LAND ARMAMENT GENERAL DIRECTORATE

ACTIVE, SHORT & VERY SHORT RANGE, ANTIMISSILE DEFENCE SYSTEM

SCUDO

AGENDA

- OPERATIONAL REQUIREMENTS
- THREATS & SCENARIOS
- VEHICLE DEFENSE STRATEGY
- SYSTEM COMPOSITION & CHARACTERISTICS
- SUB-SYSTEMS DESCRIPTION
- COMPARISON WITH SIMILAR SYSTEMS
- INSTALLATION & DESIGN REQUIREMENTS
- PROGRAM STATUS

OPERATIONAL REQUIREMENTS

- ACTIVE DEFENSE OF ARMORED AND LIGHT ARMORED VEHICLES AGAINST ANTI TANK WEAPON LIKE GUIDED MISSILE (ATGM) ROCKET PROPELLED GRANADES (RPG) AND HEAT PROJECTILES
- VERY SHORT ENGAGEMENT RANGE AND QUICK REACTION TIME
- FULL AUTOMATIC THREAT DETECTION EVALUATION AND REACTION
- SAFETY OPERATION
- EASY INSTALLATION AS ADD ON INSTALLATION KIT

SCENARIOS

- URBAN AREA
  - CHECK POINT
  - CLEANING UP OPERATION
  - PATROL

- CONVOY DEFENCE
  - AMBUSH PROTECTION
  - HELICOPTER ATTACK

- OFF ROAD SCOUTING

THREAT (1)

PRIMARY

- ATGM MISSILE
  - LASER GUIDED (SNIPER, ATG16, ..., HELLFIRE,....)
  - WIRE GUIDED (TOW TYPE,..., AT4,AT5,...)
  - FIRE & FORGET (JAVELLIN TYPE,..)




THREAT (2)

- RPGM
  - RPG2,RPG7,RPG18
  - PF89

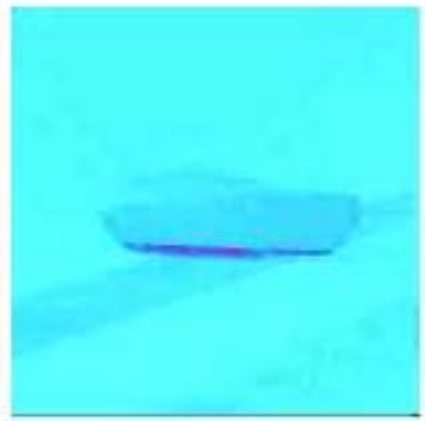
SECONDARY

- HEAT PROJECTILE

VEHICLE DEFENSE STRATEGY (1)

PASSIVE PROTECTION

- SIGNATURE REDUCTION (IR,VISIBLE, EM)



- EARLY WARNING
- PASSIVE DEFENSE SYSTEM
  - ECM
  - IR / SMOKE/CHAFF GENERATION
  - PASSIVE ARMOR

VEHICLE DEFENSE STRATEGY (2)

ACTIVE PROTECTION

- ACTIVE ARMOR
  - ➢ REDUCE THREAT WARHEAD TERMINAL EFFECTIVENESS
- ACTIVE PROTECTION SYSTEM
  - ➢ REDUCE THREAT HIT/KILL PROBABILITY BY INTERCEPTING THREAT BEFORE IMPACT

VEHICLE DEFENCE STRATEGY (3)

ACTIVE PROTECTION SYSTEM

ITALIAN MOD AND OTO MELARA STARTED IN 2002 THE STUDY OF A NEW ACTIVE PROTECTION SYSTEM CALLED "SCUDO" TO BE INSTALLED ON ITALIAN ARMY VEHICLES

PHASED PROGRAM:

