## J-2 Engine Lineage

**J-2X: Adding a new member to the family**

<table>
<thead>
<tr>
<th>Year</th>
<th>J-2</th>
<th>J-2S</th>
<th>X-33</th>
<th>J-2X</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1960-1970</strong></td>
<td>J-2</td>
<td>J-2S</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1965-1971</strong></td>
<td>J-2S</td>
<td>J-2S</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1996-2001</strong></td>
<td>J-2S</td>
<td></td>
<td>X-33</td>
<td></td>
</tr>
<tr>
<td><strong>2006-</strong></td>
<td></td>
<td></td>
<td>J-2X</td>
<td></td>
</tr>
<tr>
<td><strong>Configuration</strong></td>
<td>J-2</td>
<td>J-2S</td>
<td>X-33</td>
<td>J-2X</td>
</tr>
<tr>
<td><strong>Thrust</strong></td>
<td>230 klb</td>
<td>265 klb</td>
<td>261 klb</td>
<td>294 klb</td>
</tr>
<tr>
<td><strong>Isp</strong></td>
<td>425 sec</td>
<td>436 sec</td>
<td>419 sec</td>
<td>448 sec</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>3,492 lb</td>
<td>3,800 lb</td>
<td>7,500 lb</td>
<td>5,450 lb</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>116 in</td>
<td>116 in</td>
<td>79 in</td>
<td>185 in</td>
</tr>
</tbody>
</table>

Pratt & Whitney Rocketdyne
J-2X: Apollo-era Derivative Engine
CEV Upper Stage and CaLV EDS Engine

Upper Stage (1 J-2X)
280 klb LOx/LH₂

Earth Departure Stage (1 J-2X)
450 klb LOx/LH₂

Core Stage (5 RS-68)
2.6 Mlb LOx/LH₂

Height: 309 ft
Gross Liftoff Mass: 2.0Mlb

Crew Launch Vehicle
Pratt & Whitney Rocketdyne

Height: 358 ft
Gross Liftoff Mass: 6.4Mlb

Cargo Launch Vehicle

Height: 364 ft
Gross Liftoff Mass: 6.5Mlb

Saturn V

S-IVB (1 J-2)
240 klb LOx/LH₂

S-IC (5 F-1)
3.9 Mlb LOx/RP

S-II (5 J-2)
1 Mlb LOx/LH₂

5 Segment RSRM

Crew
Lander

Gross Liftoff Mass: 6.4Mlb

Heights and masses for the different stages of the rocket are provided, along with a diagram showing the components and dimensions.
J-2X Basic Characteristics

- Cycle: GG
- Thrust, vac (klbs): 294
- Isp, vac (sec): 448
- Pc (psia): 1,337
- MR: 5.5
- AR: 92
- Weight (lbm), max: 5,450
- Secondary Mode MR: 4.5
- Secondary Mode PC: 82%
- Restart: Yes
- Operational Starts: 8
- Operational Seconds: 2,600
- Length (in), Max: 185
- Exit Dia. (in), Max: 120

Pratt & Whitney Rocketdyne
J-2X System Development Plan

**J-2X Engine DDT&E**

- Projected Launch Milestones
  - Engine Need Dates
  - Engine for MPTA
  - Engine for Orion 1

**Engine Need Dates**

- Engine for Orion 1

**Engine Build Completions**

- Engine for MPTA

**Level 5 Milestones**

- Level 4 Milestones
  - Ares 1-Y Mass Sim
  - E10006 (NE005)

**Projected Launch Milestones**

- Orion 1
  - Orion 2, 3, 4...

**SSC A-1**

**SSC A-2**

**SSC A-3**

**SL MPTA**

**Shaker Facility (boost phase sim)**

**Pratt & Whitney Rocketdyne**
J-2X & RS-68 Size Comparison

J-2X

RS-68

Pratt & Whitney Rocketdyne
J-2X Accomplishments

Powerpack 1A in A-1

Pratt & Whitney Rocketdyne

51 Element Injector
J-2X Program Summary

- DDT&E Contract definitized through 2012
- Working proposal for additional tests/hardware
- Increasing staff to CDR next summer
- Long lead hardware orders underway
- Building supplier base for long production run

58 Months until J-2X DCR