

### *Pre-Launch Checklist*

COM	TIME	PROCEDURE	Mission Control Notes
1	T-00:05:00	<p><b><u>Launch HOLD</u></b></p> <p>CABIN DOOR to LATCH</p> <p>ENVIRONMENTAL SYSTEM O<sub>2</sub> SYS to OPEN</p> <p>ENVIRONMENTAL SYSTEM N<sub>2</sub> SYS to OPEN</p> <p>ENVIRONMENTAL SYSTEM H<sub>2</sub>O LOOP to OPEN</p> <p><b>Key in ITEM</b>  <b>Select A</b>  <b>Key in DPS</b>  <b>Select 1 (OPS 1)</b>  <b>Key in EXEC</b></p> <p>BOILER CNTRL POWER (1/2/3) to ON</p> <p>BOILER CNTRL HEATER (1/2/3) to ON</p> <p>BOILER N<sub>2</sub> SUPPLY (1/2/3) to OPEN</p> <p><b>Key in DPS</b>  <b>Select 2 (OPS 2)</b>  <b>Key in EXEC</b></p>	<p>Advise: Go for Load OPS 1 and Execute</p> <p>Announce: Confirm Water Spray Boiler On</p> <p>Advise: Check Boiler Temp</p> <p>Advise: Go for Load OPS 2 and Execute</p> <p>Advise: Go for Cabin Leak Check</p> <p>Announce: Go for Helium (He) Pressurization</p>

<p>1 cont.</p>		<p>PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to OPEN</p> <p>APU FUEL TNK VLV (1/2/3) to CLOSE</p> <p>APU SHUTDWN to ENABLE</p> <p>HYD MAIN PUMP PRESSURE (1/2/3) to LOW</p> <p>APU SPEED SELECT (1/2/3) to NORMAL</p> <p>HYD CIRC PUMP (1/2/3) to GPC</p> <p>APU MAIN POWER to ON</p> <p>APU CNTRL POWER (1/2/3) to ON</p> <p>APU MSTR VLV to OPEN</p> <p>APU FUEL TNK VLV (1/2/3) to OPEN</p> <p>APU/HYDRAULICS (1/2/3) to RUN</p> <p>HYD MAIN PUMP PRESSURE (1/2/3) to NORMAL</p> <p>HYD CIRC PUMP (1/2/3) to OFF</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>STAR TRACKER to ON</p> <p><i>C - <u>Request Go/No Go for launch</u></i></p>	<p>Announce: APU Pre-Start Check Is Underway</p> <p>Advise: Check Vent Temp</p> <p>Announce: Nominal APU Start</p> <p>Advise: Mission Control confirms all systems are nominal. You are <b>Go</b> for launch.</p>
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<p>1 cont.</p>		<p><b>Initiate Launch Clock Restart when <u>Go</u> order received</b></p> <p>MAIN ENGINE POWER (LEFT/CENTER/RIGHT) to ENABLE</p> <p>N<sub>2</sub> CNTRL VLV LEFT (1/2) to ENABLE</p> <p>N<sub>2</sub> CNTRL VLV RIGHT (1/2) to ENABLE</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 <b>exactly</b> T-4:00</p>
<p>2</p>	<p>T-00:04:00</p>	<p>PRIMARY SYSTEM RADAR to ON</p> <p>RATE GYRO ASSEMBLY (RG1/RG2-3/RG4) to ON</p> <p>INTERNAL SHUTTLE SYSTEM PWR (BAT A/ BAT B) to ON</p> <p>INTERNAL SHUTTLE SYSTEM POWER - INT PWR TRANSFER to ON</p>	<p>Announce: Synchronization of Fuel Cells Underway</p> <p>Announce: Confirming Shuttle Is On Internal Power</p>
<p>3</p>	<p>T-00:03:00</p>	<p><b>Key in DPS Select 3 (OPS 3)</b></p>	<p>Advise: Go for Load OPS 3</p> <p>Announce: External Tank Cap is retracted</p>

