

### *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> SYS2 to OPEN</p> <p>ENVIRONMENTAL SYSTEM N<sub>2</sub> SYS2 to OPEN</p> <p>ENVIRONMENTAL SYSTEM H<sub>2</sub>O LOOP to ON</p> <p><b>Key in ITM</b>  <b>Select A</b>  <b>Key in DPS</b>  <b>Select 1 (OPS 1)</b>  <b>Key in EXE</b></p> <p>BOILER CNTRL POWER (1/2/3) to ON</p> <p>BOILER CNTRL HTR (1/2/3) to ON</p> <p>BOILER N<sub>2</sub> SUPPLY (1/2/3) to ON</p> <p><b>Key in DPS</b>  <b>Select 2 (OPS 2)</b>  <b>Key in EXE</b></p> <p>He ISOLATION A (LEFT/CENTER/RIGHT) to OPEN</p> <p>He ISOLATION B (LEFT/CENTER/RIGHT) to OPEN</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>

<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 TK VLV 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 POWER to ON</p> <p>APU CNTRL POWER (1/2/3) to ON</p> <p>APU TK VLV to OPEN</p> <p>APU FUEL TNK VLV (1/2/3) to OPEN</p> <p>APU /HYDRAULICS (1/2/3) to START/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>Announce: Nominal APU Start</p> <p>Advise: Check Hydraulic (APU) Pressure</p> <p>Advise: Mission Control</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 ARM</p> <p>OMS ENGINE VLV (LEFT/RIGHT) to OPEN</p> <p>OMS ENGINE (LEFT/RIGHT) to ARM</p>	<p>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>
<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>Advise: Confirm Shuttle Is On Internal Power</p>

3	T-00:03:00	<p><b>Key in DPS</b> <b>Select 3 (OPS 3)</b></p> <p>GLOBAL POSITIONING SYSTEM (GPS-1/GPS-2/GPS-3) to ON</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</p> <p><i>Verify SRB JETTISON is GPC</i></p> <p><i>Verify EXT TANK JETTISON is GPC</i></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</p> <p>INTERNAL SHUTTLE SYSTEM POWER - EXT PWR DISCONNECT to ON</p>	<p>Announce: Confirm ground power disconnect complete.</p> <p>Advise: Mission Commander - You are Go for Executing OPS 3 at <b>T-4 seconds</b></p>
6	<b>T-00:00:04</b>	<p><b>Key in EXE</b></p>	<p>Advise: Go for Execute OPS 3</p>
7	<b>T-00:00:00</b>		<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</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>	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+00:08:00		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</p> <p>FWD RCS He PRIMARY REGULATOR (A/B) to OPEN</p> <p>AFT RCS He TANK ISOL (A/B) to OPEN</p> <p>AFT RCS He PRIMARY REGULATOR (A/B) to OPEN</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</p> <p><i>Confirm</i> OMS ENGINE (LEFT/RIGHT) are ARMed</p>	<p>Announce: Standing by for Auto OMS1 Burn</p>
18	T+00:09:30	<p>FLT CNTLR PWR to INHIBIT</p> <p>ENGINE DAP to AUTO</p>	<p>Announce: MPS Propellants Automatic Dump initiated.</p>
19	T+00:09:45	<p>MAIN ENGINE POWER (LEFT/CENTER/RIGHT) to OFF</p>	<p>Announce: Auto Propellant Dump Complete</p>
20	T+00:10:00	<p>He ISOLATION A (LEFT/CENTER/RIGHT) to GPC</p> <p>He ISOLATION B (LEFT/CENTER/RIGHT) to GPC</p> <p>PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to GPC</p> <p>H<sub>2</sub> SYSTEM LINE VENT to OPEN</p>	<p>Announce: Confirm External Tank Separation</p>

