

***Pre-Launch Checklist (Classroom Computer Training Simulator)***

COM	TIME	PROCEDURE	Mission Control Notes
0	System Set-Up	<p><i>Shuttle Launch Commands for the Left Terminal MFD (Mission Commander)</i></p> <p><u>Load before beginning pre-launch checklist.</u></p> <ol style="list-style-type: none"> <li>1. Confirm HUD is on and in <u>Orbit Earth</u> mode. <b>[Ctrl] H</b> will turn HUD on and the <b>H</b> key will cycle through the various HUD options.</li> <li>2. Have the student hit <b>[SEL]</b> on the left MFD with the mouse and then select <b>[Terminal MFD]</b>. (You may have to hit <b>[SEL]</b> twice to get to this prompt)</li> <li>3. Then select <b>[INP]</b>. An "Input Script Command" dialog box will pop up. Type in <b>run"atlantis/launch"</b> and press <b>ENTER</b></li> <li>4. Select <b>[INP]</b> and then type in <b>do oms2=false</b> and press <b>ENTER</b></li> <li>5. Select <b>[INP]</b> and then type in <b>launch()</b></li> <li>6. Press <b>ENTER</b> when you are <u>instructed to launch</u> the shuttle at T-minus 4 seconds.</li> </ol> <p>Be careful not to touch the keyboard before launch (T-00:00:04) as it may change or erase the final command and mess up your launch timing with the Pilot's Power Point.</p> <p><u>Checklist Notes:</u></p> <p>The number in parenthesis following a command represents the panel location of the switch.</p> <p>The following notations clarify who is responsible for specific actions or communication</p> <p><b>C</b> – Mission Commander  <b>P</b> – Pilot  <b>E</b> – Flight Engineer  <u>Advise</u> – must receive a confirmation  <u>Announce</u>- No response expected, information only</p>	

