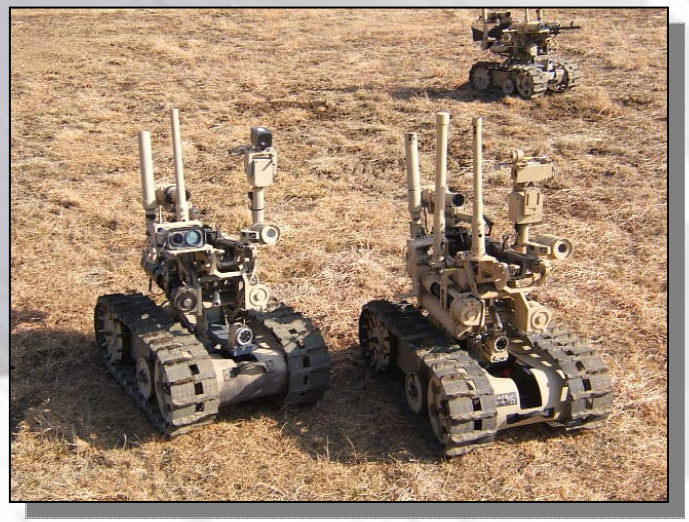
# SWORDS

## Special Weapons Observation Remote reconnaissance Direct action System (SWORDS)



## NDIA Joint Services Small Arms Systems Annual Symposium
## 16-18 May 2006
## SWORDS Live Fire Demo on 18 May 2006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# Outline

- SWORDS Origin
- SWORDS Description
- Operational Scenarios
- Test Requirements & Results
- User Assessment
- Safety Modifications
- Conclusion




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# 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…

# The Origin of SWORDS


**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)**



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# 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°/-15º 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.

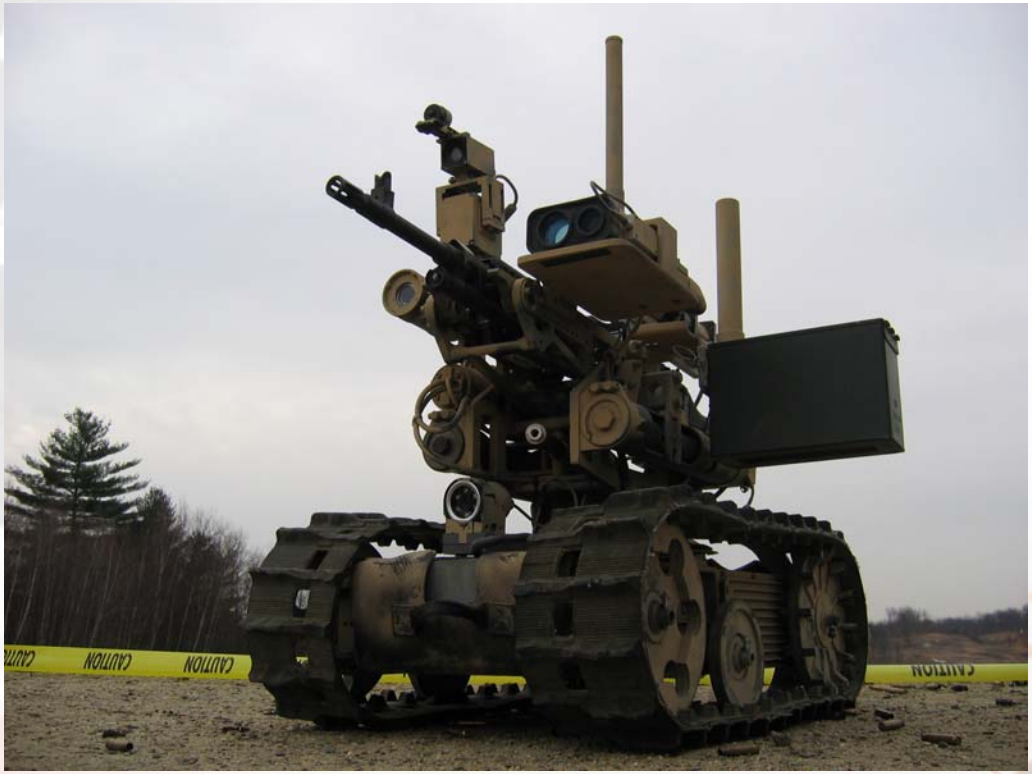
- The Gunner uses the night vision cameras and IR lights for driving and firing during limited visibility operations.