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

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>H<sub>2</sub> SYSTEM OUTBRD VLV to GPC</p> <p>H<sub>2</sub> SYSTEM INBRD VLV to GPC</p> <p>ENGINE DAP to MANUAL</p> <p>FLT CNTLR 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>blue key 4</b>) to stabilize the maneuver.</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>
25	Mission Dependent	<p>PAYLOAD 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
26	Mission Dependent	STAR TRACKER to OFF  Ku ANTENNA to STOW  RADIATORS to STOW  PAYLOAD BAY DOOR to CLOSE  PAYLOAD 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
27	Mission Dependent	BOILER CNTRL HTR (1/2/3) to ON  HYD CIRC PUMP (1/2/3) to OFF	
28	Mission Dependent	<i>Position the Shuttle to The Correct Attitude – Retrograde</i>  <b>Key in 6 – Retrograde</b>	Announce: Confirm Shuttle in retrograde attitude
29	Mission Dependent	He ISOLATION A (LEFT/CENTER/RIGHT) to OPEN  He ISOLATION B (LEFT/CENTER/RIGHT) to OPEN  PNEUMATIC He ISOL (LEFT/CENTER/RIGHT) to OPEN	Announce: Main Propulsion System Helium Release confirmation

30	Mission Dependent	<p>BOILER N<sub>2</sub> SUPPLY (1/2/3) to ON</p> <p>BOILER CNTRL POWER (1/2/3) to ON</p> <p>APU TK VLV to OPEN</p> <p>APU FUEL TNK VLV (1/2/3) to OPEN</p> <p>APU POWER to ON</p> <p>APU CNTRL POWER (1/2/3) to ON</p> <p>APU SHUTDWN to INHIBIT</p> <p>HYD MAIN PUMP PRESSURE (1/2/3) to LOW</p> <p>APU SPEED SELECT (1/2/3) to NORMAL</p> <p>APU / HYDRAULICS (1/2/3) to START/RUN</p> <p>DUMP ISOL VLV to OPEN</p>	
31	Mission Dependent	<p>OMS ENGINE VLV (LEFT/RIGHT) to OPEN</p> <p>OMS ENGINE (LEFT/RIGHT) to ARM</p> <p>Engine Throttle to Maximum</p>	Advise: Go for Perform De-orbit Burn
32	Mission Dependent	<p>Engine Throttle to OFF</p> <p>OMS ENGINE (LEFT/RIGHT) to OFF</p> <p>OMS ENGINE VLV (LEFT/RIGHT) to CLOSE</p>	Advise: Confirm De-orbit Burn Complete

33	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>
34	Mission Dependent	<p>RE-ENTRY SYS CHECK to ON</p> <p>HYD MAIN PUMP PRESSURE (1/2/3) to NORMAL</p>	<p>Announce: Confirmation of Auto Dump RCS Propellant</p>
35	Mission Dependent	<p>FWD RCS He TANK ISOL (A/B) to CLOSE</p> <p>FWD RCS He PRIMARY REGULATOR (A/B) to CLOSE</p> <p>AFT RCS He TANK ISOL (A/B) to CLOSE</p> <p>AFT RCS He PRIMARY REGULATOR (A/B) to CLOSE</p> <p>DUMP ISOL VLV to CLOSE</p>	<p>Announce: Pressure cycle complete</p>
36	Mission Dependent		<p>Advise: De-Orbit Procedure is Complete</p>

## *Landing Checklist*

COM	Altitude	Procedure	Mission Control Notes
37	35 k	<i>Disengage RCS mode</i> <b>Key in D</b>  LANDING SYS CHECK to ON  LANDING SYSTEM RADAR to ON	
38	28 k	<i>(Lift takes affect)</i>	Announce: Current altitude and speed
39	25 k	THERMAL CONDITION SYSTEM HYD / FUEL to AUTO	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	Announce: Current altitude and speed of orbiter every 1 km
41	2.5 k	GEAR to DEPLOY	Announce: Gear deployed
42	0.5 k (500 m)	SPEED BRAKE to DEPLOY  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	Touchdown	DROGUE CHUTE to DEPLOY	Announce: Touchdown
44		<i>End of Mission</i>	