US Army’s Search for an Economical Device for Stun Hand Grenade Training

NDIA International & Joint Services Small Arms Symposium

18 May 2005

Fred Fitzsimmons
Camber Corp
Product Director
PM-Crew Served Weapons
ffitzs@pica.army.mil
ARMY’s R&D MANAGEMENT for SMALL ARMS AMMUNITION

BG James Moran

Program Executive Office Soldier

Project Manager Soldier Warrior
  - Product Manager Air Warrior
  - Product Manager Land Warrior
  - Product Manager Future Warrior

Project Manager Soldier Equipment
  - Product Manager Sensors and Lasers
  - Product Manager Clothing and Individual Equipment

Project Manager Soldier Weapons
  - Product Manager Crew Served Weapons
  - Product Manager Individual Weapons
In the beginning ....
There was the M84 Non Lethal Stun Grenade

Which was heavily
Leveraged against
Existing Law Enforcement Technology

Type Classified – Oct 1998
Released to Field – June 2002

Height = 5.25”
Dia = 1.73 “
Wt = 15 oz
Pyro Wt = 3.5 oz
Vent holes = 12
Dual Pull Pins
Delay = 1-2.3 sec
The M84 Stun Grenade (SG) is a single use item for deployment in Closed Rooms ...for

- HOSTAGE RESCUE
  TEMPORARILY DISORIENT KIDNAPPERS
  ...But NOT INJURE HOSTAGES

- ROOM CLEARING
  CONFUSE HOSTILES PRIOR TO ENTRY OF FRIENDLIES

Note: Ineffective outdoors
M84, Grenade, Stun Diversionary/Flash Bang, is a hand thrown one time use flash bang stun device primarily for Special Reaction Team (SRT) use in forced entry scenarios, hostage rescue and could be used for selected MOUT or crowd control operations. The device is designed to be thrown into a room (through an open door, a standard glass window or other opening) where it delivers a loud bang and bright flash sufficient to temporarily confuse, disorient and/or momentarily distract the occupants/threats through intense flash/bang. Flash Intensity: Over 1 Million Candle Power; Noise Level: 170~180dB at 5 feet; No permanent hearing damage

Shipped 3 ea per M19A1 Metal Ammunition Container; 4 Per Box

Ammunition, Illuminating UN: 0297 NSN: 1330-01-459-8141
DOD Hazard Class: 1.4G DODAC: 1330-GG09
M84 Stun Grenade Details

Major Components

- M240 FUZE / CARTRIDGE
- STEEL BODY
  - M42 Primer
  - FIRST FIRE MIX
  - DELAY MIX
  - SEPARATION CHG
- Flash – Bang Composition
- Sealed w/ Loctite

Assembled Grenade
....Then in Oct 2000 it was determined that an economical Trainer was required to complement the M84
ARMY STRATEGY

- PURSUE WITH THE M84 PRODUCER (UPCO) THE CONCEPT OF FIELDING THE TWO MAJOR COMPONENTS OF THE M84 SEPARATELY then:
  - (1) ASSEMBLING THEM AS GRENADES BY HAND IN THE FIELD*
  - (2) DISASSEMBLING SPENT GRENADES BY HAND
  - (3) DISCARDING SPENT CARTRIDGES
  - (4) Re-ASSEMBLE STEEL BODIES WITH NEW M240 CTGS (10X’s Min; DESIRED – 25X’s)

- ACHIEVE A 15 - 30 % COST SAVINGS VS THE M84 (REDUCED NEED FOR STEEL BODIES)
- REALIZE AN 80% REDUCTION IN TEST & EVALUATION COST (ONLY UNIQUE DIFFERENCES VS THE M84 REQUIRED EVALUATION)

* No sealant applied at Threaded Joint
UNIQUE FEATURES OF TRAINER

- FUZE/CTG & STEEL BODY SHIPPED TO FIELD IN THEIR OWN PACK (VS M84 WHICH IS SHIPPED AS AN ASSEMBLED HAND GRENADE)

- ASSEMBLED / DISASSEMBLED BY HAND IN THE FIELD

- BODY MUST BE RE-USEABLE & USES RECORDED

- COMPATIBLE WITH PROJECTED TRAINING SCENARIO’S

- PAINTED BLUE TO SIGNIFY TRAINER VS OLIVE DRAB OF M84
Figure 2-5a. Components of XM102 Reloadable Stun Practice Hand Grenade: Practice Stun Grenade Body and M240 Fuse Cartridge.

Figure 2-5b. screwing the M240 Fuse Cartridge onto Grenade Body.

Figure 2-5c. Remove numerical sticker in sequence after each use.
XM 102 PACKAGING

- 12 M240’s per M2A1 Metal Container
- 12 Bodies per Cardboard Container
## PERFORMANCE SPEC REQUIREMENTS

