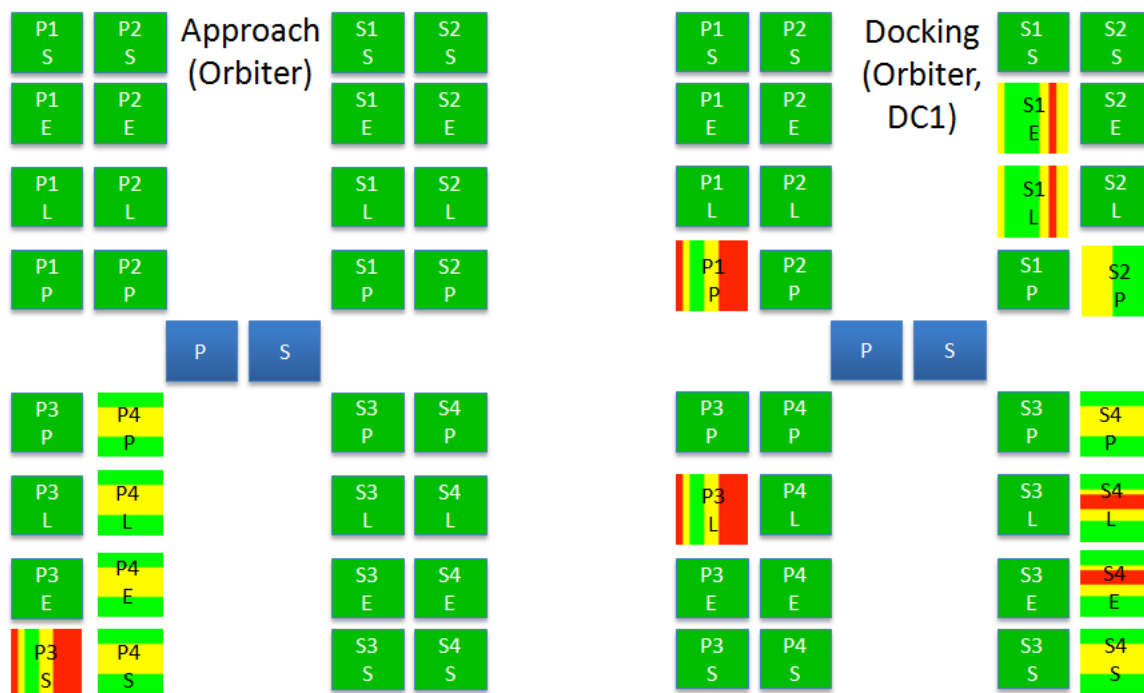
#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/13:30	R	Docked	Orbiter	DC1
2	170/06:00 170/13:30	P	Docked	Orbiter	DC1
3	170/06:00 170/13:30	Y	Docked	Orbiter	DC1



### Medium Problem 5

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Approach (Orbiter)	60	355.0 357.3 358.0	XVV /LVLH	N	17
2	170/8:30 170/10:00	Docking (Orbiter, DC1)	60	65.1 287.2 0.0	XVV /LVLH	N	17

#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/13:30	R	Docked	Soyuz	SM
2	170/06:00 170/13:30	P	Docked	Progress	FGB
3	170/06:00 170/13:30	Y	Docked	Progress	FGB