# 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.



# Firepower

- 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.**

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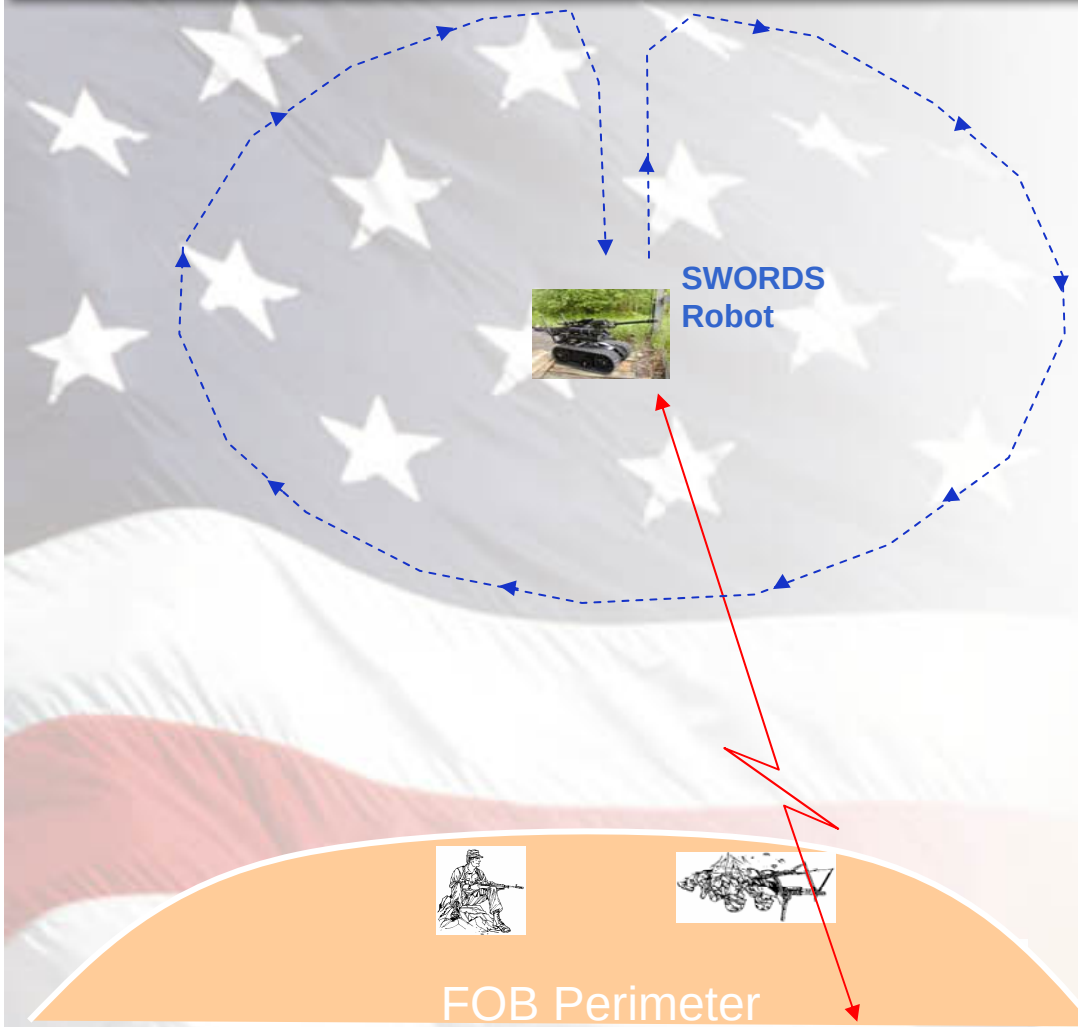
# Perimeter Security