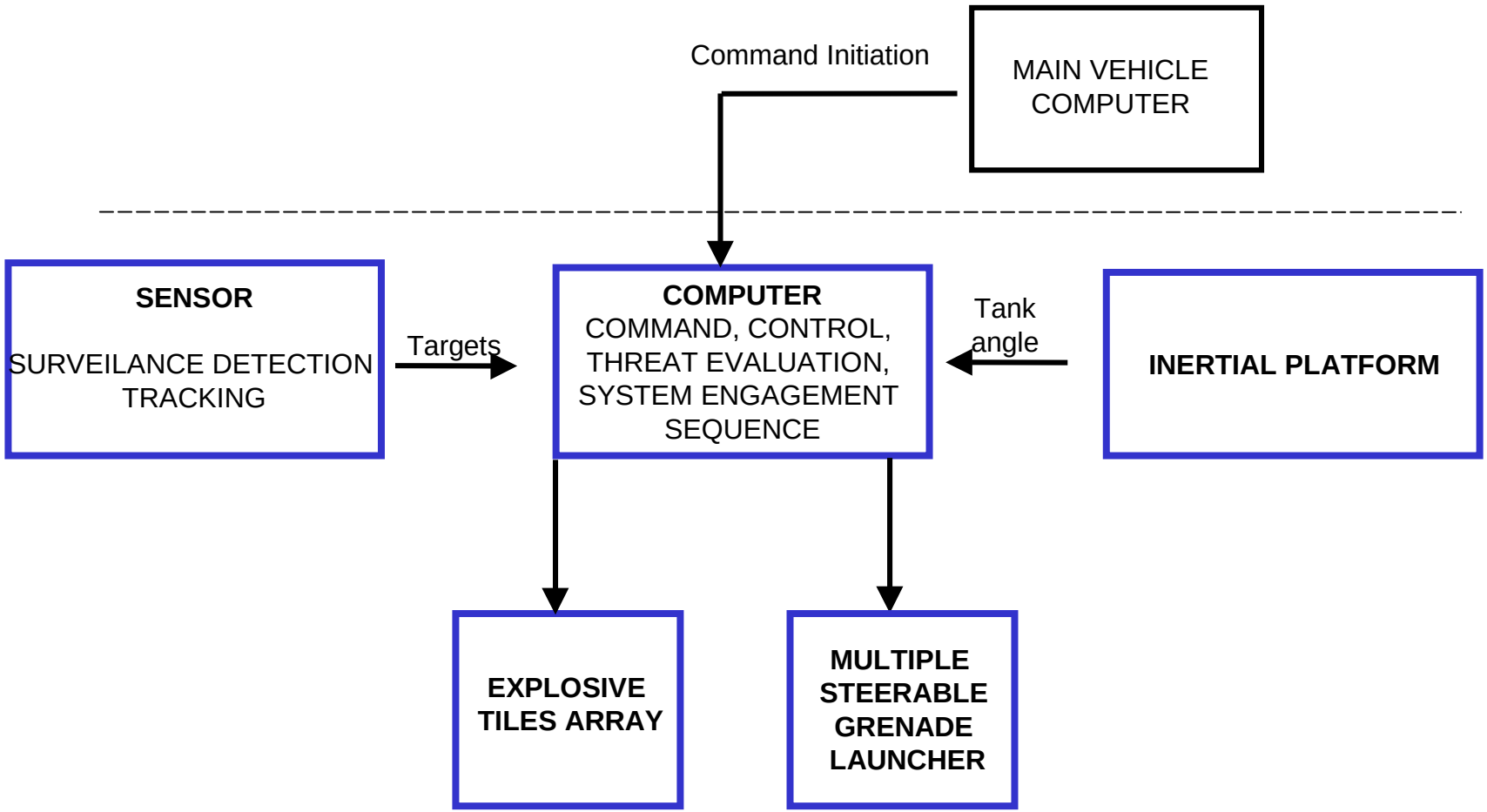
- **DEMONSTRATOR OF SEARCH AND DETECTOR SENSORS (CONTRACT AWARDED IN 2002)**
- **DEMONSTRATOR OF AMMUNITION AND ACTIVE REACTION MECHANISMS (CONTRACT AWARDED IN 2003)**
- **INTEGRATION OF THE SYSTEM (CONTRACT NOT IN PLACE).**

THE FIRST TWO PHASES OF THE PROGRAM WILL BE COMPLETED IN 2006 WITH FIELD LIVE TEST TO DEMONSTRATE THE REACTION CAPABILITY OF THE SYSTEM AND THE OVERALL EFFECT

SYSTEM COMPOSITION

- SURVEILLANCE, DETECTION AND TRACKING SENSORS
  - X BAND DUAL FREQUENCY CW RADAR
- COMMAND, CONTROL AND THREAT EVALUATION SYSTEM
  - REALTIME MULTIFUNCTIONAL AND SYSTEM CONTROL COMPUTER
- FIRST LAYER DEFENSE SYSTEM
  - MULTIPLE STEERABLE GRENADE LAUNCHER SYSTEM
- SECOND LAYER DEFENSE SYSTEM
  - ARRAY OF EXPLOSIVE TILES