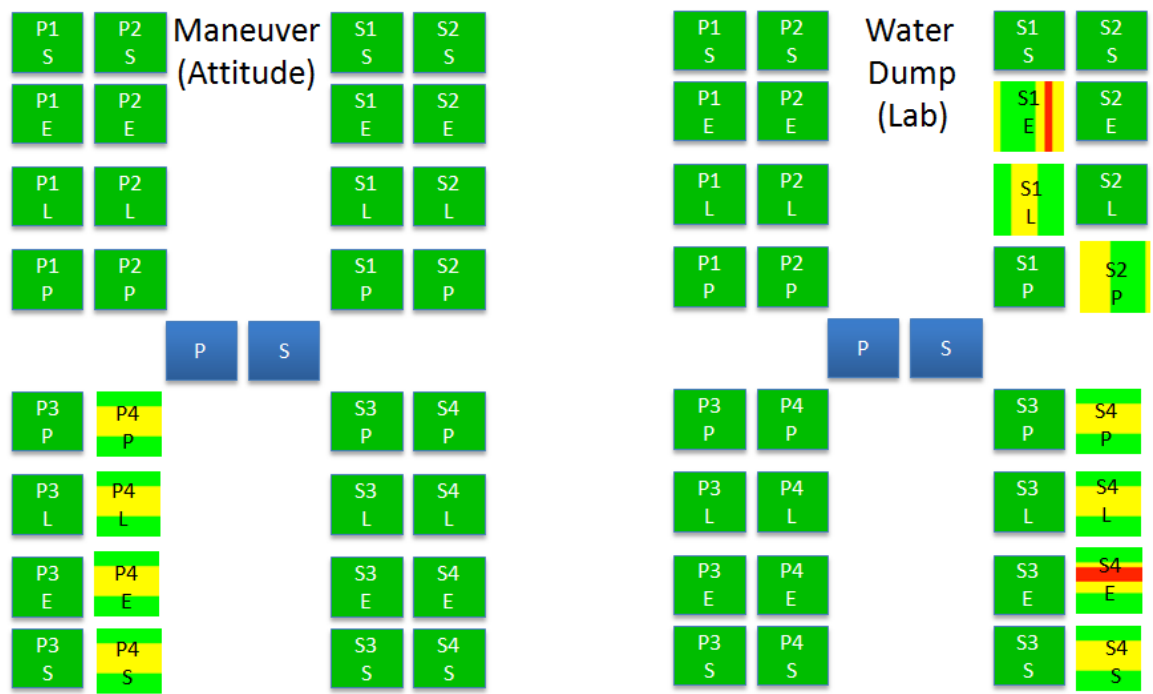


Hard Problems

Hard Problem 1

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Maneuver (attitude)	60	65.1 287.2 0.0	XVV /LVLH	Y	17
2	170/8:30 170/10:00	Water Dump (Lab)	60	355.0 357.3 358.0	XVV /LVLH	Y	17

#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/08:30 170/13:30	R	Docked	Soyuz	SM
2	170/08:30 170/13:30	P	Docked	Progress	FGB
3	170/08:30 170/13:30	Y	Docked	Progress	FGB

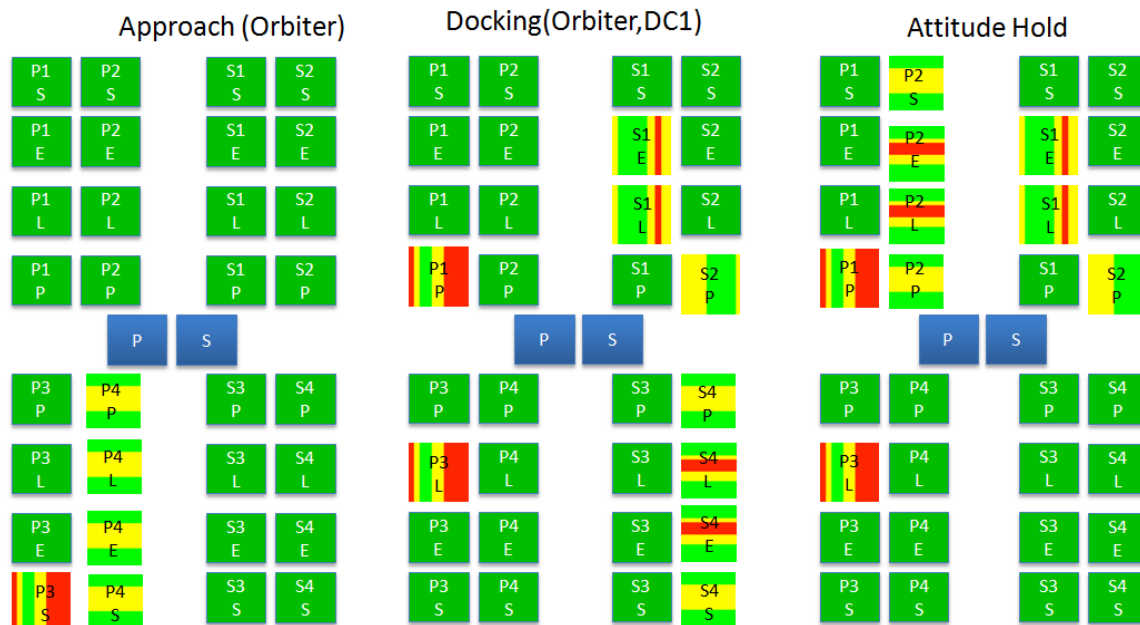




## Hard Problem 2

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Approach (Orbiter)	60	355.0 357.3 358.0	XVV /LVLH	N	17
2	170/8:30 170/10:00	Docking (Orbiter, DC1)	60	65.1 287.2 0.0	XVV /LVLH	N	17
3	170/10:00 170/13:00	Attitude Hold	60	355.0 357.3 358.0	XVV /LVLH	N	17

#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/13:00	R	Docked	Soyuz	SM
2	170/06:00 170/13:00	P	Docked	Progress	FGB
3	170/06:00 170/13:00	Y	Docked	Progress	FGB



### Hard Problem 3

#	Start-Stop (GMT)	Event	Solar Beta	YPR	Attitude Name /Reference frame	Contingency	SARJ turn rate
1	170/06:00 170/08:30	Approach (Orbiter)	60	355.0 357.3 358.0	XVV /LVLH	N	17
2	170/8:30 170/10:00	Docking (Orbiter, DC1)	60	65.1 287.2 0.0	XVV /LVLH	N	17
3	170/10:00 170/13:00	Attitude Hold	61	355.0 357.3 358.0	XVV /LVLH	N	17

#	Start-Stop (GMT)	Attitude	Thruster	Spacecraft	Port
1	170/06:00 170/12:00	R	Docked	Soyuz	SM
2	170/06:00 170/12:00	P	Docked	Progress	FGB
3	170/06:00 170/12:00	Y	Docked	Progress	FGB
4	170/12:00 170/13:30	R	Docked	Orbiter	DC1
5	170/12:00 170/13:30	P	Docked	Orbiter	DC1
6	170/12:00 170/13:30	Y	Docked	Orbiter	DC1

