ORBITER
Atlantis with MMU & Satellite Version 3.0

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**Special Thanks to Dr. Martin Schweiger
who made it all possible and fun**
http://www.orbitersim.com
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1. INTRODUCTION

This document explains how to use and operate the Atlantis with MMU and Satellite Module for Orbiter.

2. SPECIFICATIONS

To be added later

3. VERSION HISTORY

Version 1.0
> Initial Release

Version 1.1
> Fixed problem with not reading SAT_JETTISONED in the scenario file.
> Fixed problem with the E key not returning to the shuttle from the MMU.
> Added E key to the satellite to return to shuttle
> Added the ability for the satellite and/or mmu to parse it's own name to return back to the launching shuttle.
> Modified the Shuttle's J key so that if the satellite is launched it will shift focus back to the launched satellite.
> Added SAT_OFS_X, SAT_OFS_Y, SAT_OFS_Z to the scenario file to control the offset of the shuttle in the payload bay.

Version 1.2
> Better MMU Mesh thanks McDope
> Added SAT_NAME, and SAT_MESH to the scenario file to read the name and mesh of the satellite you want to use.

Version 2.0
> Added new MMU courtesy of Andrew Farnaby (Dirk_Dan)
> Added the ability to control the RMS on the Shuttle.

Version 2.1
> Added Multi-Purpose Logistics Module mesh and config
> Added Grappling capability

Version 3.0
> *Dr. Martin Schweiger*
> Added Cradle Mesh and Position
> Added Grappling Jettison Capability
> Eliminated the need for SATELLITE_NMESH
> *Robert Conley*
> Added Accurate MMU Jets
> Added MMU Docking Port
> Added Carina Docking Port
> Added Atlantis Satellite Repair Scenario

4. ATLANTIS
Flight Plan

MET+0	Launch
MET+2	HUD To Surface Mode
MET+4	Bring up Surface Mode MFD
MET+15	Begin 180 degree roll
MET+55	End Roll
MET+75	Pitch to 80 degrees
MET+95	Pitch to 70 degrees
MET+115	Pitch to 60 degrees
MET+135	Pitch to 50 degrees
MET+155	Pitch to 40 degrees
MET+175	Pitch to 30 degrees
MET+195	Pitch to 20 degrees
MET+215	Pitch to 10 degrees
MET+235	Pitch to 0 degrees
	Hold 0 degree pitch until vertical speed drop to 0.
	Pitch to 30+ degrees until vertical accel is zero
	Drop pitch keeping vertical accel zero
	Cut Engines when Ecc reaches close to zero

Keyboard

|		
J	Jettison Satellite	Focus will change to satellite, using shift doesn't change focus
1	Rotate Shoulder Pitch	Shift will rotate in opposite direction RoM (+145 / -2)
2	Rotate Shoulder Yaw	Shift will rotate in opposite direction RoM (+/- 180)
3	Rotate Elbow Pitch	Shift will rotate in opposite direction RoM (+2 / -160)
4	Rotate Wrist Pitch	Shift will rotate in opposite direction RoM (+/- 120)
5	Rotate Wrist Yaw	Shift will rotate in opposite direction RoM (+/- 120)
6	Rotate Wrist Roll	Shift will rotate in opposite direction RoM (+/- 447)
8	Grapple Object	8 again will un-grapple
9	Stow Arm	Be aware of where the arm is or you risk a crash.
0	Change Degree of Motion	10 deg -> 1 deg -> .1 deg -> 10 deg
K	Operate Cargo Doors	
G	Operate Landing Gears	
E	Begin Eva	Launch MMU

