System Set-Up Checklist

(Classroom Simulator Training System)

COM	TIME	PROCEDURE	Mission Control Notes
0	**System Set-Up**	*Shuttle Launch Commands for the Left Terminal MFD (Mission Commander)* *Load before beginning Pre-Launch checklist.* 1. Press the **F1 (PF1)** key to switch the view from the external (default) view of the launchpad to the internal cockpit view. 2. Repeatedly press **[Ctrl] X** to zoom out the cockpit view to display the external tank and the tips of the Solid Rocket Boosters. 3. Confirm HUD is on and in Orbit Earth mode. **[Ctrl] H** will turn HUD on and the **H** key will cycle through the various HUD options. 4. Have the student hit **[SEL]** on the left MFD with the mouse and then select [**Terminal MFD**]. (You may have to hit **[SEL]** twice to get to this prompt) 5. Then select **[INP].** An "Input Script Command" dialog box will pop up. Type in ***run"atlantis/launch"*** and press **ENTER** 6. Select **[INP]** and then type in ***do_oms2=false*** and press **ENTER** 7. Select **[INP]** and then type in ***launch()*** 8. Press **ENTER** when you are *instructed to launch* the shuttle at T-minus 4 seconds. 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.	

0 cont.		Checklist Notes: **The number in parenthesis following a command represents the panel location of the switch.** **The following notations clarify who is responsible for specific actions or communication** **C – Mission Commander** **P – Pilot** **E – Flight Engineer** **Advise – must receive a confirmation** **Announce- No response expected, information only** **It is recommended that each team create their own custom launch scenario to assist in simplifying simulation practice set-up. Changes to include in your custom scenario should include:** ➢ **changing the view to the internal cockpit view** ➢ **Initializing the HSI MDF to display the KSC VOR and SLF ILS frequencies** ➢ **Turning off Orbiter Info items** **See the document *Saving an Orbiter Scenario* on the SAC website under Administrative Documentation.**	

Pre-Launch Checklist

COM	TIME	PROCEDURE	Mission Control Notes
1	T-00:05:00	**Launch HOLD** CABIN DOOR to LATCH **(6)** ENVIRONMENTAL SYSTEM O_2 SYS to OPEN **(5)** ENVIRONMENTAL SYSTEM N_2 SYS to OPEN **(5)** ENVIRONMENTAL SYSTEM H_2O LOOP to OPEN **(5)**	Advise: Go for Load OPS 1 and Execute
		Key in ITEM (4) **Select A (4)** **Key in DPS (4)** **Select 1 (OPS 1) (4)** **Key in EXEC (4)** BOILER CNTRL POWER (1/2/3) to ON **(5)** BOILER CNTRL HEATER (1/2/3) to ON **(5)** BOILER N_2 SUPPLY (1/2/3) to OPEN **(5)**	Announce: Confirm Water Spray Boiler On Advise: Check Boiler Temp
		C - Confirm that the (WSB CNTLR) BLR TEMP data display is less than **225 degrees F** (Located on Pilot PowerPoint SYSTEM SUMMARY 3 MFD)	Advise: Go for Load OPS 2 and Execute
		Key in DPS (4) **Select 2 (OPS 2) (4)** **Key in EXEC (4)**	Advise: Go for Cabin Leak Check
		C - Check CABIN PRESSURE gauge for possible depressurization (normal is 760 torr)	

1 cont.		PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to OPEN **(1)**	Advise: Go for Helium (He) Pressurization Announce: APU Pre-Start Check Is Underway
		APU FUEL TNK VLV (1/2/3) to CLOSE **(5)** APU SHUTDWN to ENABLE **(2)** HYD MAIN PUMP PRESSURE (1/2/3) to LOW **(1)** APU SPEED SELECT (1/2/3) to NORMAL **(1)** HYD CIRC PUMP (1/2/3) to GPC **(1)**	
		C - Confirm that the (WSB CNTRL) VENT TEMP data display is greater than **120 degrees F** (Located on Pilot PowerPoint SYSTEM SUMMARY 3 MFD)	Advise: Check Vent Temp
		APU MAIN POWER to ON **(2)** APU CNTRL POWER (1/2/3) to ON **(5)** APU MSTR VLV to OPEN **(2)** APU FUEL TNK VLV (1/2/3) to OPEN **(5)** APU /HYDRAULICS (1/2/3) to RUN **(1)**	
		HYD MAIN PUMP PRESSURE (1/2/3) to NORMAL **(1)** HYD CIRC PUMP (1/2/3) to OFF **(1)**	Announce: Nominal APU Start
		Confirm central HUD is on and in Orbit Earth Mode. • *If needed* **Select 0** (toggle until Orbit Earth HUD is visible) C - [In Orbiter [Ctrl] H will turn the HUD on and off, the H key will cycle through the various HUD options] **This should have been done before starting.** STAR TRACKER to ON **(2)**	

