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Handheld Standoff Mine Detection System (HSTAMIDS) Operational Field Evaluation in Cambodia

Robert C. Doheny
Office of Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict (OASD/SOLIC)

Sean Burke, Roger Cresci, Peter Ngan, Chris Walk
U.S. Army RDECOM CERDEC NVESD
Humanitarian Demining R&D Program
OUTLINE

- System Overview
- Field Testing/ Deployment History
  - Cambodia Operational Field Evaluation (OFE)
    - Areas Of Operation
    - Operational Timeline
    - SOP’s
      - Process
      - Modifications
    - Environmental Challenges
    - Mines Encountered
    - Minefield Analysis
- Summary
• U.S. Army’s proven dual sensor, handheld mine detector:
  -- Combines electro magnetic induction sensor and ground penetrating radar (GPR)
  -- real-time data algorithms fuse data enabling discrimination between mines and clutter
  -- Metal detector is modified Minelab F1A4 with ground compensation

• Highly accurate metal vs. mine discrimination provides greater efficiency and clearance rates

• Currently deployed with the U.S. armed forces and Demining Organizations
INTRODUCE HSTAMIDS TO HD COMMUNITY

OBJECTIVES:

• Demonstrated performance of HSTAMIDS to demining organizations

• Train demining organizations’ deminers in proper use and operation of HSTAMIDS

• Assessed performance after limited experience and training

• Tested worldwide against a comprehensive global mine threat

THAI LAND – Nov’04
HALO Trust Cambodia,
Thailand Mine Action Center

NAMI BIA – Mar’05
HALO Trust Angola,
MgM, Angola

SOUTHWEST ASIA – Nov’05
HALO Trust
PROVIDE HSTAMIDS FOR OFE’s

- Establish worldwide training sites; Cambodia, Southwest Asia, Thailand
- Provide training to deminers
- Assist with development of SOP’s
- Conduct operational field evaluations in actual minefields
- Obtain data and feedback to further improve system

CAMBODIA
Mar 06 - Present
HALO Trust, Cambodia

SOUTHWEST ASIA
May 06 – Jul 06
HALO Trust

THAILAND
Aug 06 – Feb 07
Thailand Mine Action Center (TMAC)
<table>
<thead>
<tr>
<th>Country</th>
<th>Dates</th>
<th>Area Searched (m²)</th>
<th>Mine Calls</th>
<th>Clutter calls</th>
<th>Total Detections</th>
<th>Clutter Rejection (%)</th>
<th>Mines found</th>
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<td>Apr ’06 - Feb ’07</td>
<td>199,266</td>
<td>17,387</td>
<td>119,249</td>
<td>136,636</td>
<td>87.3%</td>
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<td>May ’06 - July ’06</td>
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<td>Aug ’06 - Feb ’07</td>
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<td>35,227</td>
<td>87.1%</td>
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Northwest Cambodia

KDEP THMA SOP TRAINING AREA

PREY CHAN
BOENG TRAKUON
INTIAL TRAINING

OU KAMBOT
CHONG SRAE
OU TAMENG

HALO Anlong Veaeng
HALO Thmar Pouk
Preah Vihear
Battambang
Pailin
Pursat
Northwest Cambodia: Case Studies

- HALO Anlong Veaeng
- HALO Thmar Pouk
- OU TAMENG
- PREY CHAN
The K5 mine belt is ≈700 kilometers long and 400-500 meters wide on the northwestern border of the country. It was built in the course of a year by 100,000 conscripts in the late 1970s on orders from the Vietnamese military in an attempt to keep the Khmer Rouge from infiltrating Cambodia from guerrilla camps in Thailand.

Cambodia was wracked by violence in the late ’70s and early ’80s, from civil wars to Vietnamese invasions. All sides used mines to defend villages and roads, but due to constant shifting allegiances, minefields were created throughout the country.

