All Solid Motor
Launch Vehicle

MORTON THIOKOL, INC.
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Abstract: The objective of the briefing was to provide a concept of Morton Thiokol's new launch vehicle.
All Solid Motor Launch Vehicle

G. W. Broman
Director, Peacekeeper Program
Objectives

- To provide you with an understanding of our concept for a new launch vehicle

- To illicit your response to this new concept and obtain your help in defining the solution
Product Line Plan

- Use the Stage I Peacekeeper to develop a reliable low-cost solid motor launch vehicle system
  - 1980's technology
  - Production line in-operation

- Provide family of launch configurations
  - Modular approach
  - Minimize payload-in-orbit cost

- Achieve lower cost launch vehicle system
  - Use demonstrated "off-the-shelf" technology for balance of system

- Support early flight readiness
  - 24 months to 1st flight
Perception of Need

- Backlog of satellite launches due to non availability of compatible launch systems
  - Expendable launch vehicles
  - Nonexpendable launch vehicles
  - No priority available for commercial payloads
  - Many payloads with no identified launch systems
  - Requirement exits for reliable, lower cost launch system
Product Line Advantages

- Majority of vehicle from "ongoing" MTI production

- Offers a family of vehicles which can provide broad range of capability at minimum user cost including
  - Launch-On Warning (LOW)
  - Launch-On Demand (LOD)

- Concept requires minimal launch permanent crew

- Can commit to firm launch dates without threat of preemption

- "Listens to needs of the users"
Design Options

- All options based on use of Peacekeeper Stage 1

- New third stage motor use
  - Star 75 or
  - Shorter Peacekeeper Stage 1

- Combine motors to form "family" of launchers
### ASTRA Configurations

<table>
<thead>
<tr>
<th>Stage</th>
<th>0</th>
<th>Castor II (5)</th>
<th>PK (2)</th>
<th>PK (3)</th>
<th>PK (3)</th>
<th>PK (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>PK</td>
<td>PK</td>
<td>PK</td>
<td>PK</td>
<td>PK</td>
<td>PK</td>
</tr>
<tr>
<td>II</td>
<td>PK</td>
<td>PK</td>
<td>PK</td>
<td>PK</td>
<td>PK</td>
<td>PK</td>
</tr>
<tr>
<td>III</td>
<td>Star 75</td>
<td>Star 75</td>
<td>SPK</td>
<td>Star 75</td>
<td>SPK</td>
<td>SPK</td>
</tr>
<tr>
<td>Payload to LEO (lb) 100 nm</td>
<td>3,500</td>
<td>4,500</td>
<td>13,100</td>
<td>11,200</td>
<td>15,500</td>
<td>22,000</td>
</tr>
<tr>
<td>Payload to GTO (lb)</td>
<td>1,345</td>
<td>1,730</td>
<td>5,040</td>
<td>4,300</td>
<td>5,960</td>
<td>8,460</td>
</tr>
<tr>
<td>Spacecraft to GEO (lb)</td>
<td>0</td>
<td>637</td>
<td>2,435</td>
<td>2,137</td>
<td>2,975</td>
<td>2/1,786 or 1/3,814</td>
</tr>
</tbody>
</table>
ELV Concept Comparison

<table>
<thead>
<tr>
<th>Orbit</th>
<th>Delta&lt;sup&gt;(1)&lt;/sup&gt; McDonnell Douglas</th>
<th>Modified Delta&lt;sup&gt;(1)&lt;/sup&gt; McDonnell Douglas</th>
<th>Atlas Centaur General Dynamics</th>
<th>Titan 34D Martin Marietta</th>
<th>ASTRA Morton Thiokol</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEO (100 nmi)</td>
<td>7,910 - 8,455 1,450</td>
<td>8,780 - 11,110 2,850</td>
<td>12,300</td>
<td>32,900 4,200</td>
<td>15,500 2,975</td>
</tr>
<tr>
<td>GEO</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Vehicle Configuration

STAGE ZERO: 3 REOQ
(Peacekeeper first stage without aft skirt extension)

STAGE I (Peacekeeper first stage with modified nozzle and aft skirt extension)

STAGE II (Peacekeeper first stage with modified nozzle and aft skirt extension)

STAGE III (shorter Peacekeeper first stage with modified nozzle and aft skirt extension)
Customer Assessment

1. Are you in need of such a launch vehicle?

2. What do you need to better develop our joint understanding?