1 cont.		*C - Request **Go/ No Go** for launch*	Advise: Mission Control confirms all systems are nominal. You are **Go** for launch. **OR** Mission Control confirms some systems are Off-Nominal. You are **No Go** for launch until these systems are corrected.
		Initiate Launch Clock Restart when Go order received (6) P - [space bar]	Advise: Go for Main Propulsion System (MPS) initialization
		MAIN ENGINE POWER (LEFT/CENTER/RIGHT) to ENABLE **(3)**	Advise: Go for OMS Engines Initialization
		N2 CNTRL VLV LEFT (1/2) to ENABLE **(3)** N2 CNTRL VLV RIGHT (1/2) to ENABLE **(3)**	Announce: Stand by to Initiate radar at **exactly** T-4:00
2	T-00:04:00	PRIMARY SYSTEM RADAR to ON **(7)** E - [space bar]	
		RATE GYRO ASSEMBLY (RG1/ RG2-3/ RG4) to ON **(1)**	
		INTERNAL SHUTTLE SYSTEM PWR (BAT A / BAT B) to ON **(3)**	Annouce: Synchronization of Fuel Cells Underway
		INTERNAL SHUTTLE SYSTEM POWER - INT PWR TRANSFER to ON **(3)**	Announce: Confirming Shuttle Is On Internal Power

3	T-00:03:00	**Key in DPS (4)** **Select 3 (OPS 3) (4)** GLOBAL POSITIONING SYSTEM (GPS-1/GPS-2/GPS-3) to ON **(5)** C - Check that the (HYD) ACCUM PRES data display is greater than 2800 PSI. (Located on FE PowerPoint SYSTEM SUMMARY 1 MFD	Advise: Go for Load OPS 3 Announce: External Tank Cap is retracted Advise: Check Hydraulic (APU) Pressure
4	T-00:02:00	APU SHUTDWN to INHIBIT **(2)** *Verify* SRB JETTISON is GPC **(3)** *Verify* EXT TANK JETTISON is GPC **(3)**	Announce: Confirm APU Power Shutdown is inhibited Announce: External Tank Liquid Hydrogen vents are closed.
5	T-00:01:00	AC BUS SENSOR to MONITOR **(2)** INTERNAL SHUTTLE SYSTEM POWER - EXT PWR DISCONNECT to ON **(3)**	Announce: Confirm ground power disconnect complete. Advise: Mission Commander - You are Go for Executing OPS 3 **at T-4 seconds**
6	**T-00:00:04**	**Key in EXEC (4)** C - [ENTER] on keyboard for Orbiter program	
7	**T-00:00:00**		Initiate Mission Elapsed Time Clock Announce: Shuttle liftoff, the clock is running

Ascent Checklist

COM	MET	PROCEDURE	Mission Control Notes
8	T+00:00:20	Switch Left MFD back to Surface Mode **Key in 9 (4)** 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	*SRB Separation* FREON LOOP to OPEN **(5)** H_2O HX to OPEN **(5)** AIR HX to OPEN **(5)**	Announce: OMS assist burn start
12	T+00:03:00	C - Confirm that the (FREON LOOP) EVAP OUT T data display shows below 60 degrees (Located on FE PowerPoint SYSTEM SUMMARY 1 MFD)	Advise: Check Flash Evaporator Is Operational
13	T+00:04:20		Advise: Negative Return
14	T+00:05:00	C - Confirm the fuel cell gauges read 32 Volts and 61.5 Amps for each Fuel Cell INTERNAL SHUTTLE SYSTEM PWR (BAT A / BAT B) to STANDBY **(3)**	Advise: Confirm Status of Fuel Cells
15	T+00:08:00		Advise: Go for Engines Automatic Throttle Down In Preparation for Main Engine Cutoff (MECO)
16	T+00:08:55	*Main Engine Cutoff (MECO)*	Advise: Confirm Main Engine Shutdown and Engine Cutoff (MECO)

Orbit Insertion Checklist (Post MECO)