		GLOBAL POSITIONING SYSTEM (GPS-1/GPS-2/GPS-3) to ON	Advise: Check Hydraulic (APU) Pressure
4	T-00:02:00	APU SHUTDWN to INHIBIT  <i>Verify</i> SRB JETTISON is GPC  <i>Verify</i> EXT TANK JETTISON is GPC	Announce: Confirm APU Power Shutdown is inhibited  Announce: External Tank Liquid Hydrogen vents are closed.
5	T-00:01:00	AC BUS SENSOR to AUTO  INTERNAL SHUTTLE SYSTEM POWER - EXT PWR DISCONNECT to ON	Announce: Confirm ground power disconnect complete.  Advise: Mission Commander - You are Go for Executing OPS 3 <b>at T-4 seconds</b>
6	<b>T-00:00:04</b>	<b>Key in EXEC</b>	Advise: Go for Execute OPS 3
7	<b>T-00:00:00</b>		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 <b>Key in 9</b>	
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>  FREON LOOP to OPEN  H <sub>2</sub> O HX to OPEN  AIR HX to OPEN	Announce: OMS assist burn start
12	T+00:03:00		Advise: Check Flash Evaporator Is Operational
13	T+00:04:20		Advise: Negative Return
14	T+00:05:00	INTERNAL SHUTTLE SYSTEM PWR (BAT A / BAT B) to STANDBY	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	<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
17	T+00:09:00	FWD RCS He TANK ISOL (A/B) to OPEN  AFT RCS LEFT He TANK ISOL (A/B) to OPEN  AFT RCS RIGHT He TANK ISOL (A/B) to OPEN	Announce: Initialize External Tank Separation system
18	T+00:09:20	<i>Confirm</i> N <sub>2</sub> CNTRL VLV LEFT (1/2) are ENABLEd  <i>Confirm</i> N <sub>2</sub> CNTRL VLV RIGHT (1/2) are ENABLEd	Announce: Standing by for Auto OMS1 Burn
19	T+00:09:30	FLT CNTRL PWR to INHIBIT  ENGINE DAP to AUTO	
20	T+00:09:45	MAIN ENGINE POWER (LEFT/CENTER/RIGHT) to OFF	
21	T+00:10:00	HYD MAIN PUMP PRESSURE (1/2/3) to LOW  APU/HYDRAULICS (1/2/3) to OFF  APU SHUTDWN to ENABLE  APU FUEL TNK VLV (1/2/3) to CLOSE  APU MSTR VLV to CLOSE  APU CNTRL POWER (1/2/3) to OFF  APU MAIN POWER to OFF	

21 Cont.		HYD CIRC PUMP (1/2/3) to GPC	Announce: APU Shutdown complete  Announce: Confirm External Tank Separation
22	T+00:10:30	DUMP ISOL VLV to OPEN  H <sub>2</sub> RECIRC VLV to OPEN  H <sub>2</sub> OUTBOARD VLV to OPEN  H <sub>2</sub> INBOARD VLV to OPEN  PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to GPC  O <sub>2</sub> VENT LINE to OPEN  O <sub>2</sub> OUTBOARD VLV to OPEN  O <sub>2</sub> INBOARD VLV to OPEN	Announce: MPS Propellants Automatic Dump initiated.
23	T+00:11:00 <u>approximate</u>	<i>Advise Mission Control when OMS Burn Initiated</i>  BOILER N <sub>2</sub> SUPPLY (1/2/3) to CLOSE  BOILER CNTRL HEATER (1/2/3) to OFF  BOILER CNTRL POWER (1/2/3) to OFF	Advise: Confirm OMS Burn Initiated
24	T+00:12:00 <u>approximate</u>	H <sub>2</sub> RECIRC VLV to CLOSE  H <sub>2</sub> OUTBOARD VLV to CLOSE  H <sub>2</sub> INBOARD VLV to CLOSE  O <sub>2</sub> VENT LINE to CLOSE  O <sub>2</sub> OUTBOARD VLV to CLOSE	

24 Cont.		<p>O<sub>2</sub> INBOARD VLV to CLOSE</p> <p>DUMP ISOL VLV to CLOSE</p>	<p>Announce: Auto MPS Propellant Dump Complete</p>
25	<p>T+00:14:00 <u>approximate</u></p>	<p>AIR HX to GPC</p> <p>H<sub>2</sub>O HX to GPC</p> <p>FREON LOOP to GPC</p>	
26	<p>T+00:15:10 <u>approximate</u></p>	<p><i>Advise Mission Control when OMS Burn Complete</i></p> <p>N<sub>2</sub> CNTRL VLV LEFT (1/2) to DISABLE</p> <p>N<sub>2</sub> CNTRL VLV RIGHT (1/2) to DISABLE</p> <p>AC BUS SENSOR to MONITOR</p>	<p>Advise: OMS Burn complete</p>
27	<p>Mission Dependent</p>	<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>H<sub>2</sub> RECIRC VLV to GPC</p> <p>H<sub>2</sub> OUTBOARD VLV to GPC</p> <p>H<sub>2</sub> INBOARD VLV to GPC</p> <p>O<sub>2</sub> VENT LINE to GPC</p> <p>O<sub>2</sub> OUTBOARD VLV to GPC</p> <p>O<sub>2</sub> INBOARD VLV to GPC</p> <p>ENGINE DAP to MANUAL</p>	<p>Announce: Liquid H<sub>2</sub> Fill &amp; Drain Valves are set to Computer Control</p> <p>Announce: Liquid O<sub>2</sub> Fill &amp; Drain Valves are set to Computer Control</p>



