Improvements Based on Ground Penetrating Radar Field Evaluation in Angola

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Outline

- Objectives
- Mine Stalker System Description
- Mine Stalker System Operation
- Test Site Description
- Test Results
- Summary
Objectives

- Fulfill a request from 2006 HD Requirements Workshop to evaluate Mine Stalker against AT mines in Cambodia
- Determine the potential benefit of this system to demining organizations conducting on-road AT mine clearance
- Better understand systems performance in real-world operations and conditions
- Determine any limitations that need to be addressed
Mine Stalker System Description

- 2.4 meter wide ultra wideband ground penetrating radar
- Automatic detection with anomaly pre-screener algorithm and discrimination capability based on feature-based algorithm
- Auto-height for GPR sensor
Mine Stalker System Description

- Remotely operated system with remote start, E-stop, and closed loop control
- Antennas for DGPS, Remote Control, and Base Station Communication
- DGPS Receiver
- Marking System Containers
- Vehicle automatically stops when algorithms detect a target and physically marks the target location
Mine Stalker System Description

Encoded lights on all four sides

GPS, IMU, and Remote Control Electronics

Mine Stalker System Electronics and CPU
Mine Stalker System Operation

Easy to use Graphical User Interface
Mine Stalker System Operation

• Mine Stalker stops and transmits data back to base station during either a pre-screener algorithm alarm and/or discrimination algorithm alarm.
• During a discrimination algorithm alarm the operator has to **ACKNOWLEDGE** the mine on the GUI before the remote control operator can regain control of the vehicle.
Test Site: Kampong Chhnang, Cambodia
Test Site: Kampong Chhnang, Cambodia

- 100% funded by the Humanitarian Demining R&D Program
- 7 test lanes / 6 soil types
- Calibration area and blind area
- Vegetation, potholes, and uneven terrain
- 2 types of metallic anti-tank mines found in Cambodia
- Lanes contain live mines that are rendered safe
- AT mines buried at various depths
- Lanes populated Jan 07
Test Site: Kampong Chhnang, Cambodia

LOAM

SANDY CLAY LOAM

SAND

YELLOW / BROWN LATERITE
Test Site: Kampong Chhnang, Cambodia
Test Site: Kampong Chhnang, Cambodia
Red Laterite
Test Site: Kampong Chhnang, Cambodia
Test Site: Kampong Chhnang, Cambodia
Test Results

- 3 week evaluation during February 2008
- Over 15,630 m² of area covered
- 112 total mine encounters
- 100% Probability of Detection of mines buried down to 20 cm
- False Alarm Rate: .007 - .2
Test Results

M-AT @ 20 cm

M-AT @ 12 cm

M-AT @ 20 cm

M-AT @ 8 cm
Proven Ruggedness

- Punctured hole in antenna
- Hit tree
Limitations

• Auto Height Control
• Terrain
Summary

• The Mine Stalker performed exceptionally well in the blind test
• The system proved rugged enough for vegetation and rough terrain
• The system operated very reliably during the 3 week evaluation
• Demonstrated acceptable false alarm rate in challenging environments
• The auto height control needs improvement