FUNCTIONAL DIAGRAM



SYSTEM MAIN CHARACTERISTICS

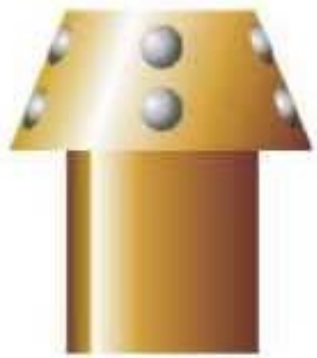
Threat type	Anti Tank missiles, rockets, grenades, HEAT projectiles
Threat velocity	100 - 500 m/s (primary threat) 500 – 1200 m/s (secondary threat)
Angle coverage	360 ° in azimuth >30° in elevation (45° desirable)
Kill probability	>90 %
False alarm probability	Overall $< 10^{-5}$
Operational security system	System inhibition Blind sectors selection
Operational scenario	Country, town and road
Environmental condition	All weather

SUB SYSTEM DESCRIPTION

X BAND DUAL FREQUENCY CW RADAR

SURVEILLANCE, DETECTION, TARGET TRACKING

Range	More than 500 m (1000 m desirable) against Anti Tank Missiles, Rockets and Grenades
Angle Coverage	360° in azimuth > 45° in elevation
False Alarm Probability	Over all < 10^{-5}

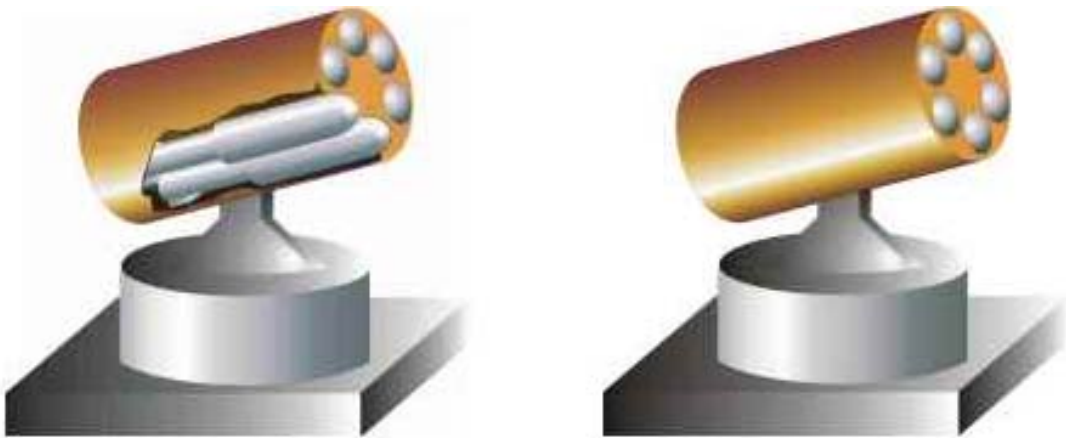


CW sensors equipment

SUB SYSTEM DESCRIPTION

FIRST LAYER MULTIPLE STEREABLE GRENADE LAUNCHING SYSTEM

Range	30 - 100 m
Reaction time	< 250 ms with 180° rotation
Coverage	360 ° in azimuth, 30° in elevation (45° desirable)
Number of firing action	Up to 6 engagement per launcher
Weight	< 90 Kg
Security	- Inhibition before launch - No charge activation before 10 m from the tank - Operation sectors selection