RMS Illustration
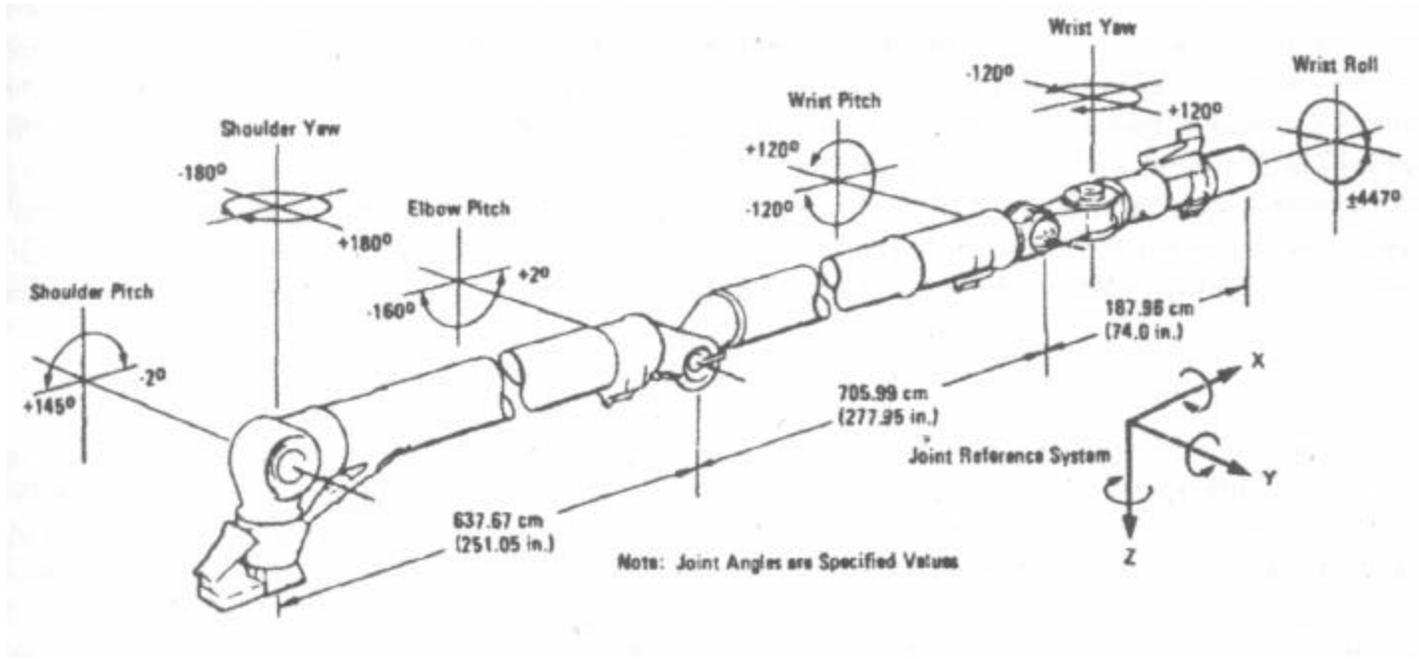
Mechanical Arm-Stowed Position and Movement Configuration