1	T-00:05:00	<p><b><u>Launch HOLD</u></b></p> <p>CABIN DOOR to LATCH (6)</p> <p>ENVIRONMENTAL SYSTEM O<sub>2</sub> SYS2 to OPEN (5)</p> <p>ENVIRONMENTAL SYSTEM N<sub>2</sub> SYS2 to OPEN (5)</p> <p>ENVIRONMENTAL SYSTEM H<sub>2</sub>O LOOP to ON (5)</p> <p><b>Key in ITM (4)</b>  <b>Select A (4)</b>  <b>Key in DPS (4)</b>  <b>Select 1 (OPS 1) (4)</b>  <b>Key in EXE (4)</b></p> <p>BOILER CNTRL POWER (1/2/3) to ON (5)</p> <p>BOILER CNTRL HTR (1/2/3) to ON (5)</p> <p>BOILER N<sub>2</sub> SUPPLY (1/2/3) to ON (5)</p> <p><b>Key in DPS (4)</b>  <b>Select 2 (OPS 2) (4)</b>  <b>Key in EXE (4)</b></p> <p>C - Check CABIN PRESSURE gauge for possible depressurization (normal is 760 torr)</p> <p>He ISOLATION A (LEFT/CENTER/RIGHT) to OPEN (2)</p> <p>He ISOLATION B (LEFT/CENTER/RIGHT) to OPEN (2)</p> <p>PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to OPEN (2)</p>	<p>Advise: Go for Load OPS 1 and Execute</p> <p>Announce: Confirm Boiler Power On</p> <p>Advise: Go for Load OPS 2 and Execute</p> <p>Advise: Go for Cabin Leak Check</p> <p>Advise: Go for Helium (He) Pressurization</p>
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1 cont.		<p>APU FUEL TNK VLV (1/2/3) to CLOSE (5)</p> <p>APU TK VLV to CLOSE (1)</p> <p>APU SHUTDWN to ENABLE (1)</p> <p>HYD MAIN PUMP PRESSURE (1/2/3) to LOW (2)</p> <p>APU SPEED SELECT (1/2/3) to NORMAL (2)</p> <p>HYD CIRC PUMP (1/2/3) to GPC (2)</p> <p>APU POWER to ON (1)</p> <p>APU CNTRL POWER (1/2/3) to ON (5)</p> <p>APU TK VLV to OPEN (1)</p> <p>APU FUEL TNK VLV (1/2/3) to OPEN (5)</p> <p>APU /HYDRAULICS (1/2/3) to START/RUN (2)</p> <p>HYD MAIN PUMP PRESSURE (1/2/3) to NORMAL (2)</p> <p>C - Check that the ACCUM P in the APU/HYD column is greater than 3000 PSI. (Located on Pilot PowerPoint left MFD)</p> <p>HYD CIRC PUMP (1/2/3) to OFF (2)</p> <p>Confirm central HUD is on and in <u>Orbit Earth</u> Mode.</p> <ul style="list-style-type: none"> <li>• <i>If needed</i> <b>Select 0</b> (toggle until <u>Orbit Earth</u> HUD is visible)</li> </ul> <p>C - [In Orbiter [Ctrl] H will turn the HUD on and off, the H key will cycle through the various HUD options] <u><b>This should have been done before starting.</b></u></p> <p>STAR TRACKER to ON (1)</p>	<p>Announce: APU Pre-Start Check Is Underway</p> <p>Announce: Nominal APU Start</p> <p>Advise: Check Hydraulic (APU) Pressure</p>
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1 cont.		<p><i>C - <u>Request Go/ No Go for launch</u></i></p> <p><b>Initiate Launch Clock Restart when <u>Go</u> order received (6)</b>  P - [space bar]</p> <p>MAIN ENGINE POWER (LEFT/CENTER/RIGHT) to ARM (3)</p> <p>OMS ENGINE VLV (LEFT/RIGHT) to OPEN (3)</p> <p>OMS ENGINE (LEFT/RIGHT) to ARM (3)</p>	<p>Advise: Mission Control confirms all systems are nominal. You are <b><u>Go</u></b> for launch.</p> <p><b><u>OR</u></b></p> <p>Mission Control confirms some systems are Off-Nominal. You are <b><u>No Go</u></b> for launch until these systems are corrected.</p> <p>Advise: Go for Main Propulsion System (MPS) initialization</p> <p>Advise: Go for OMS Engines Initialization</p> <p>Announce: Stand by to Initiate radar at T-4:00</p>
2	T-00:04:00	<p>PRIMARY SYSTEM RADAR to ON (8)  E - [space bar]</p> <p>RATE GYRO ASSEMBLY (RG1/ RG2-3/ RG4) to ON (2)</p> <p>INTERNAL SHUTTLE SYSTEM PWR (BAT A / BAT B) to ON (3)</p> <p>INTERNAL SHUTTLE SYSTEM POWER - INT PWR TRANSFER to ON (3)</p>	<p>Announce: Synchronization of Fuel Cells Underway</p> <p>Advise: Confirm Shuttle Is On Internal Power</p>

3	T-00:03:00	<p><b>Key in DPS (4)</b>  <b>Select 3 (OPS 3) (4)</b></p> <p>GLOBAL POSITIONING SYSTEM (GPS-1/GPS-2/GPS-3) to ON (5)</p>	<p>Advise: Go for Load OPS 3</p> <p>Announce: External Tank Cap is retracted</p>
4	T-00:02:00	<p>APU SHUTDWN to INHIBIT (1)</p> <p>Verify SRB JETTISON is GPC (3)</p> <p>Verify EXT TANK JETTISON is GPC (3)</p>	<p>Announce: Confirm APU Power Shutdown is inhibited</p> <p>Announce: External Tank Liquid Hydrogen vents are closed.</p>
5	T-00:01:00	<p>AC BUS SENSOR to AUTO (1)</p> <p>INTERNAL SHUTTLE SYSTEM POWER - EXT PWR DISCONNECT to ON (3)</p>	<p>Announce: Confirm ground power disconnect complete.</p> <p>Advise: Mission Commander - You are Go for Executing OPS 3 at T-4 seconds</p>
6	T-00:00:04	<p><b>Key in EXE (4)</b>  C - [ENTER] on keyboard for Orbiter program</p>	<p>Advise: Execute OPS 3</p>
7	T-00:00:00		<p>Initiate Mission Elapsed Time Clock</p> <p>Announce: Shuttle liftoff, the clock is running</p>

