



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

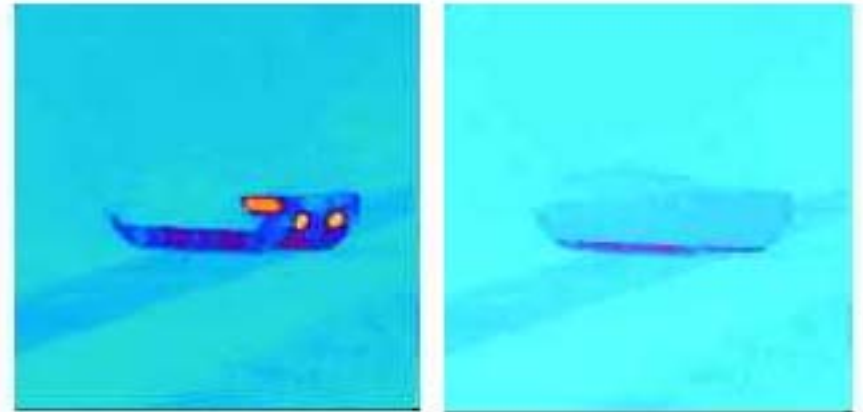




VEHICLE DEFENSE STRATEGY (1)

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

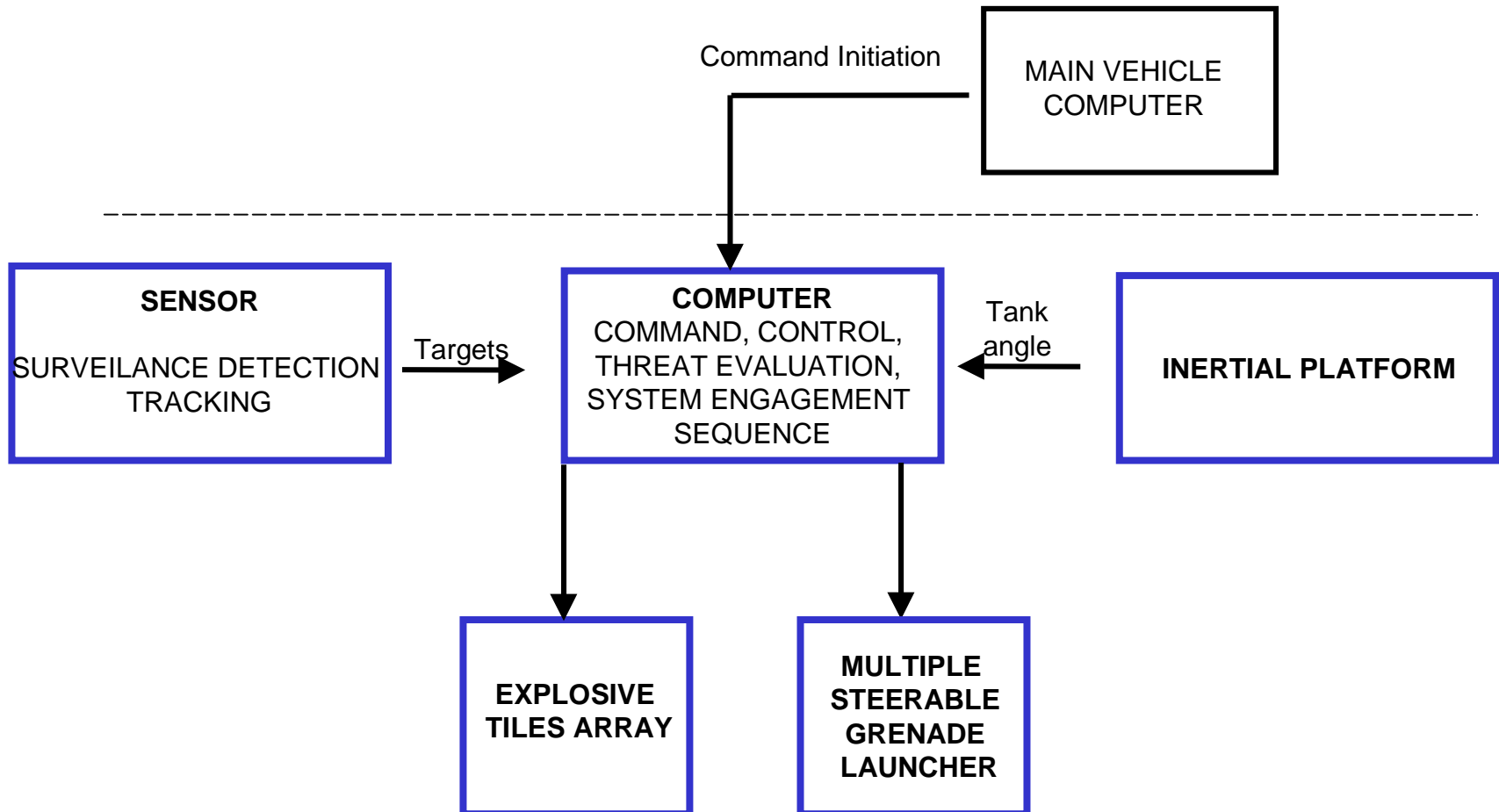
- COMMAND, CONTROL AND THREAT EVALUATION SYSTEM
 - REALTIME MULTIFUNCTIONAL AND SYSTEM CONTROL COMPUTER