COM	MET	Procedure	Mission Control Notes
17	T+00:09:00	FWD RCS He TANK ISOL (A/B) to OPEN **(3)** AFT RCS LEFT He TANK ISOL (A/B) to OPEN **(3)** AFT RCS RIGHT He TANK ISOL (A/B) to OPEN **(3)**	Announce: Initialize External Tank Separation system
18	T+00:09:20	*Confirm* N_2 CNTRL VLV LEFT (1/2) are ENABLEd **(3)** *Confirm* N_2 CNTRL VLV RIGHT (1/2) are ENABLEd **(3)**	Announce: Standing by for Auto OMS1 Burn
19	T+00:09:30	FLT CNTRL PWR to INHIBIT **(2)** ENGINE DAP to AUTO **(2)**	
20	T+00:09:45	MAIN ENGINE POWER (LEFT/CENTER/RIGHT) to OFF **(3)**	
21	T+00:10:00	HYD MAIN PUMP PRESSURE (1/2/3) to LOW **(1)** APU SHUTDWN to ENABLE **(2)** APU / HYDRAULICS (1/2/3) to OFF **(1)** APU FUEL TNK VLV (1/2/3) to CLOSE **(5)** APU MSTR VLV to CLOSE **(2)** APU CNTRL POWER (1/2/3) to OFF **(5)** APU MAIN POWER to OFF **(2)** HYD CIRC PUMP (1/2/3) to GPC **(1)**	Announce: APU Shutdown complete

21 Cont.			Announce: Confirm External Tank Separation
22	T+00:10:30	DUMP ISOL VLV to OPEN **(2)** H_2 RECIRC VLV to OPEN **(1)** H_2 OUTBOARD VLV to OPEN **(1)** H_2 INBOARD VLV to OPEN **(1)** PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to GPC **(1)** O_2 VENT LINE to OPEN **(1)** O_2 OUTBOARD VLV to OPEN **(1)** O_2 INBOARD VLV to OPEN **(1)**	Announce: MPS Propellants Automatic Dump initiated.
23	T+00:11:00 approximate	C – *Advise Mission Control when OMS Burn Initiated* BOILER N_2 SUPPLY (1/2/3) to CLOSE **(5)** BOILER CNTRL HEATER (1/2/3) to OFF **(5)** BOILER CNTRL POWER (1/2/3) to OFF **(5)**	Advise: Confirm OMS Burn Initiated
24	T+00:12:00 approximate	H_2 INBOARD VLV to CLOSE **(1)** H_2 OUTBOARD VLV to CLOSE **(1)** H_2 RECIRC VLV to CLOSE **(1)** O_2 INBOARD VLV to CLOSE **(1)** O_2 OUTBOARD VLV to CLOSE **(1)** O_2 VENT LINE to CLOSE **(1)** DUMP ISOL VLV to CLOSE **(2)**	Announce: Auto MPS Propellant Dump Complete

25	T+00:14:00 approximate	AIR HX to GPC **(5)** H_2O HX to GPC **(5)** FREON LOOP to GPC **(5)**	
26	T+00:15:10 approximate	C – *Advise Mission Control when OMS Burn Complete* N_2 CNTRL VLV LEFT (1/2) to DISABLE **(3)** N_2 CNTRL VLV RIGHT (1/2) to DISABLE **(3)** AC BUS SENSOR to AUTO **(2)**	Advise: OMS Burn complete
27	Mission Dependent	Confirm central HUD is on and set to Orbit Earth mode. • If needed **Select 0** (toggle until Orbit Earth HUD is visible) C –[In Orbiter **[Ctrl] H** will turn the HUD on and off, the **H** key will cycle through the various HUD options] H_2 RECIRC VLV to GPC **(1)** H_2 OUTBOARD VLV to GPC **(1)** H_2 INBOARD VLV to GPC **(1)** O_2 VENT LINE to GPC **(1)** O_2 OUTBOARD VLV to GPC **(1)** O_2 INBOARD VLV to GPC **(1)** ENGINE DAP to MANUAL **(2)** FLT CNTRL POWER to ENABLE **(2)**	Announce: Liquid H_2 Fill & Drain Valves are set to Computer Control Announce: Liquid O_2 Fill & Drain Valves are set to Computer Control

27 cont.		RATE GYRO ASSEMBLY (RG1/ RG2-3/ RG4) to OFF **(1)** Orient the shuttle to a zero attitude while using the Kill Rotation command (**blue key 4**) to stabilize the maneuver. C - Kill rotation by clicking on Kill Rotation box at the bottom of the orbiter screen. ****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.**	Advise: Go for Initiating Manual Zero Attitude Correction Announce: Confirm Shuttle in zero attitude (manual prograde)
28	Mission Dependent	PAYLOAD BAY POWER to ON **(7)** PAYLOAD BAY DOOR to OPEN **(7)** E - [space bar] RADIATORS to DEPLOY **(7)** E - [space bar] Ku ANTENNA to DEPLOY **(7)** E - [space bar]	Advise: Go for payload bay door open program Announce: Confirm Payload Bay Doors are open Announce: Confirm Radiator Deployment Announce: Confirm KU Antenna Deployment Announce: Shuttle is correctly configured for the mission