*Ascent Checklist*

COM	MET	PROCEDURE	Mission Control Notes
8	T+00:00:20	Switch Left MFD back to Surface Mode <b>Key in 9 (4)</b> C –[Use mouse to select in orbiter program left MFD]	
9	T+00:00:44		Announce: Automatic Main Engines Throttle Down to 65%
10	T+00:01:10		Announce: Automatic Main Engines Throttle Up to 104%
11	T+00:02:05	<i>SRB Separation</i>	Announce: OMS assist burn start
12	T+00:03:00	C - Confirm that the (Freon) EVAP OUT TEMP data display shows <u>below 60 degrees</u> (Located on Pilot PowerPoint lower MFD)	Advise: Check Flash Evaporator Is Operational
13	T+00:04:20		Advise: Negative Return
14	T+00:08:00		Advise: Go for Engines Automatic Throttle Down In Preparation for Main Engine Cutoff (MECO)
15	T+00:08:55	<i>Main Engine Cutoff (MECO)</i>	Advise: Confirm Main Engine Shutdown and Engine Cutoff (MECO)

***Orbit Insertion Checklist (Post MECO)***

COM	MET	Procedure	Mission Control Notes
16	T+00:09:00	<p>FWD RCS He TANK ISOL (A/B) to OPEN (3)</p> <p>FWD RCS He PRIMARY REGULATOR (A/B) to OPEN (3)</p> <p>AFT RCS He TANK ISOL (A/B) to OPEN (3)</p> <p>AFT RCS He PRIMARY REGULATOR (A/B) to OPEN (3)</p>	<p>Announce: Initialize External Tank Separation system</p>
17	T+00:09:15	<p><i>Confirm</i> OMS ENGINE VLV (LEFT/RIGHT) are OPEN (3)</p> <p><i>Confirm</i> OMS ENGINE (LEFT/RIGHT) are ARMed (3)</p>	<p>Announce: Standing by for Auto OMS1 Burn</p>
18	T+00:09:30	<p>FLT CNTLR PWR to INHIBIT (1)</p> <p>ENGINE DAP to AUTO (1)</p>	<p>Announce: MPS Propellants Automatic Dump initiated.</p>
19	T+00:09:45	<p>MAIN ENGINE POWER (LEFT/CENTER/RIGHT) to OFF (3)</p>	<p>Announce: Auto Propellant Dump Complete</p>
20	T+00:10:00	<p>He ISOLATION A (LEFT/CENTER/RIGHT) to GPC (2)</p> <p>He ISOLATION B (LEFT/CENTER/RIGHT) to GPC (2)</p> <p>PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to GPC (2)</p> <p>H<sub>2</sub> SYSTEM LINE VENT to OPEN (5)</p>	<p>Announce: Confirm External Tank Separation</p>

21	T+00:10:30	<p>HYD MAIN PUMP PRESSURE (1/2/3) to LOW (2)</p> <p>APU / HYDRAULICS (1/2/3) to OFF (2)</p> <p>APU SHUTDOWN to ENABLE (1)</p> <p>APU FUEL TNK VLV (1/2/3) to CLOSE (5)</p> <p>APU TK VLV to CLOSE (1)</p> <p>APU CNTRL POWER (1/2/3) to OFF (5)</p> <p>APU POWER to OFF (1)</p> <p>BOILER CNTRL HTR (1/2/3) to OFF (5)</p> <p>BOILER CNTRL POWER (1/2/3) to OFF (5)</p> <p>BOILER N<sub>2</sub> SUPPLY (1/2/3) to OFF (5)</p> <p>HYD CIRC PUMP (1/2/3) to GPC (2)</p> <p>H<sub>2</sub> SYSTEM LINE VENT to GPC (5)</p>	Announce: APU Shutdown complete
22	T+00:11:00 <u>approximate</u>	<i>C – Advise Mission Control when OMS Burn Initiated</i>	Advise: Confirm OMS Burn Initiated
23	T+00:15:10 <u>approximate</u>	<p><i>C – Advise Mission Control when OMS Burn Complete</i></p> <p>OMS ENGINE (LEFT/RIGHT) to OFF (3)</p> <p>OMS ENGINE VLV (LEFT/RIGHT) to CLOSE (3)</p> <p>AC BUS SENSOR to MONITOR (1)</p>	Advise: OMS Burn complete



