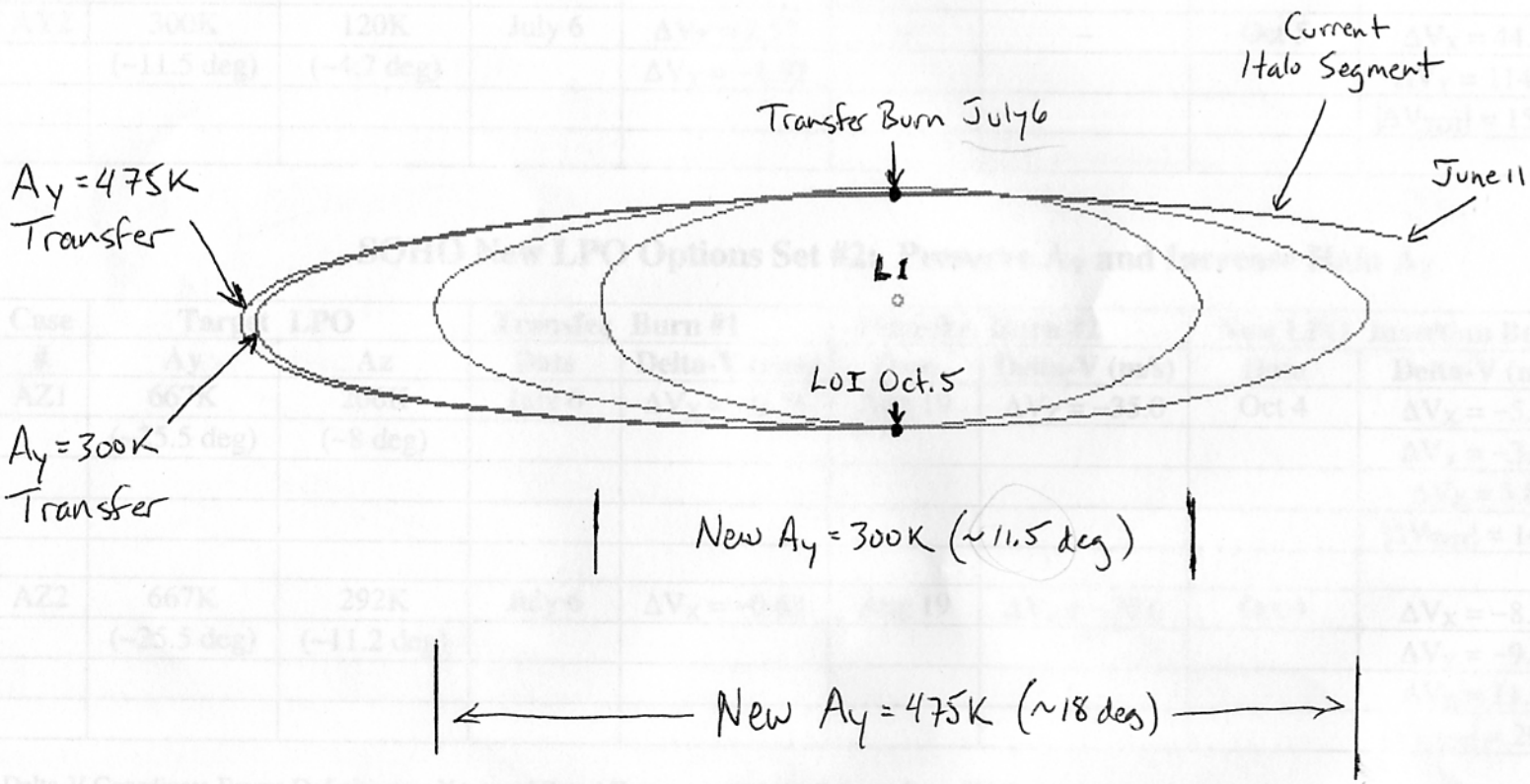
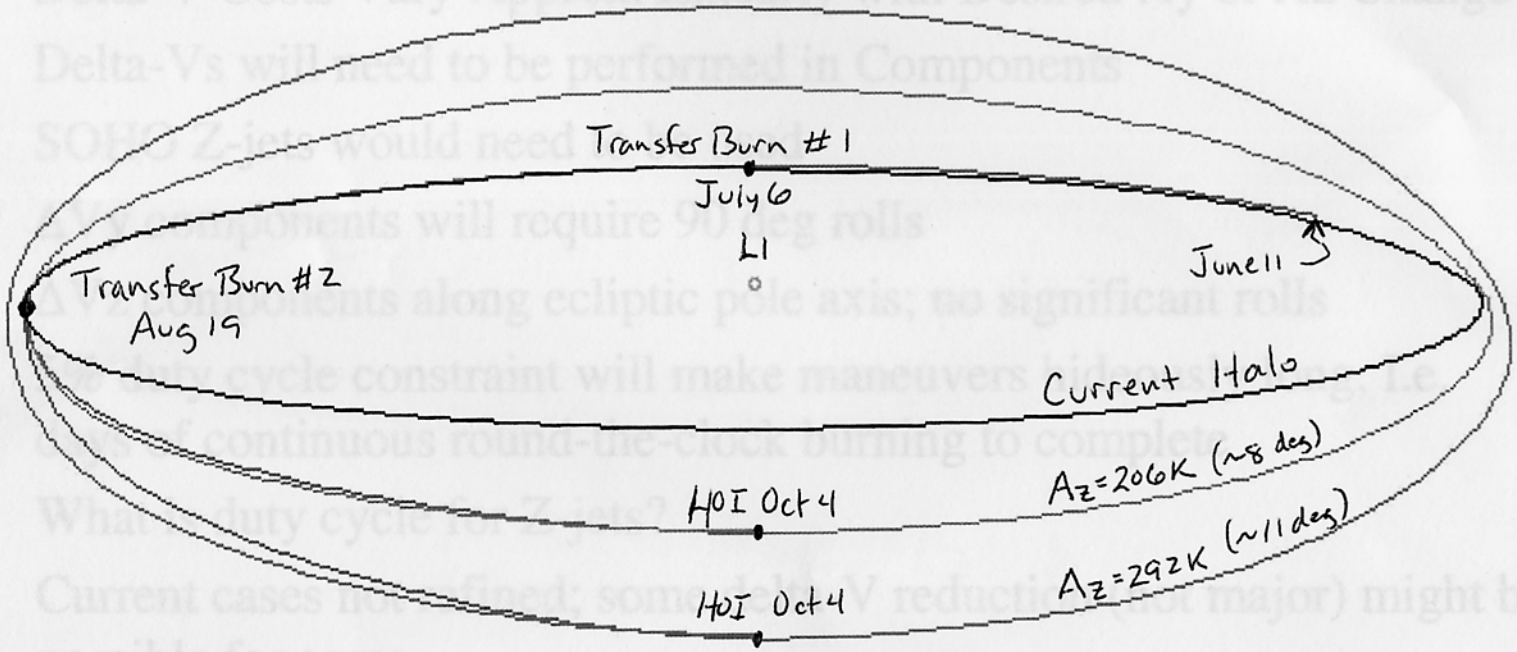
Decreasing SOHO Ay: Two Cases

