HYDRA-70 Application

U.S. ARMY
- APACHE
- KIOWA WARRIOR
- COMANCHE

U.S. NAVY
- COBRA
- CH-60 SEAHAWK

U.S. AIR FORCE
- F-16
- A-10

SYSTEM CHARACTERISTICS
- Area Suppression
- High Degree of Modularity
- Family of Warheads: HEPD, Flechette, MPSM, Smoke and Illumination
- Immune to Countermeasures (HYDRA-70)

USERS

UNITED STATES
- ARMY
- NAVY
- MARINES
- AIR FORCE

INTERNATIONAL
- EGYPT
- JORDAN
- KUWAIT
- SAUDI ARABIA
- SINGAPORE
- THAILAND
- TUNISIA
- UAE

<table>
<thead>
<tr>
<th>M151</th>
<th>M274 WTU 1/B</th>
<th>M229</th>
<th>M255A1</th>
<th>M261</th>
<th>M267</th>
<th>M157</th>
<th>M67</th>
<th>M264</th>
<th>M257</th>
<th>M278</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEPD</td>
<td>Flechette</td>
<td>MPSM</td>
<td>Smoke</td>
<td>Illumination</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
JAMS PO IM Warhead Explosive Selection

- Explosive Selections
- Test Conducted
  - Fragment Impact
  - Mini-Arena
- M151/ IM Explosive Comparison
Explosive Candidate Summary

<table>
<thead>
<tr>
<th>Explosive</th>
<th>Unit Cost $/lb</th>
<th>Selection based on</th>
<th>Gurney Constant</th>
<th>Nominal Fragment Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBXIH-137</td>
<td>10.73</td>
<td>RDX Based</td>
<td>8563 ft/s</td>
<td>4120 ft/s</td>
</tr>
<tr>
<td>PBXN-110</td>
<td>20.03</td>
<td>HMX Based</td>
<td>9121 ft/s</td>
<td>4710 ft/s</td>
</tr>
<tr>
<td>PBXN-109</td>
<td>9.42</td>
<td>Aluminized</td>
<td>7415 ft/s</td>
<td>3532 ft/s</td>
</tr>
<tr>
<td>PAX-21</td>
<td>9.13</td>
<td>IM use in M720 HE mortar</td>
<td>8104 ft/s</td>
<td>4618 ft/s</td>
</tr>
</tbody>
</table>

• Explosive Selection will be based on cost analysis, Fragment Impact (FI) and Mini-Arena Testing
Fragment Impact Results

<table>
<thead>
<tr>
<th>Reaction Type</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI</td>
<td>No Reaction</td>
</tr>
<tr>
<td>V</td>
<td>Burn</td>
</tr>
<tr>
<td>IV</td>
<td>Deflagration</td>
</tr>
<tr>
<td>III</td>
<td>Explosion</td>
</tr>
<tr>
<td>II</td>
<td>Partial Detonation</td>
</tr>
<tr>
<td>I</td>
<td>Detonation</td>
</tr>
</tbody>
</table>

- Start
  - 6800 ft/s
    - 8300 ft/s 137 Fail
      - 7500 ft/s Fail(PBXIH-137, PBXN-110 & PAX-21)
        - Proceed to Arena Test

8300 ft/s FI Witness Plate Photo/Results

- 7500 ft/s Fail(PBXIH-137, PBXN-110 & PAX-21)

- ~6800 ft/s
  - 6800 Pass (PBXN-109, PBXN-110 & PAX-21)
  - 6658 Fail (PAX-21)

- Proceed to Arena Test
**Mini-Arena Test Summary**

**Fragments**

<table>
<thead>
<tr>
<th>Explosive</th>
<th>PAX-21</th>
<th>PBXN-110</th>
<th>PBXIH-137</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number*</td>
<td>58</td>
<td>81</td>
<td>73</td>
</tr>
<tr>
<td>Total Mass* (grams)</td>
<td>116.67</td>
<td>121.05</td>
<td>114.11</td>
</tr>
<tr>
<td>Average Mass* (grams)</td>
<td>2.01</td>
<td>2.03</td>
<td>1.94</td>
</tr>
<tr>
<td>Initial Velocity (ft/s)</td>
<td>6120</td>
<td>6610</td>
<td>5990</td>
</tr>
</tbody>
</table>

* This ignores the fragments below 0.05-grams

**Spray Angle**

- 148-inch
- 95-degree
- 78-degree

**Total Mass Recovered**

**Initial Velocity (ft/s)**

- 1.94
- 2.03
- 2.01

**Average Mass (grams)**

- PAX-21: 114.1
- PBXN-110: 112.05
- PBXIH-137: 116.67

**Total Mass (grams)**

- PAX-21: 738
- PBXN-110: 158
- PBXIH-137: Number

**Explosive**

- PAX-21
- PBXN-110
- PBXIH-137
Fragment Comparison To Current M151 WH

![Fragment Count Graph]

**Mass Bins (Gr):**
- 0 - 1
- 1 - 2
- 2 - 5
- 5 - 8
- 8 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 35
- 35 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 125
- 125 - 150
- 150 - 200
- 200 - 250
- 250 - 350
- 350 - 500

**Count:**
- 1
- 10
- 100
- 1000
- 10000

**Legend:**
- PBXH-137
- PBXN-110
- PAX-21
- M151

**标注内容:**
- M423 or M433 Fuze
- Explosive
IM Warhead Explosive Selection Summary

- Fragment Impact was used as a discriminator to assess relative IM performance.
  - PBXN-110 and PBXIH-137
- Mini arena tests were conducted to validate fragment velocity.
  - All three explosives had improved distribution of fragment sizes
  - Velocity was highest in PBXN-110 and PAX-21
- Cost
  - PBXN-110 was highest