

Valve/Stage	Power Fail State	Setup/Valve Check	Fuel Filling	LOX pre-fill inert	LOX filling & chill	Safety State (SS0)	Pressurized	Ignition	Oxidizer Start	Fuel Start	Firing	Purge	LOX blowdown	Fuel Drain	Automatic Shutdown
Hand Turn Vent Valves															
HV-1 (N2 bleed)	na	Cycle	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed
HV-2 (N2 bleed)	na	Cycle	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed
HV-3 (LOX bleed)	na	Cycle	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed
HV-5 (N2 main valve)	na	Cycle	Closed	Open	Open	Open	Open	Open	Open	Open	Open	Open	Open	Closed	Open
HV-7 (Manual LOX dump)	na	Cycle	Open	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
HV-8 (fuel fill)	na	Cycle	Open	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed
HV-9 (Fuel bleed)	na	Cycle	Open	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed
HV-10 (LOX bleed)	na	Cycle	Open	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed
Igniter Valves															
SOV-? (Igniter valve)	Closed	Cycle	Closed	Closed	Closed	Closed	Closed	Open	Open	Open	Closed	Closed	Closed	Closed	Closed
SOV-? (Igniter valve)	Closed	Cycle	Closed	Closed	Closed	Closed	Closed	Open	Open	Open	Closed	Closed	Closed	Closed	Closed
Sparker	Off	Test	Off	Off	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	Off
Solenoid Vent Valves															
SOV-4	Open	Cycle	Open	Closed	Closed	Open	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed
SOV-8	Open	Cycle	Open	Closed	Open	Open	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed
Solenoid Valves															
SOV-1 (Fuel Pressure)	Closed	Cycle	Closed	Closed	Closed	Closed	Open	Open	Open	Open	Open	Closed	Closed	Closed	Closed
SOV-2 (LOX Pressure)	Closed	Cycle	Closed	Open	Closed	Closed	Open	Open	Open	Open	Open	Closed	Open	Closed	Closed
SOV-3 (Purge N2)	Closed	Cycle	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Closed	Closed	Open
SOV-7 (LOX Fill)	Closed	Cycle	Closed	Closed	Open	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Main Valves															
SOV-6 (LOX Main)	Closed	Cycle	Closed	Open	Open	Closed	Closed	Closed	Open	Open	Open	Closed	Open	Closed	Closed
SOV-5 (Fuel Main)	Closed	Cycle	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Open	Open	Closed	Closed	Closed	Closed

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Valve\Stage			
Hand Turn Vent Valves			
HV-1 (N2 bleed)			
HV-2 (N2 bleed)			
HV-3 (LOX bleed)			
HV-5 (N2 main valve)			
HV-7 (Manual LOX dump)			
HV-8 (fuel fill)			
HV-9 (Fuel bleed)			
HV-10 (LOX bleed)			
Igniter Valves			
SOV-? (Igniter valve)			
SOV-? (Igniter valve)			
Sparker			
Solenoid Vent Valves			
SOV-4			
SOV-8			
Solenoid Valves			
SOV-1 (Fuel Pressure)			
SOV-2 (LOX Pressure)			
SOV-3 (Purge N2)			
SOV-7 (LOX Fill)			
Main Valves			
SOV-6 (LOX Main)			
SOV-5 (Fuel Main)			