(Solar Rotating YZ Plane View)



Increase SOHO Halo Az: Two Cases

(Solar Rotating YZ Plane View)



Looking Sunward from Earth

23 June 2003
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GSFC FDF/CSC

SOHO New LPO Options Set #1: Preserve A_Z and Decrease A_Y (New LPO is a Lissajous)

Case	Target LPO		Transfer Burn #1		Transfer Burn #2		New LPO Insertion Burn		Total Determ.
#	Ay	Az	Date	Delta-V (m/s)	Date	Delta-V (m/s)	Date	Delta-V (m/s)	Delta-V (m/s)
AY1	475K	120K	July 6	$\Delta V_X = -0.76$	–	–	Oct 5	$\Delta V_X = 21.38$	84.95
	(~18 deg)	(~4.7 deg)		$\Delta V_Y = -0.38$				$\Delta V_Y = 62.43$	
								$\lvert\Delta V_{TOT}\rvert = 83.81$	
AY2	300K	120K	July 6	$\Delta V_X = 2.57$	–	–	Oct 5	$\Delta V_X = 44.19$	167.07
	(~11.5 deg)	(~4.7 deg)		$\Delta V_Y = -5.52$				$\Delta V_Y = 114.79$	
								$\lvert\Delta V_{TOT}\rvert = 158.98$	

SOHO New LPO Options Set #2: Preserve A_Y and Increase Halo A_Z

Case	Target LPO		Transfer Burn #1		Transfer Burn #2		New LPO Insertion Burn		Total Determ.
#	Ay	Az	Date	Delta-V (m/s)	Date	Delta-V (m/s)	Date	Delta-V (m/s)	Delta-V (m/s)
AZ1	667K	206K	July 6	$\Delta V_X = -0.20$	Aug 19	$\Delta V_Z = -35.0$	Oct 4	$\Delta V_X = -5.74$	49.88
	(~25.5 deg)	(~8 deg)						$\Delta V_Y = -3.13$	
								$\Delta V_Z = 5.81$	
								$\lvert\Delta V_{TOT}\rvert = 14.68$	
AZ2	667K	292K	July 6	$\Delta V_X = -0.63$	Aug 19	$\Delta V_Z = -70.0$	Oct 4	$\Delta V_X = -8.91$	100.08
	(~25.5 deg)	(~11.2 deg)						$\Delta V_Y = -9.47$	
								$\Delta V_Z = 11.07$	
								$\lvert\Delta V_{TOT}\rvert = 29.45$	

Delta-V Coordinate Frame Definition: +X toward Sun, +Z up toward North Ecliptic Pole, X x Y = Z

SOHO Orbit Modification: Important Points

- SOHO delta-V capability ~ 164 m/sec
- Some rather large (for SOHO) burns needed for significant orbit mods
- Delta-V Costs Vary Approx. Linearly with Desired Ay or Az Change
- Delta-Vs will need to be performed in Components
- SOHO Z-jets would need to be used
- ΔVy components will require 90 deg rolls
- ΔVz components along ecliptic pole axis; no significant rolls
- 5% duty cycle constraint will make maneuvers hideously long, I.e. days of continuous round-the-clock burning to complete
- What is duty cycle for Z-jets?
- Current cases not refined; some delta-V reduction (not major) might be possible for some