## 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

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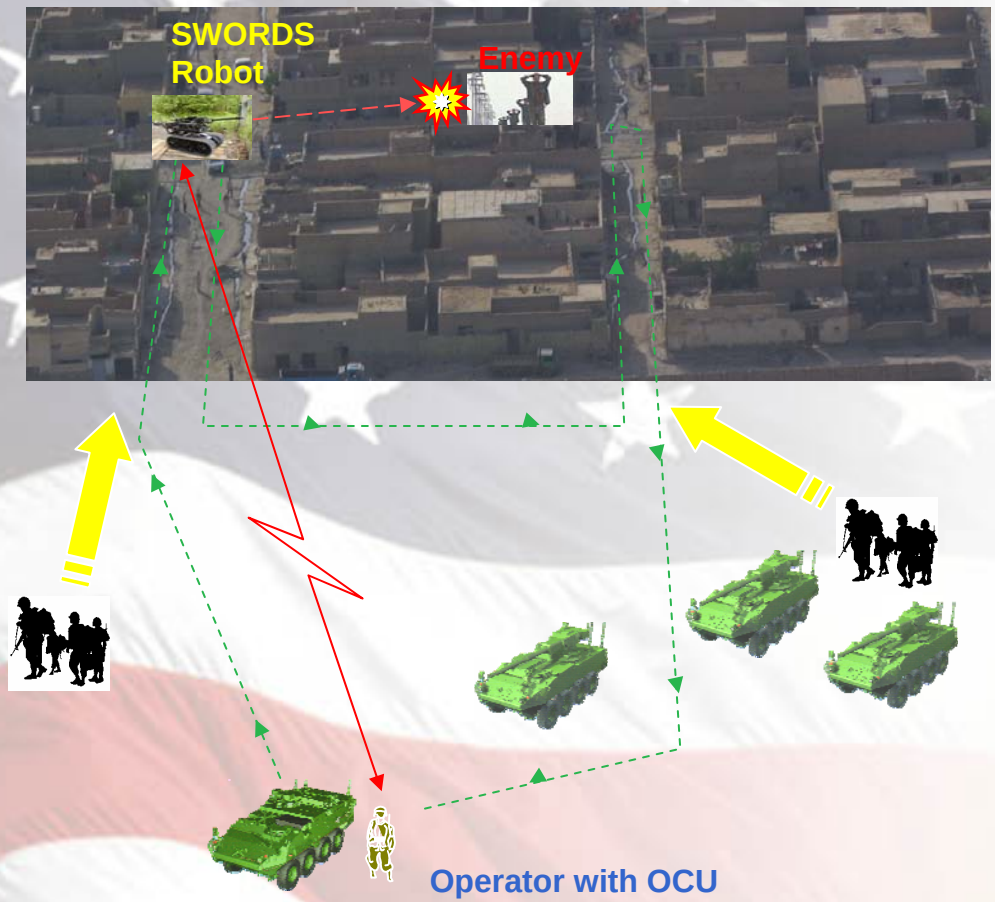
# Reconnaissance & Surveillance




## 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

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# Search & Seizure

Operator with OCU (mounted or dismounted)

## 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

# SWORDS ONS Requirements

## 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

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# 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

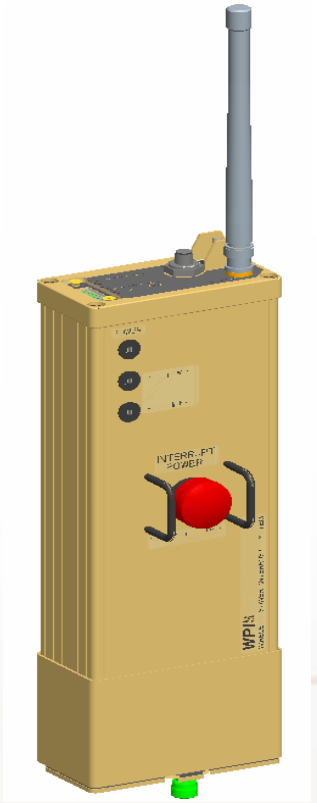
# User Assessment

- 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**



# Test Video

# 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**

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