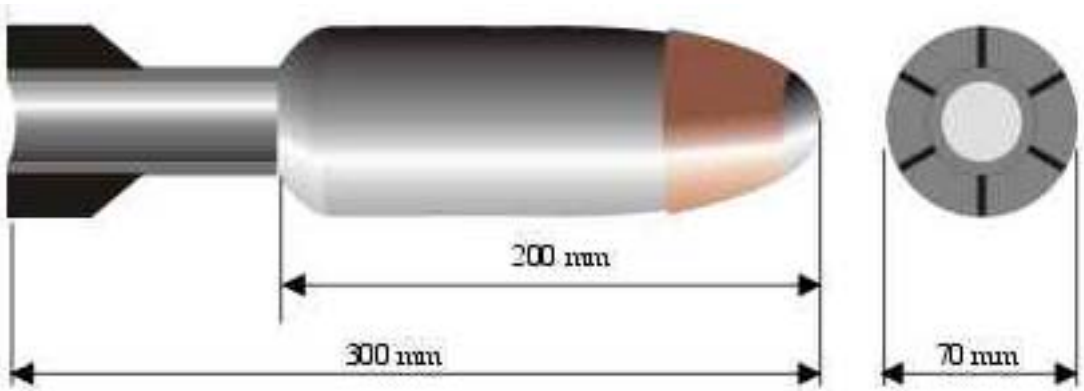


Launcher installed above the turret

SUB SYSTEM DESCRIPTION

GRENADE

- **PREFRAGMENTED GRENADE**
- **PAYLOAD > 3,5 Kg**
- **REDUCED SENSITIVITY EXPLOSIVE**
- **PROXIMITY MICROWAVE FUZE**
- **LETALITY: 75% of Single Shot Kill Probability within 7 m from the burst point**
- **SAFETY AND ARMAMENT DEVICE**