- FIRST LAYER DEFENSE SYSTEM
 - MULTIPLE STEERABLE GRENADE LAUNCHER SYSTEM

- SECOND LAYER DEFENSE SYSTEM
 - ARRAY OF EXPLOSIVE TILES



FUNCTIONAL DIAGRAM





SYSTEM MAIN CHARACTERISTICS

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

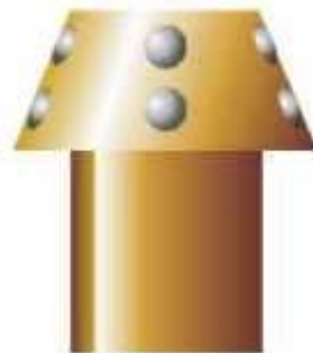


SUB SYSTEM DESCRIPTION

X BAND DUAL FREQUENCY CW RADAR

SURVEILLANCE, DETECTION, TARGET TRACKING

<i>Range</i>	More than 500 m (1000 m desirable) against Anti Tank Missiles, Rockets and Grenades
<i>Angle Coverage</i>	360° in azimuth > 45° in elevation
<i>False Alarm Probability</i>	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	<ul style="list-style-type: none">- Inhibition before launch- No charge activation before 10 m from the tank- Operation sectors selection



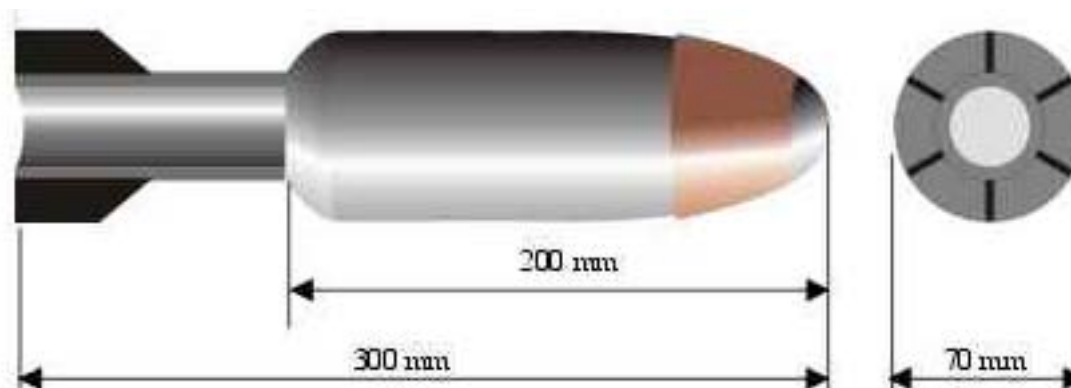
*Launcher installed
above the turret*



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**





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GRANADES LAUNCHER INSTALLATION

