SUNNYVALE STS MISSIONS

SP80-1 "TEAL RUBY"

STS-19 & STS-62A

Add-on for Orbiter2010-P1 (build 100830)
v. 120102

INSTALLATION
Unzip into your Orbiter folder as usual.
Should not overwrite any standard Orbiter files.

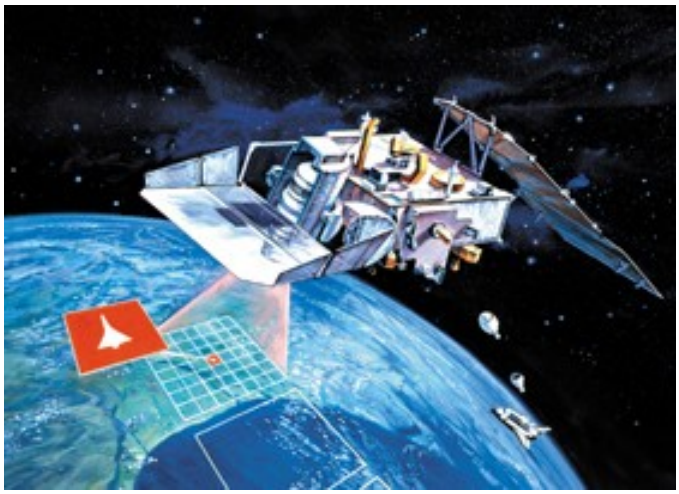
REQUIREMENTS
Can be used with no other add-ons

RECOMMENDED (optional)
Shuttle Fleet 4.8
http://www.orbithangar.com/searchid.php?ID=5531
Kev's SLC-6 (optional)
http://www.orbithangar.com/searchid.php?ID=1331

Note: Shuttle Fleet 4.8 requires Universal UMMU 2.0
http://orbiter.dansteph.com/index.php?disp=d

INCLUDES
SP80-1 satellite and associated SRB's and launch cradle, Spacelab experiment pallets. Launch scenarios for default Atlantis or ShuttleFleet4.8 (Orbiter2010-P1)

SP80-1 "TEAL RUBY" OVERVIEW



The SP80-1 satellite was to be the demonstration platform for various technologies including the "Teal Ruby" infra-red surveillance sensor and two Mercury-Ion engines.

Launches scheduled for 1981(STS-19) and 1986(STS-62A) were both cancelled and SP80-1 never flew.

SP80-1 would require a 750 x 750km, 72.5° inclination orbit, in sunlight for the first 72hrs comissioning phase.

The SP80-1 flight attitude would normally be:
+Z pointed at nadir (down)
+Y pointed along velocity vector

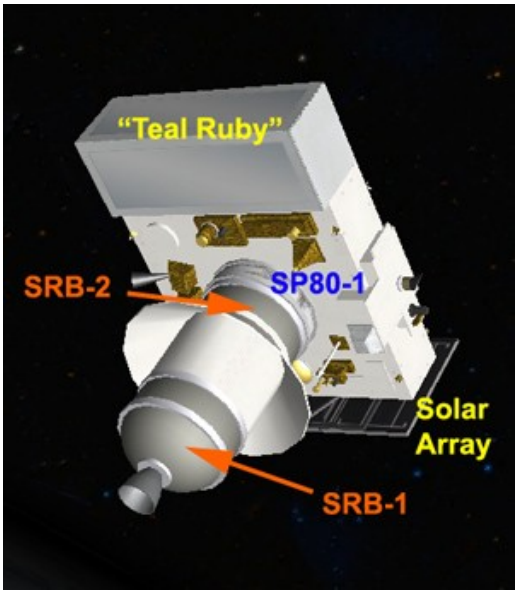
SP80-1 SPECIFICATIONS

Empty mass	1735kg
Hydrazine	50kg
Mercury (Ion eng)	5kg
RCS	20N
Ion Engines	0.05N

SP80-1 CONTROLS

NumPad+ = Start SRB burn (STS-19 only)
V = Deploy "TealRuby" IR sensor telescope
B = Deploy Solar Array
N = Start/Stop +Z Ion Engine
M = Start/Stop -Y Ion Engine

SP80-1 BOOSTER CONFIGURATION



STS-19

For the STS-19 Cape Canaveral launch scenario, the SP80-1 has two Star37FM solid-rocket boosters (SRB) in order to make the large plane-change manoeuvre from 57° to 72.5°, and also to boost the orbit to 750km.

The SRB boosters have no throttle or restart - they will burn at 100% throttle until depletion.

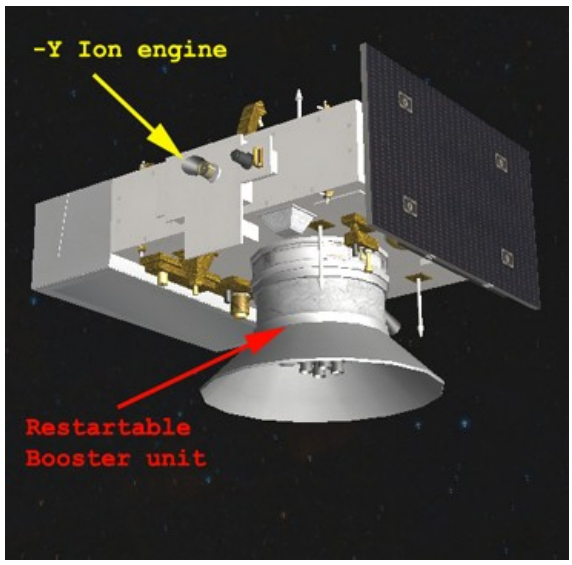
The available dV for the current SRB is displayed on the cockpit HUD.

Use your favourite MFD to plan the SRB burns!
I use IMFD "Course -> DeltaVelocity" , set target to "L" for equatorial frame.

First set the prograde dV component to raise the apogee to 750km, then increase/decrease the plane-change dV component until total dV required is just below available SRB dV (shown on HUD).
To fine tune the resulting plane-change, you can vary the time of the burn either side of the node(equator).

NB If you use IMFD "AutoBurn" function, make sure the total dV required for the burn is LESS than the available dV in SRB1 - otherwise IMFD will try to use SRB2 to make up the shortfall!

STS-62A
For the STS-62A Vandenberg launch scenario, the SP80-1 has a re-startable hydrazine booster unit, which is suffucient to boost the orbit from 400km to 750km



SCENARIOS
Two hypothetical launch scenarios:
STS-19 from Cape Canaveral, 1981
STS-62A from Vandenberg, 1986

STS-19 Launch
Shuttle: Columbia
Launch from Cape Canaveral
29 July 1981 01:00 UTC
Launch to 57deg inclination, 291km circular orbit
Deploy SP80-1
Make SP80-1 SRB1 plane-change/apogee-boost burn at descending node(on equator)
Make SP80-1 SRB2 plane-change/perigee-boost burn at ascending node(on equator)
Land at KSC

STS-62A Launch
Shuttle: Discovery
Launch from Vandenberg
01 July1986 12:45 UTC
Launch to 72.5deg inclination, 750km circular orbit
Deploy SP80-1
Land at VAFB

SHUTTLE FLEET 4.8 NOTES
The launch autopilot is set for the correct launch azimuth and there is a full complement of UMMU crew on board.

You may find the autopilot does not work particularly well for the STS-19 launch - if so, take manual control after the initial roll and pitch manoeuvres!

Happy orbiting!
BrianJ