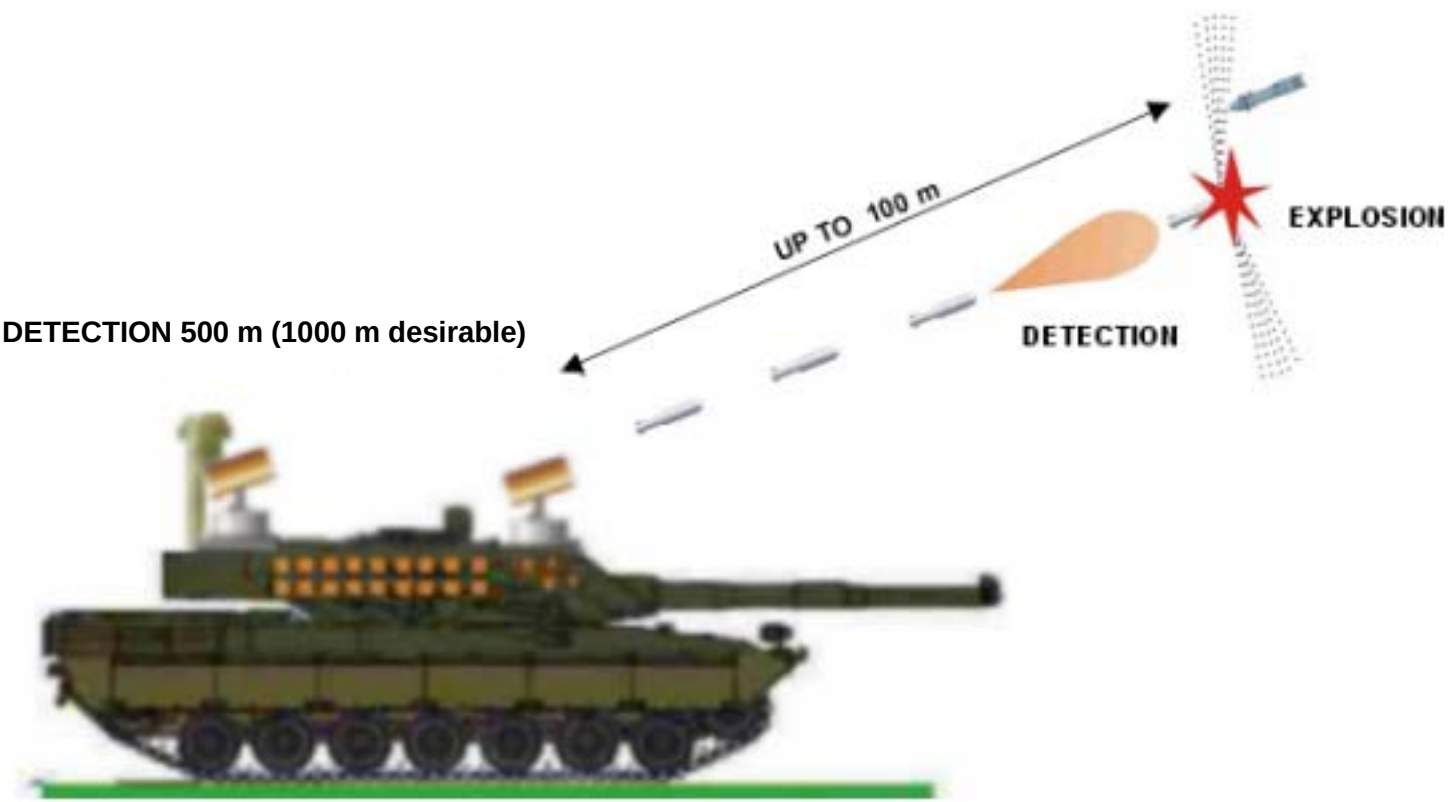


GRANADES LAUNCHER INSTALLATION

A POSSIBLE SOLUTION ABOVE THE TURRET

TYPICAL FIRING ACTION WITH GRENADES

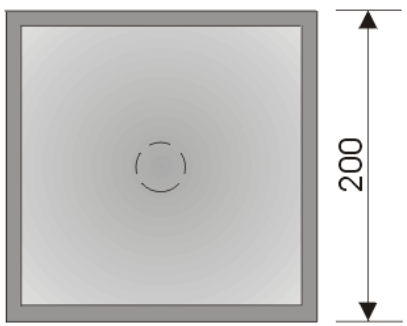
SEARCH AND DETECTION 500 m (1000 m desirable)