24	Mission Dependent	<p>Confirm central HUD is on and set to <u>Orbit Earth</u> mode.</p> <ul style="list-style-type: none"> <li>• If needed <b>Select 0</b> (toggle until <u>Orbit Earth</u> HUD is visible)</li> </ul> <p>C –[In Orbiter <b>[Ctrl] H</b> will turn the HUD on and off, the <b>H</b> key will cycle through the various HUD options]</p> <p>H<sub>2</sub> SYSTEM OUTBRD VLV to GPC <b>(5)</b></p> <p>H<sub>2</sub> SYSTEM INBRD VLV to GPC <b>(5)</b></p> <p>ENGINE DAP to MANUAL <b>(1)</b></p> <p>FLT CNTLR POWER to ENABLE <b>(1)</b></p> <p>RATE GYRO ASSEMBLY (RG1/ RG2-3/ RG4) to OFF <b>(2)</b></p> <p>Orient the shuttle to a zero attitude while using the <u>Kill Rotation</u> command (<b>blue key 4</b>) to stabilize the maneuver.</p> <p>C - Kill rotation by clicking on <u>Kill Rotation</u> box at the bottom of the orbiter screen)</p> <p><b>**To see this action demonstrated ensure that the orbiter HUD is in "Orbit Earth Mode" then click on "PROGRADE". The Commander is required to normally perform this operation manually. If your Joystick does not have "rudder" capabilities you can use the 1 and 3 key on the number pad for left and right translation.</b></p>	<p>Announce: Liquid H<sub>2</sub> Outboard Fill &amp; Drain Valves are set to Computer Control</p> <p>Announce: Go for Initiating Manual Zero Attitude Correction</p> <p>Announce: Confirm Shuttle in zero attitude (manual prograde)</p>
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25	Mission Dependent	<p>PAYLOAD POWER to ON (7) E - [space bar]</p> <p>PAYLOAD BAY DOOR to OPEN (7) E - [space bar]</p> <p>RADIATORS to DEPLOY (7) E - [space bar]</p> <p>Ku ANTENNA to DEPLOY (7) E - [space bar]</p>	<p>Advise: Go for payload bay door open program</p> <p>Announce: Confirm Payload Bay Doors are open</p> <p>Announce: Confirm Radiator Deployment</p> <p>Announce: Confirm KU Antenna Deployment</p> <p>Announce: Shuttle is correctly configured for the mission</p>
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***De-Orbit Checklist***

COM	MET	Procedure	Mission Control Notes
26	Mission Dependent	STAR TRACKER to OFF (1)  Ku ANTENNA to STOW (7) E - [space bar]  RADIATORS to STOW (7) E - [space bar]  PAYLOAD BAY DOOR to CLOSE (7) E - [space bar]  PAYLOAD POWER to OFF (7)	Advise: Go for Payload Bay Door Close program.  Announce: Confirm KU Antenna is stowed  Announce: Confirm Radiators are stowed  Announce: Confirm Payload Bay Doors are closed
27	Mission Dependent	BOILER CNTRL HTR (1/2/3) to ON (5)  HYD CIRC PUMP (1/2/3) to OFF (2)	
28	Mission Dependent	<i>Position The Shuttle to The Correct Attitude – Retrograde</i>  <b>Key in 6 – Retrograde (4)</b> C –[Use mouse to select <u>retrograde</u> on Orbiter screen]	Announce: Confirm Shuttle in retrograde attitude
29	Mission Dependent	He ISOLATION A (LEFT/CENTER/RIGHT) to OPEN (2)  He ISOLATION B (LEFT/CENTER/RIGHT) to OPEN (2)  PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to OPEN (2)	Announce: Main Propulsion System Helium Release confirmation