<table>
<thead>
<tr>
<th></th>
<th>M84 GRENADE</th>
<th>XM 102 GRENADE</th>
<th>Rqmt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin Pull</td>
<td>28.9 lbs avg</td>
<td>28.9 lbs avg</td>
<td>15 – 40 LBS</td>
</tr>
<tr>
<td>Weight</td>
<td>14.35 oz avg</td>
<td>14.35 oz avg</td>
<td>23 oz max</td>
</tr>
<tr>
<td>LENGTH</td>
<td>5.25 in avg</td>
<td>5.25 in avg</td>
<td>6 in max</td>
</tr>
<tr>
<td>DIAMETER</td>
<td>1.3 in avg</td>
<td>1.3 in avg</td>
<td>2 in max</td>
</tr>
<tr>
<td>DELAY</td>
<td>1- 2.3 SEC</td>
<td>1- 2.3 SEC</td>
<td>1-2.3 Sec</td>
</tr>
<tr>
<td>FLASH @ 5 FEET</td>
<td>4.5 M Cp avg</td>
<td>Same as M84</td>
<td>1M CP Min</td>
</tr>
<tr>
<td>BANG @ 5 FEET</td>
<td>175.15 DB avg</td>
<td>Same as M84</td>
<td>170 -180 DB</td>
</tr>
</tbody>
</table>
QUALIFICATION TEST RESULTS

PERFORMANCE PHASE

<table>
<thead>
<tr>
<th>Conditioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure Vib (SCV) @ Hot</td>
</tr>
<tr>
<td>Secure Vib (SCV) @ Cold</td>
</tr>
<tr>
<td>SCV (H) + Hot Soak + 7 ft Drop</td>
</tr>
<tr>
<td>SCV (H) + Cold Soak + 7 ft Drop</td>
</tr>
<tr>
<td>SCV (H) + Hot Soak + 7 ft Drop + Loose Cargo Vib (hot)</td>
</tr>
<tr>
<td>SCV (H) + Cold Soak + 7 ft Drop + Loose Cargo Vib (Cold )</td>
</tr>
<tr>
<td>SCV (H) + Hot Soak + 7 ft Drop + Loose Cargo Vib (hot) + 5ft Drop (H)</td>
</tr>
<tr>
<td>SCV (H) + Cold Soak + 7 ft Drop + Loose Cargo Vib (hot) + 5ft Drop (C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th># Tested</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>no failures</td>
</tr>
<tr>
<td>24</td>
<td>no failures</td>
</tr>
<tr>
<td>24</td>
<td>no failures</td>
</tr>
<tr>
<td>24</td>
<td>no failures</td>
</tr>
<tr>
<td>48</td>
<td>no failures</td>
</tr>
<tr>
<td>48</td>
<td>no failures</td>
</tr>
<tr>
<td>24</td>
<td>no failures</td>
</tr>
<tr>
<td>24</td>
<td>no failures</td>
</tr>
</tbody>
</table>

SAFETY PHASE

| 40 ft Drop @ Hot |
| 40 ft Drop @ Cold |
| Jolt |
| Loose Cargo (bare fuze) |
| 5 ft Drop Bare Fuze |

<table>
<thead>
<tr>
<th># Tested</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>no failures</td>
</tr>
<tr>
<td>48</td>
<td>no failures</td>
</tr>
<tr>
<td>12</td>
<td>no failures</td>
</tr>
<tr>
<td>12</td>
<td>no failures</td>
</tr>
<tr>
<td>12</td>
<td>1 dud</td>
</tr>
</tbody>
</table>

Total 369
Performance of Steel Body

- During Testing 369 XM 102 Grenades were fired but only 4 Bodies were used
  - 2 Bodies were fired 69 x’s
  - 1 Body was fired 115 x’s
  - 1 body was fired 118 x’s

- No structural damage was noted and no difficulty was experienced in assembly or disassembly

Note:
Results confirmed US Army ARDEC Math Model which predicted unlimited re-use (since internal stresses are well below body strength)
TEST SHOTS
ARMY TEAM CONCLUSION

Team Members
- US Army Military Police School – Proponent
- US Army Aberdeen Test Center – Tester
- US Army Development Test Command – Safety Certifier
- US Army & Evaluation Command – System Evaluator
- US Army Research Development & Eng Center – Developer
- US Army Research Lab – MANPRINT Assessor
- US Army Center for Health Promotion & Preventative Medicine

Concluded that:
- XM 102 satisfies all Safety, Performance and Operational Requirements stated in its Operational Requirements Document &
- Is ready to enter into Production & Deployment
TIMELINE

- Nov 95 - Requirements Doc (ORD) for M84 Stun Grenade Appv’d
- Dec 98 - M84 Type Classified
- Oct 2000 - Need for (XM 102) Reload able Trainer Established
- Oct 2001 – XM102 R&D (Soldier Enhancement) Pgm Initiated
- Nov 2002 M84 Released to Field *
- Aug 2004 XM 102 Production Qualification Test Conducted
- May 2005 XM 102 Type Classification Anticipated
- May 2006 XM 102 Material Release to Field Anticipated

* Conditionally... pending Fielding of a Trainer
ARMY MANAGEMENT ORGANIZATION for PRODUCTION of SMALL ARMS AMMUNITION
BOTTOM LINE

- THE ARMY’S SEARCH FOR AN ECONOMICAL TRAINING COMPANION FOR THE M84 SG HAS BEEN SUCCESSFULLY CONCLUDED

- CONCEPT of a RE-USABLE BODY HAS BEEN PROVEN

- PRODUCTION HARDWARE BUYS AND FIELD RELEASE IS ANTICIPATED IN FY 06

- ARMY MANAGEMENT WILL SHIFT FROM PEO-SOLDIER /PM-SW TO PEO – AMMUNITION /PM-CCS IMMEDIATELY UPON TYPE CLASSIFICATION APPROVAL