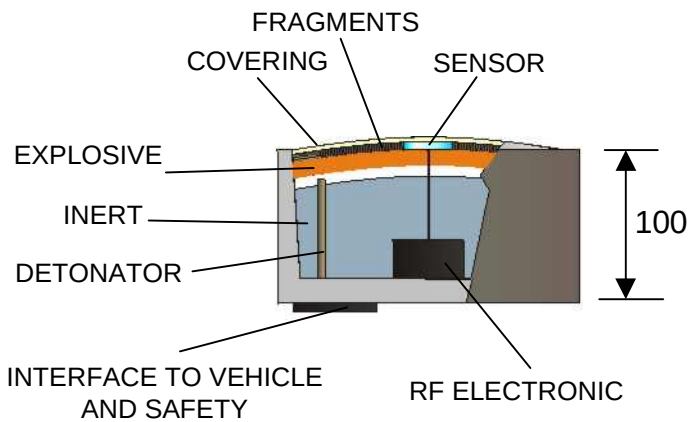


SUB SYSTEM DESCRIPTION

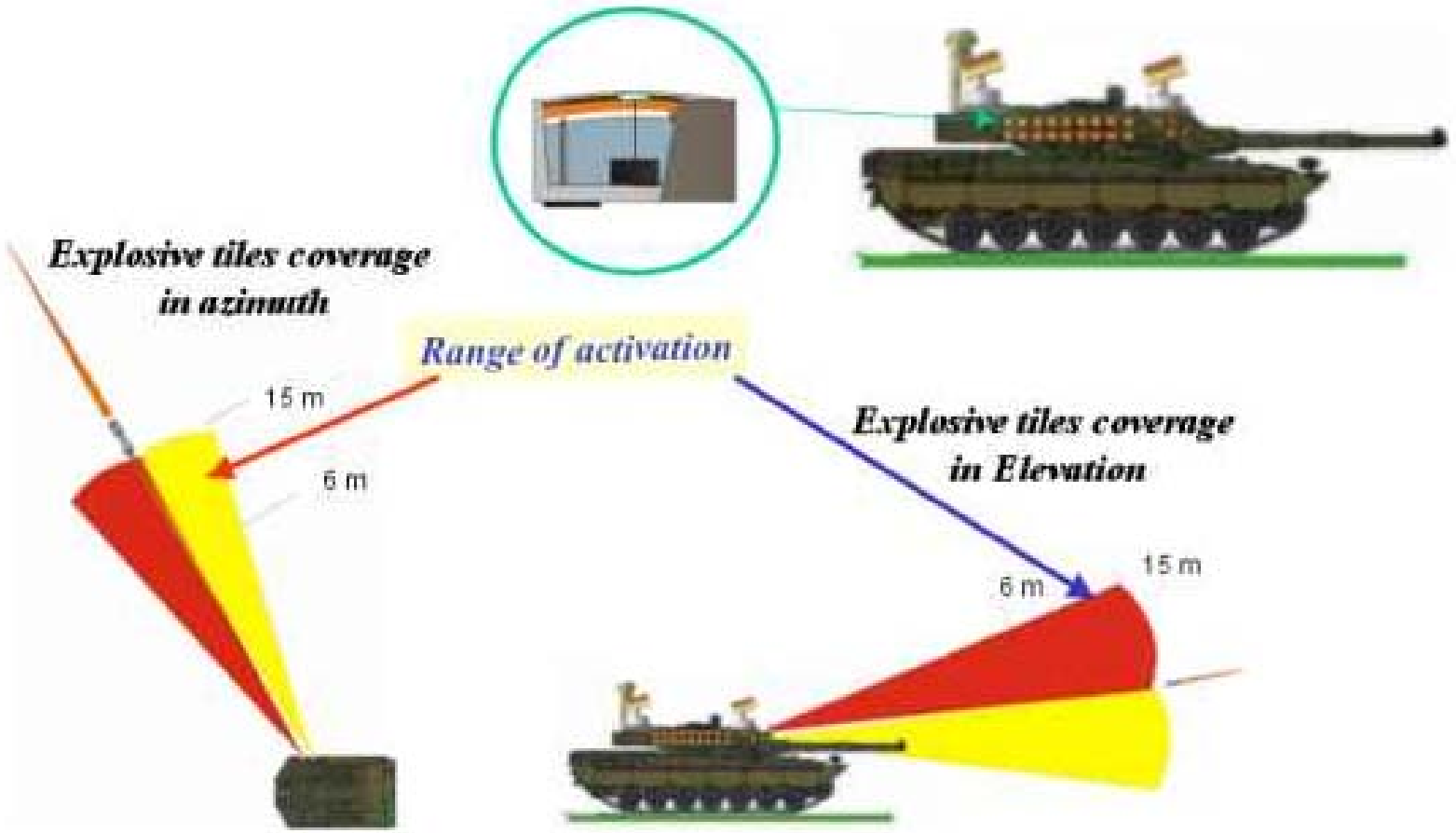
SECOND LAYER ARRAY OF EXPLOSIVE TILES

Range	**6- 15 m**
Reaction time	**< 150 ms**
Coverage	**Up to 360 ° in azimuth , 23 ° in elevation**
Number of firing action	**1 firing action with 2 - 4 units in any directions**
Weight	**< 15 Kg each tile**
Explosive	**Reduced sensitivity**
Fuze	**Microwave type**
Security	**- Inhibition before launch** **- Safety and Armament Unit and Fuze for each Tile** **- Selection of sectors of operation**





EXPLOSIVE TILES INSTALLATION AND COVERAGE



COMPARISON WITH SIMILAR SYSTEM (1)

- *DROD 2 (RUSSIA)*
  - **IN SERVICE**
  - **INSTALLED ON SOVIET T55 AND T80 TANKS**
  - **MMW SENSOR**
  - **ROCKETS 107 mm**
  - **LOW SENSOR PERFORMANCE**
  - **HIGH COLLATERAL DAMAGE POSSIBILITY**

- *ARENA (RUSSIA)*
  - **PROTOTYPE STATUS**
  - **KA BAND SENSOR**
  - **EXPLOSIVE IN FLIGHT STEREABLE BOX**

COMPARISON WITH SIMILAR SYSTEM (2)

- *AWISS (GE)*
  - **UNDER DEVELOPMENT**
  - **RADAR AND IR SENSORS**
  - **MULTIPLE GRENADE LAUNCHER**
  - **EXPENSIVE**
  - **HIGH SENSOR PERFORMANCE**
  - **VERY ACCURATE REQUIREMENTS**

"SCUDO" INSTALLATION AND DESIGN REQUIREMENTS

- *INSTALLATION*
  - INSTALLATION POSSIBLE ON:
    - ✓ MAIN BATTLE TANK (ARIETE)
    - ✓ LIGHT ARMOURED VEHICLE (CENTAURO)
    - ✓ IFV AND APC TRANSPORT DESIRABLE (DARDO)
  - DESIGNED AS ADD ON KIT FOR VEHICLE PRE ARRANGED FOR INSTALLATION
- *COST*
  - LIMITED UNIT PRODUCTION COST

PROGRAM STATUS

TIME SCHEDULE