The K5 belt is well delineated, in contrast to other parts of the former war zone, where sporadic, overlapping and unmapped minefields resulted from the practice of laying mines year after year to protect defensive perimeters as combatants retreated to safe ground after the annual dry season.

Some of the most commonly found antipersonnel mines in Cambodia are PMN, PMN2, PMD-6, MN79, Type 69, MBV78A1, POMZ-2M, MD82B and Type 72A.

In 2004, 898 new landmine and UXO casualties were reported in Cambodia: 171 people were killed and 727 injured; 547 were men, 74 were women and 277 were children; 888 were civilians.

INITIAL TRAINING:

Initial Training, HALO Trust HQ, Siem Reap:
- Duration of 13 days (March 8 - 21, 2006)
- 11 HALO Deminers, 3 MAG Deminers
- Course geared towards Humanitarian Demining
SOP Training, Kdep Thmar, Cambodia

- Duration of 4 days (April 1 - 4, 2006)
- New SOP's developed to incorporate dual-sensor technology
- “Lateral sweep method” introduced for efficiency
- Evolved with OFE
Minefield Integration, Boeng Trakuon, Cambodia

- Minefield ops start: April 23, 2006
- HSTAMIDS used as primary sensor
- Data Collection key component
- SOP’s refined to improve efficiency
- Systems moved to various minefields for further evaluation
HSTAMI DS SOP’s

1. Detector check
2. Strimmer cut
3. Lane Preparation
4. HSTAMIDS Operation
5. Signal investigation
6. QA check
1. DETECTOR CHECK
2. STRIMMER CUT
3. LANE PREPARATION
4. HSTAMI DS OPERATION
5. SIGNAL INVESTIGATION
5. RAPID INVESTIGATION
6. QUALITY ASSURANCE
VARIOUS ENVIRONMENTS
### 11 Mine Types in 18 Different Minefields

- **Type 72A**
- **MN79 (M14 Copy)**
- **PMN**
- **PMD-6**
- **MBV78A1**
- **MBV78A2**
- **Type 69**
- **POMZ2M**
- **TM-46**
- **MD82B**

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<th>Mine Type</th>
<th>Percentage</th>
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<td><strong>MN79 (M14 Copy)</strong></td>
<td>10%</td>
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<tr>
<td><strong>PMN</strong></td>
<td>64%</td>
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<tr>
<td><strong>Type 72A</strong></td>
<td>17%</td>
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<tr>
<td><strong>CLUTTER REJECTION</strong></td>
<td>87%</td>
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**Total Mines:** 1578
EXTREME CONDITIONS & ENHANCED ABILITY
EXTREME CONDITIONS: PREY CHAN

• Average rate of 2 m²/day-manual excavation
• MD operator best clearance rate: 10 m²/day
• Many areas left for Mechanical Excavation

**HSTAMI DS**

• Encountered as many as 35 detections/m²
• 1 HSTAMI DS operator averaged 60 – 70 m²/day
• 1825 m² cleared in 4 weeks
• 94.5% clutter rejection rate
• Encountered over 11,000 signals
• Manual mean would take 600 deminer days
ENHANCED ABILITY: OU TAMENG

- Dense T72A minefields
- Difficult wet conditions
- Decaying Mines

**HSTAMI DS**

- Detected T72A @ 14cm
- Rechecked Ebinger 420H cleared area:
  - HSTAMI DS found 9 more T72A’s
    - One T72A @ 9cm with only GPR audio indication

*PMN found @ 25cm on side- GPR only*
DECAYING MINES: OU TAMENG
CONCLUSION

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<td>TOTALS</td>
<td></td>
<td>283,325</td>
<td>23,204</td>
<td>174,246</td>
<td>197,450</td>
<td>88.2%</td>
<td>1595</td>
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**BENEFITS:**
- Safety
- Efficiency
- Cost Savings

**FUTURE:**
- OFE with MAG Cambodia
- OFE with CMAC
- Continue to improve system & training
- Future OFE’s TBD
Robert C. Doheny
Office of Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict (OASD/SOLIC)

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