<p>27 Cont.</p>		<p>FLT CNTRL POWER to ENABLE</p> <p>RATE GYRO ASSEMBLY (RG1/RG2-3/RG4) to OFF</p> <p>Orient the shuttle to a zero attitude while using the <u>Kill Rotation</u> command (<b>key 4</b>) to stabilize the maneuver.</p>	<p>Announce: Go for Initiating Manual Zero Attitude Correction</p> <p>Announce: Confirm Shuttle in zero attitude (manual prograde)</p>
<p>28</p>	<p>Mission Dependent</p>	<p>PAYLOAD BAY POWER to ON</p> <p>PAYLOAD BAY DOOR to OPEN</p> <p>RADIATORS to DEPLOY</p> <p>Ku ANTENNA to DEPLOY</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>

### *De-Orbit Checklist*

COM	MET	Procedure	Mission Control Notes
29	Mission Dependent	STAR TRACKER to OFF  Ku ANTENNA to STOW  RADIATORS to STOW  PAYLOAD BAY DOOR to CLOSE  PAYLOAD BAY POWER to OFF	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  BOILER CNTRL HEATER (1/2/3) to ON  BOILER N <sub>2</sub> SUPPLY (1/2/3) to OPEN	
31	Mission Dependent	<i>Position the Shuttle to The Correct Attitude – Retrograde</i>  <b>Key in 6 – Retrograde</b>	Announce: Confirm Shuttle in retrograde attitude
32	Mission Dependent	DUMP ISOL VLV to OPEN  PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to OPEN	Announce: Main Propulsion System Helium Release Initiated

33	Mission Dependent	<p>APU MAIN POWER to ON</p> <p>APU CNTRL POWER (1/2/3) to ON</p> <p>APU MSTR VLV to OPEN</p> <p>APU FUEL TNK VLV (1/2/3) to OPEN</p> <p>APU SHUTDWN to INHIBIT</p> <p>APU/HYDRAULICS (1/2/3) to RUN</p> <p>HYD MAIN PUMP PRESSURE (1/2/3) to LOW</p> <p>APU SPEED SELECT (1/2/3) to NORMAL</p> <p>HYD CIRC PUMP (1/2/3) to OFF</p>	
34	Mission Dependent	<p>PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to CLOSE</p> <p>DUMP ISOL VLV to CLOSE</p>	<p>Announce: Main Propulsion System Helium Release Completed</p>
35	Mission Dependent	<p>N<sub>2</sub> CNTRL VLV LEFT (1/2) to ENABLE</p> <p>N<sub>2</sub> CNTRL VLV RIGHT (1/2) to ENABLE</p> <p>Engine Throttle to Maximum</p> <p>Engine Throttle to OFF</p> <p>N<sub>2</sub> CNTRL VLV LEFT (1/2) to DISABLE</p> <p>N<sub>2</sub> CNTRL VLV RIGHT (1/2) to DISABLE</p>	<p>Advise: Go for Performing De-orbit Burn</p> <p>Advise: Confirm De-orbit Burn Complete</p>

36	Mission Dependent	<p><i>Position The Shuttle to The Correct Attitude – Prograde</i></p> <p><b>Key in 7</b> – Prograde</p>	<p>Announce: Confirm Shuttle in prograde attitude</p>
37	Mission Dependent	<p>RE-ENTRY SYS CHECK to ON</p> <p>HYD MAIN PUMP PRESSURE (1/2/3) to NORMAL</p>	
38	Mission Dependent	<p>FWD RCS He TANK ISOL (A/B) to CLOSE</p> <p>AFT RCS LEFT He TANK ISOL (A/B) to CLOSE</p> <p>AFT RCS RIGHT He TANK ISOL (A/B) to CLOSE</p>	<p>Announce: Pressure cycle complete</p>
39	Mission Dependent		<p>Advise: De-Orbit Procedure is Complete</p>

### *Landing Checklist*

COM	Altitude	Procedure	Mission Control Notes
40	35 k	<i>Disengage RCS mode</i> <b>Key in D</b>  LANDING SYS to ARM  LANDING SYS CHECK to ON  LANDING SYSTEM RADAR to ON	
41	28 k	<i>(Lift takes affect)</i>	Announce: Actual altitude and speed
42	25 k	           <i>P – <u>Announce: Kennedy VOR is Acquired</u></i>           <i>P – <u>Announce Runway 15/33 ILS is Acquired</u></i>	Advise: Hydraulics/Brake Heater auto-activated  Announce: Actual altitude and speed
43	2.5 k	GEAR to DEPLOY	Announce: Gear deployed
44	0.5 k (500 m)	SPEED BRAKE to DEPLOY	Announce: Speed Brake deployed
45	<b>Touchdown</b>	DROGUE CHUTE to DEPLOY	Announce: Touchdown
46			Announce: Wheels Stop
47		<i>End of Mission</i>	