Grappling

      This is the first cut of the grappling capability. First off all you can grapple anywhere even if you are NOT on the satellite. Just maneuver the end of the arm to where you want to grapple on the payload and tap 8. When you are done positioning the object tap 8 to ungrapple. You can also jettison from wherever the payload is by tapping the J Key.
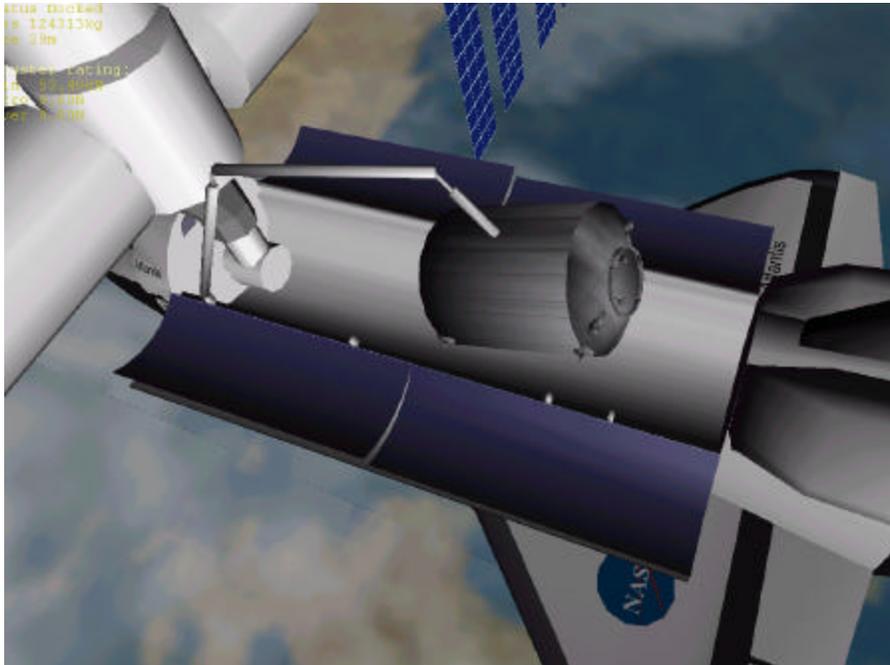
5. MMU
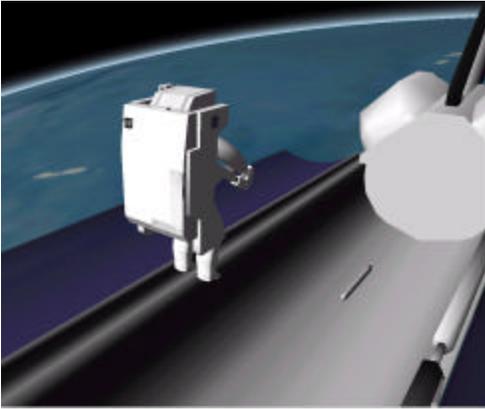
Surveying the payload bay
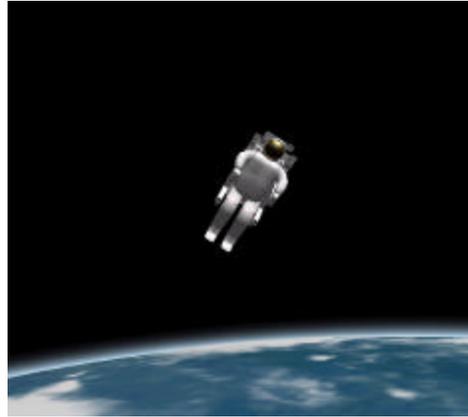
An famous picture re-visited

Thrusters: 1.5 Newton , ISP:45.0 sec
Empty Mass: 200.0 kg, Fuel Mass: 11.8 kg, DeltaVee: 20 m/sec

6. STS-SAT

This has been extensively revised in this version. It is possible for orbiter modules to read the cfg file as well as the scenario file. This is an example of doing this. In addition any config parameters entered in after the *module* = line will be read and used by the orbiter in configuring the vessel. The sts-sat.dll module does little more than read in the configuration of SAT_MESH to get the mesh name and allows the use of the J key to switch back to the Shuttle Orbiter.

```
; === Configuration file for vessel class ESA Carina===
ClassName = carina      <= setup as normal
Module = sts_sat        <= note that there is no meshname= line.
```

Normal configuration stuff

```
SAT_MESH carina         <= Add this to the bottom with the mesh name you want to load
```