De-Orbit Checklist

COM	MET	Procedure	Mission Control Notes
29	Mission Dependent	STAR TRACKER to OFF **(2)** 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 BAY 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
30	Mission Dependent	BOILER CNTRL POWER (1/2/3) to ON **(5)** BOILER CNTRL HEATER (1/2/3) to ON **(5)** BOILER N_2 SUPPLY (1/2/3) to OPEN **(5)**	
31	Mission Dependent	*Position The Shuttle to The Correct Attitude – Retrograde* **Key in 6** – Retrograde **(4)** C –[Use mouse to select retrograde on Orbiter screen]	Announce: Confirm Shuttle in retrograde attitude
32	Mission Dependent	DUMP ISOL VLV to OPEN **(2)** PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to OPEN **(1)**	Announce: Main Propulsion System Helium Release Initiated

33	Mission Dependent	APU MAIN POWER to ON **(2)** APU CNTRL POWER (1/2/3) to ON **(5)** APU MSTR VLV to OPEN **(2)** APU FUEL TNK VLV (1/2/3) to OPEN **(5)** APU SHUTDWN to INHIBIT **(2)** APU/HYDRAULICS (1/2/3) to RUN **(1)** HYD MAIN PUMP PRESSURE (1/2/3) to LOW **(1)** APU SPEED SELECT (1/2/3) to NORMAL **(1)** HYD CIRC PUMP (1/2/3) to OFF **(2)**	
34	Mission Dependent	PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to CLOSE **(1)** DUMP ISOL VLV to CLOSE **(2)**	Announce: Main Propulsion System Helium Release Completed
35	Mission Dependent	N_2 CNTRL VLV LEFT (1/2) to ENABLE **(3)** N_2 CNTRL VLV RIGHT (1/2) to ENABLE **(3)** Engine Throttle to Maximum C- [Ctrl +] Engine Throttle to OFF C- [Ctrl -]	Advise: Go for Performing De-orbit Burn (Burn time duration provide to Mission Control by Flight Director, usually 1-2 minutes. Give 10 second countdown to throttle up and burn clock start) (Give 10 second countdown to throttle down)

36	Mission Dependent	*Position The Shuttle to The Correct Attitude – Prograde* **Key in 7** – Prograde **(4)** C –[Use mouse to select prograde on Orbiter screen]	Announce: Confirm Shuttle in prograde attitude
37	Mission Dependent	RE-ENTRY SYS CHECK to ON **(6)** P - [space bar] HYD MAIN PUMP PRESSURE (1/2/3) to NORMAL **(1)**	
38	Mission Dependent	FWD RCS He TANK ISOL (A/B) to CLOSE **(3)** AFT RCS LEFT He TANK ISOL (A/B) to CLOSE **(3)** AFT RCS RIGHT He TANK ISOL (A/B) to CLOSE **(3)** AC BUS SENSOR to MONITOR **(2)**	Announce: Pressure cycle complete
39	Mission Dependent		Advise: De-Orbit Procedure is Complete Advise: Confirm De-orbit Burn Complete

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.

Key board landing controls for Orbiter

Trim control [Insert] down / [delete] up

Speed Brake [CTRL] B

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.

Left and right wheel brake , (comma) and . (period) simultaneously

COM	Altitude	Procedure	Mission Control Notes
40	**35 k**	*Disengage RCS mode* **Key in D (4)** P –[Use mouse to select RCS on Orbiter in top left of screen] LANDING SYS to ARM **(6)** LANDING SYS CHECK to ON **(6)** **P -** [space bar] LANDING SYSTEM RADAR to ON **(7)** **E -** [space bar]	
41	**28 k**	*(Lift takes affect)*	Announce: **Actual** altitude and speed (Mission Control should announce the current **actual** altitude and airspeed **from the Orbiter display** every 5k of altitude. When the Orbiter reaches 10k in altitude, the altitude and airspeed announcements should be at every 1k.)
42	**25 k**		Advise: Hydraulics / Brake Heater auto-activated Announce: **Actual** altitude and speed

42 Cont.		*P – Announce: Kennedy VOR is Acquired* (The Pilot will make this announcement **at the time** the VOR is picked up by the Orbiter program. Refer to the HSI indicators in the lower-left MFD.) *P – Announce: Runway 15/33 ILS is Acquired* (The Pilot will make this announcement **at the time** the ILS is picked up by the Orbiter program. Refer to the HSI indicators in the lower-left MFD. **Only** announce the actual runway being used.)	
43	**2.5 k**	GEAR to DEPLOY **(6)** P - [G key in Orbiter]	Announce: Gear deployed
44	**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.	Announce: Speed Brake Deployed (Mission Control announces "Speed Brake Deployed" only when the Mission Commander requests it.)
45	**Touchdown**	DROGUE CHUTE to DEPLOY **(6)**	Announce: Touchdown (Mission Control announces "Touchdown" when the Orbiter nose wheel lands on the runway.)
46			Announce: Wheels Stop (Mission Control announces "Wheels Stop" when the Orbiter forward velocity is zero.)
47		*End of Mission*	