Special Weapons Observation Remote reconnaissance Direct action System (SWORDS)

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Outline

- SWORDS Origin
- SWORDS Description
- Operational Scenarios
- Test Requirements & Results
- User Assessment
- Safety Modifications
- Conclusion
The Future is Now

- The GWOT has accelerated the introduction of thousands of new technologies onto the battlefield.

- Small, medium, and large ground and air robots have become common place tools.

- The arming of ground robots is now taking place...
Under partnerships with TACOM-ARDEC and TACOM-TARDEC, Foster-Miller integrated Precision Remote’s TRAP system onto the Talon 3B chassis, making the first Special Weapons Observation Remote reconnaissance Direct action System (SWORDS).
SWORDS Components

- **TALON IIIB**
  - 7 ft/sec (~5mph)
  - Talon 33.5 l x 22.5 w x 11 h
  - 36 VDC Power System
  - 75 lbs w/o payload
  - ~ 500 TALON’s in Iraq and Afghanistan
  - TALON IV (MTRS) in combat today

- **TRAP Payload Mount with Cameras**
  - +/- 30° Azimuth, +30°/-15° Elevation
  - 23 – 33 lbs
  - Can hold multiple weapon systems.
  - 7.62x51 - 6 Lbs per 100 rounds
Gunner in the Loop

- **SWORDS Gunner utilizes modified TALON OCU for target engagement.**

- The OCU has added fire control features to ensure positively safe weapon operations.

- The Gunner uses the night vision cameras and IR lights for driving and firing during limited visibility operations.
Lightweight Fighter

• SWORDS utilizes the small unit’s weapons, allowing integration of the M249 or M240B Machine Guns.

• Currently, the SWORDS utilizes the existing weapon belted ammunition and can quickly be rearmed by all friendly units.

• The SWORDS can be lifted by two men and easily carried in the back of HMMWVs and even on the back of ATVs.
• SWORDS permits the gunner to fire in either the automatic mode or the single shot mode.

• The robot platform provides a very steady rest for mounted weapons, thus allowing very accurate fire.

• SWORDS’ low profile and dash speed make it a potent weapon for protecting our ground forces while surgically attacking the enemy.
Operational Scenarios

SWORDS acts as a force multiplier for the small unit, allowing the remote positioning of a weapon system that can:

- Provide overwatch
- Conduct recon
- Provide security
- Engage hostile forces

While reducing the exposure of ground forces.
**Scenario Description:**

- Primary Role is early detection/ warning of enemy activity
- Has ability to engage enemy targets if necessary (M249/M240 MG)
- Deployed forward of friendly perimeter
- Monitors portion of the perimeter
- Performs a roving patrol every few hours
- Mission length is 2-8 hours
- Operator w/ OCU will be located several hundred meters from the robot LP/OP position
- Max range of robot from operator 200-800M
- Operator will normally have line of sight view of robot
**Scenario Description:**

- **Primary Role is early detection/ warning of enemy activity**
- **Supports dismounted R&S operations**
- **Can engage enemy targets if necessary (M249/M240 MG)**
- **Operator and OCU are located within several hundred meters of robot**
- **Operator maintains line of sight with robot through alley ways/roads**
- **Expected mission duration is 2-4 hours**
SWORDS In Action
Search & Seizure

Scenario Description:

- Primary Role is room clearing/early warning during cordon & seizure type operations
- Robot can destroy hostile personnel
- Operator and OCU are located within several hundred meters of the robot
- Robot only has capability to search ground level floors
- Expected mission duration is 2-4 hours
Operational Needs Statement (ONS) System Characteristics

- SWORDS weapon system options include:
  - M249, M240, M107, M203, 12 gauge shotgun, AT-4, and SMAW
    - SWORDS Spiral 1 will mount the M249
    - Follow-on safety testing will include the M240
- SWORDS is operated by a single Soldier with remote computer unit from up to 1,000 meters
  - SWORDS Spiral 1 will operate up to 400-800 meters LOS; 100-200 meters NLOS
  - SWORDS Spiral 1 will carry 5.56/7.62mm ammunition, weigh approximately 200 pounds, battery life of 2-4 hours, and max speed of 2-5 MPH

Operational Concept

- SWORDS Spiral 1 will be used to find, fix, and finish the enemy
ATC Test Requirements & Results

Urgent Materiel Release (UMR) Test Requirements & Results

- **Environmental**
  - Cold (+20F) – Passed
  - Hot (+150F/160F Solar) – Passed
  - Rain (Driving issues at the start) (Lens shields improved driving)
  - Fording (6”) - Passed
  - Sand/Dust – Passed (Minor dust intrusion in TRAP wiring)
  - Vibration – Passed accelerated profile (400 hours total)
  - Drop – Passed 3Ft drop with only minor damage

- **EMI**
  - Several susceptibility issues with video screen loss and RF interference
  - No Safety issues at ATC or YTC tests

- **Reliability/Maintainability/Supportability**
  - Reliability 300 hrs required
    - #3 584 hours
    - #4 527 hours
  - TM verification
    - Conducted during the OA. Changes will be incorporated prior to UMR approval.
  - Battery performance
    - Met spec requirements

- **Command & Control**
  - Determine maximum LOS and NLOS
    - Exceeded spec requirement
ATC Test Requirements & Results

- **Weapon Performance**
  - Operator issues with boresighting, target acquisition and tracking
    - Follow-on training corrected the deficiencies
- **Accuracy**
  - Lack of target range information to the operator was a limitation
    - Future upgrade will integrate a laser rangefinder
- **Software Safety**
  - System and unit level testing successful
- **Longitudinal & Side Slopes**
  - Successful up to 40% Longitudinal and 20% Side Slope
- **Steering and Handling**
  - Met spec requirement
- **Acceleration**
  - Met spec requirement
- **Obstacles**
  - Met most spec requirements
An Operational Assessment (OA) was conducted by Soldiers and included:

- Live Fire
- MOUT (day and night)
- Perimeter Defense
- Cordon & Search
- Reconnaissance
- Checkpoint
- SWORDS engagement with an OPFOR (MILES)

System performance was measured throughout the OA. Results will be published in the ATEC Capabilities and Limitation (C&L) Report.
Safety Modifications

ARDEC requested the following changes in the area of safety:

- Fire-on-the-move disabled
  - SWORDS has a non-stabilized weapon mount
- Firing Command modified
  - Operator aware of degraded communications
  - Proper sequence must be followed to ARM and Fire weapon
- Kill Switch incorporated
  - Operator control to power down the platform at ranges beyond tactical capability
Conclusion

Weaponized unmanned ground vehicles will soon multiply the reach of the Soldier while minimizing the Soldier’s exposure to hostile fire.

Combat units will begin receiving SWORDS this summer.

SWORDS will be profiled on The Discovery Channel episode “Future Weapons” on 17 May 2006.