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

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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 HSTAMI DS TO HD COMMUNITY

OBJECTIVES:

• Demonstrated performance of HSTAMI DS to demining organizations
• Train demining organizations’ deminers in proper use and operation of HSTAMI DS
• Assessed performance after limited experience and training
• Tested worldwide against a comprehensive global mine threat

THAILAND - Nov’04
HALO Trust Cambodia, Thailand Mine Action Center

NAMIBIA - Mar’05
HALO Trust Angola, MgM, Angola

SOUTHWEST ASIA - Nov’05
HALO Trust
PROVIDE HSTAMI DS 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

THAI LAND
Aug 06 - Feb 07
Thailand Mine Action Center (TMAC)
<table>
<thead>
<tr>
<th>Country</th>
<th>Dates</th>
<th>Area Searched (m²)</th>
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<th>Clutter calls</th>
<th>Total Detections</th>
<th>Clutter Rejection (%)</th>
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<td>Apr ’06- Feb ’07</td>
<td>199,266</td>
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<td>119,249</td>
<td>136,636</td>
<td>87.3%</td>
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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.

Taken from landmine monitor report, Cambodia, 2005 [http://www.icbl.org/lm/2005/cambodia]
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
INITIAL MINEFIELD OPERATION

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
- MBV78A1
- MBV78A2
- Type 69
- PMN
- POMZ2M
- PMD-6
- TM-46
- MD82B
- MN79 (M14 COPY)
- T72A
- MN79 (M14 COPY): 10%
- TOTAL MINES: 1578
- PMN: 64%
- T72A: 17%
- MN79 (M14 COPY): 10%
- CLUTTER REJECTION: 87%
EXTREME CONDITIONS & ENHANCED ABILITY

PREY CHAN

OU TAMENG

Mine accident indication
Province capital

HALO Anlong Veaeng
Older Meanchey
HALO Thmar Pouk

Preah Vihear

[Map showing locations in Cambodia with marker indications and images of cleared land with sticks.]
**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><strong>TOTALS</strong></td>
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<td><strong>283,325</strong></td>
<td><strong>23,204</strong></td>
<td><strong>174,246</strong></td>
<td><strong>197,450</strong></td>
<td><strong>88.2%</strong></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
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