7. ATLANTIS CONFIGURATION

These are the configuration options available in scenarios for the Atlantis module

```
STS-101:Atlantis_Sat
  CONFIGURATION 3          <= 0 Launch, 1 SRBs Ignited, 2 SRB Jettisoned, 3 Orbiter
  CARGODOOR 1 1.0000       <= X cargo door status, X.XXXX percentage moved (0..1)
  GEAR 0 0.0000            <= X gear status, X.XXXX percentage moved (0..1)
  SAT_OFS_X 0.000          <= Satellite Offset X
  SAT_OFS_Y 0.000          <= Satellite Offset Y
  SAT_OFS_Z 0.000          <= Satellite Offset Z
  ARM_SH_P 0.000           <= Arm Shoulder Pitch    in radians
  ARM_SH_Y 0.000           <= Arm Shoulder Yaw      in radians
  ARM_EL_P 0.000           <= Arm Elbow Pitch       in radians
  ARM_WR_P 0.000           <= Arm Wrist Pitch       in radians
  ARM_WR_Y 0.000           <= Arm Wrist Yaw         in radians
  ARM_WR_R 0.000           <= Arm Wrist Roll        in radians
  SAT_JETTISONED 0         <= 0 not jettisoned, 1 jettisoned
  SAT_NAME carina_dll      <= Module Name (.cfg)
  SAT_MESH carina          <= Mesh Name   (.msh)
  SAT_GRAPPLE              <= X,Y, Z location of the grapple point, not used
        0.000 2.341 0.182
  SAT_GRAPPLED 0           <= 0 not grappled, 1 grappled
  CARGO_STATIC_MESH        <= Mesh Name   (.msh)
        Carina_cradle
  CARGO_STATIC_OFS         <= X,Y, Z location of the cargo mesh
        0.000 -1.650 0.050
```

6. SCENARIOS

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Atlantis Satellite The Atlantis already in orbit with payload doors deployed. 	**Atlantis Satellite Launch** The Atlantis ready to launch with satellite payload
Atlantis Re-supplies the ISS The below picture shows you where you can place the MPLM against the ISS. It is cramped docked next to the ISS so be careful! 	**Atlantis MMU Satellite Repair** Launch the MMU from the Atlantis and dock with the Carina to effect emergency repairs!
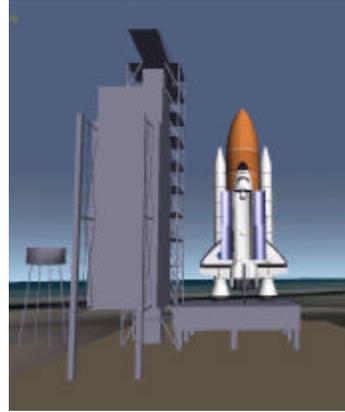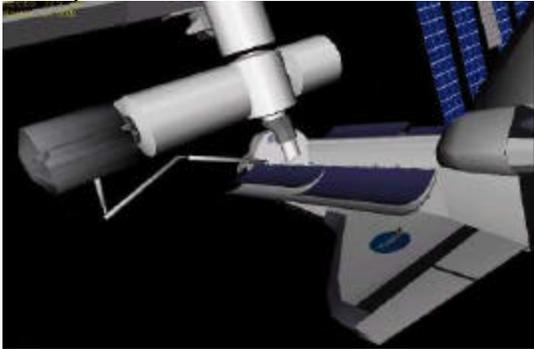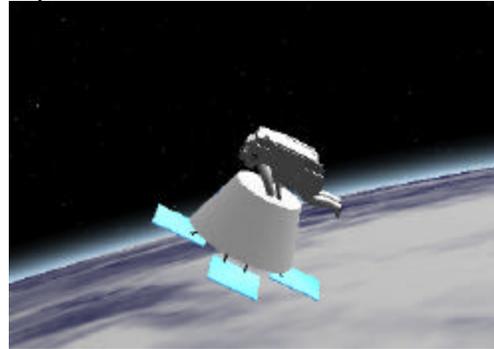
7. CREDITS

Rob Conley   - Module Modifications
Dr. Martin Schweiger - Original Module, Revised Module
Dealer McDope   - Satellite Mesh
Andrew Farnaby   - MMU Mesh
NASA   - MPLM Mesh (from their VRML ISS)
Thanks for your support and help