30	Mission Dependent	BOILER N <sub>2</sub> SUPPLY (1/2/3) to ON <b>(5)</b> BOILER CNTRL POWER (1/2/3) to ON <b>(5)</b> APU TK VLV to OPEN <b>(1)</b> APU FUEL TNK VLV (1/2/3) to OPEN <b>(5)</b> APU POWER to ON <b>(1)</b> APU CNTRL POWER (1/2/3) to ON <b>(5)</b> APU SHUTDWN to INHIBIT <b>(1)</b> HYD MAIN PUMP PRESSURE (1/2/3) to LOW <b>(2)</b> APU SPEED SELECT (1/2/3) to NORMAL <b>(2)</b> APU / HYDRAULICS (1/2/3) to START/RUN <b>(2)</b> DUMP ISOL VLV to OPEN <b>(1)</b>	
31	Mission Dependent	OMS ENGINE VLV (LEFT/RIGHT) to OPEN <b>(3)</b> OMS ENGINE (LEFT/RIGHT) to ARM <b>(3)</b>  Engine Throttle to Maximum C- [Ctrl +]	Advise: Go for Perform De-orbit Burn (Burn time data provide by Mission Control, usually 1-2 minutes. Give 10 second countdown to throttle up and burn clock start)

32	Mission Dependent	<p>Engine Throttle to OFF C- [Ctrl - ]</p> <p>OMS ENGINE (LEFT/RIGHT) to OFF (3)</p> <p>OMS ENGINE VLV (LEFT/RIGHT) to CLOSE (3)</p>	<p>(Give 10 second countdown to throttle down)</p> <p>Advise: Confirm De-orbit Burn Complete</p>
33	Mission Dependent	<p><i>Position The Shuttle to The Correct Attitude – Prograde</i></p> <p><b>Key in 7 – Prograde (4)</b> C –[Use mouse to select <u>prograde</u> on Orbiter screen]</p>	<p>Announce: Confirm Shuttle in prograde attitude</p>
34	Mission Dependent	<p>RE-ENTRY SYS CHECK to ON (6) P - [space bar]</p> <p>HYD MAIN PUMP PRESSURE (1/2/3) to NORMAL (2)</p>	<p>Announce: Confirmation of Auto Dump RCS Propellant</p>
35	Mission Dependent	<p>FWD RCS He TANK ISOL (A/B) to CLOSE (3)</p> <p>FWD RCS He PRIMARY REGULATOR (A/B) to CLOSE (3)</p> <p>AFT RCS He TANK ISOL (A/B) to CLOSE (3)</p> <p>AFT RCS He PRIMARY REGULATOR (A/B) to CLOSE (3)</p> <p>DUMP ISOL VLV to CLOSE (1)</p>	<p>Announce: Pressure cycle complete</p>
36	Mission Dependent		<p>Advise: De-Orbit Procedure is Complete</p>

## *Landing Checklist*

Have the Mission Commander exit out of the Orbiter program using the **F4 key** and then select **[exit]**. When landing select “Atlantis Landing Preparation” to practice the actual approach to the Kennedy Space Center.

<b>Key board landing controls for Orbiter</b>	
<u>Trim control</u>	[Insert] down / [delete] up
<u>Speed Brake</u>	[CTRL] B
<p>The timing and use of the speed brake is at the discretion of the Mission Commander. It may be used any time during the landing approach and can be used repeatedly, if so requested by the Commander.</p>	
<u>Left and right wheel brake</u>	, (comma) and . (period) simultaneously

COM	Altitude	Procedure	Mission Control Notes
37	35 k	<i>Disengage RCS mode</i> <b>Key in D (4)</b> C –[Use mouse to select <u>RCS</u> on Orbiter in top left of screen]  LANDING SYS CHECK to ON (6) <b>P</b> - [space bar]  LANDING SYSTEM RADAR to ON (8) <b>E</b> - [space bar]	
38	28 k	<i>(Lift takes affect)</i>	Announce: Current altitude and speed
39	25 k	THERMAL CONDITION SYSTEM HYD / FUEL to AUTO (5)	Advise: Hydraulics / Brake Heater activated  Announce: Current altitude and speed every 5 km (change to 1 km beginning at 10 km in altitude)
40	3 k	LANDING GEAR to ARM (6)	Announce: Current altitude and speed of orbiter every 1 km

41	2.5 k	GEAR to DEPLOY (6) C - [G key in Orbiter]	Announce: Gear deployed
42	0.5 k (500 m)	SPEED BRAKE to DEPLOY (6)  The speed brake is required to help stop the shuttle after landing. Its use at this point may be delayed until touchdown by order of the Mission Commander.	
43	<b>Touchdown</b>	DROGUE CHUTE to DEPLOY (6)	Announce: Touchdown
44		<i>End of Mission</i>	