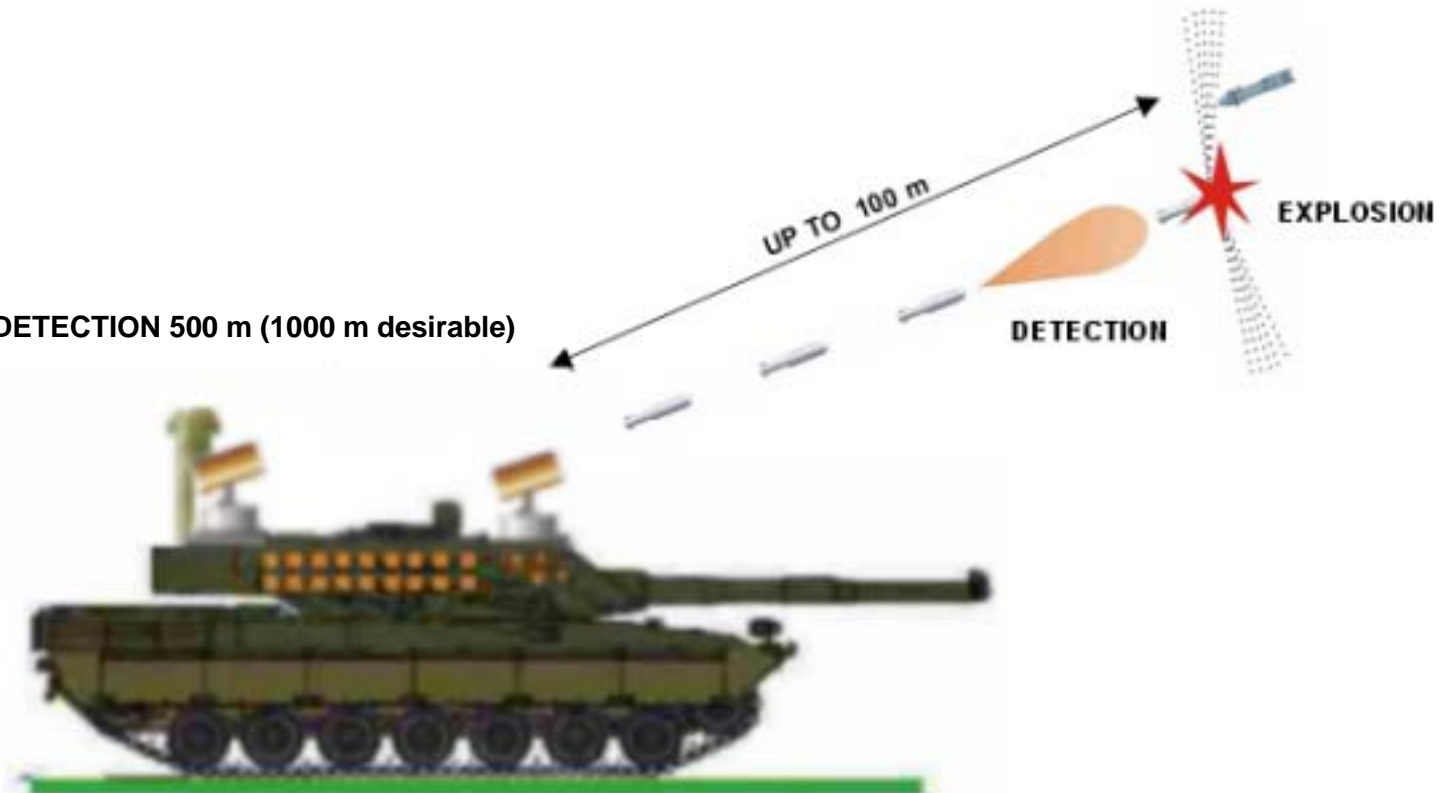
A POSSIBLE SOLUTION ABOVE THE TURRET





TYPICAL FIRING ACTION WITH GRENADES

SEARCH AND DETECTION 500 m (1000 m desirable)

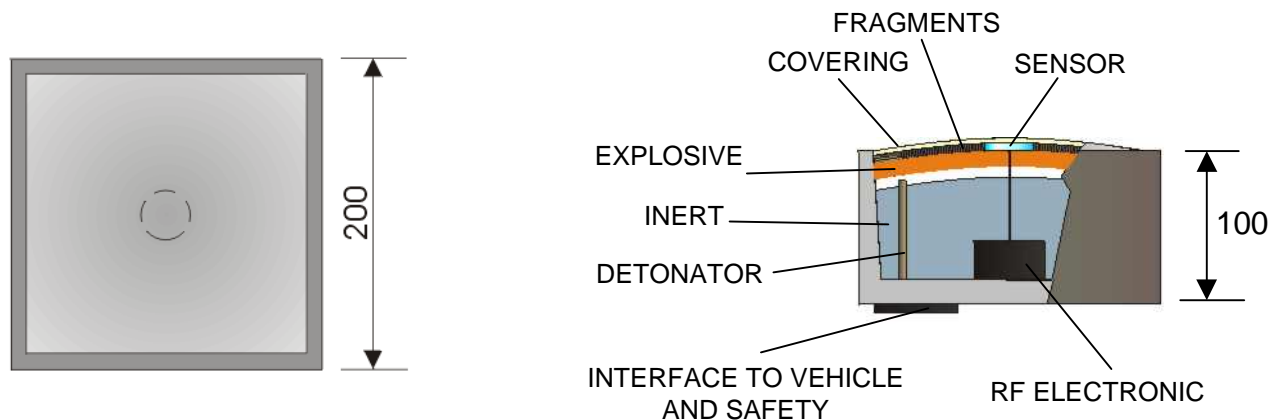




SUB SYSTEM DESCRIPTION

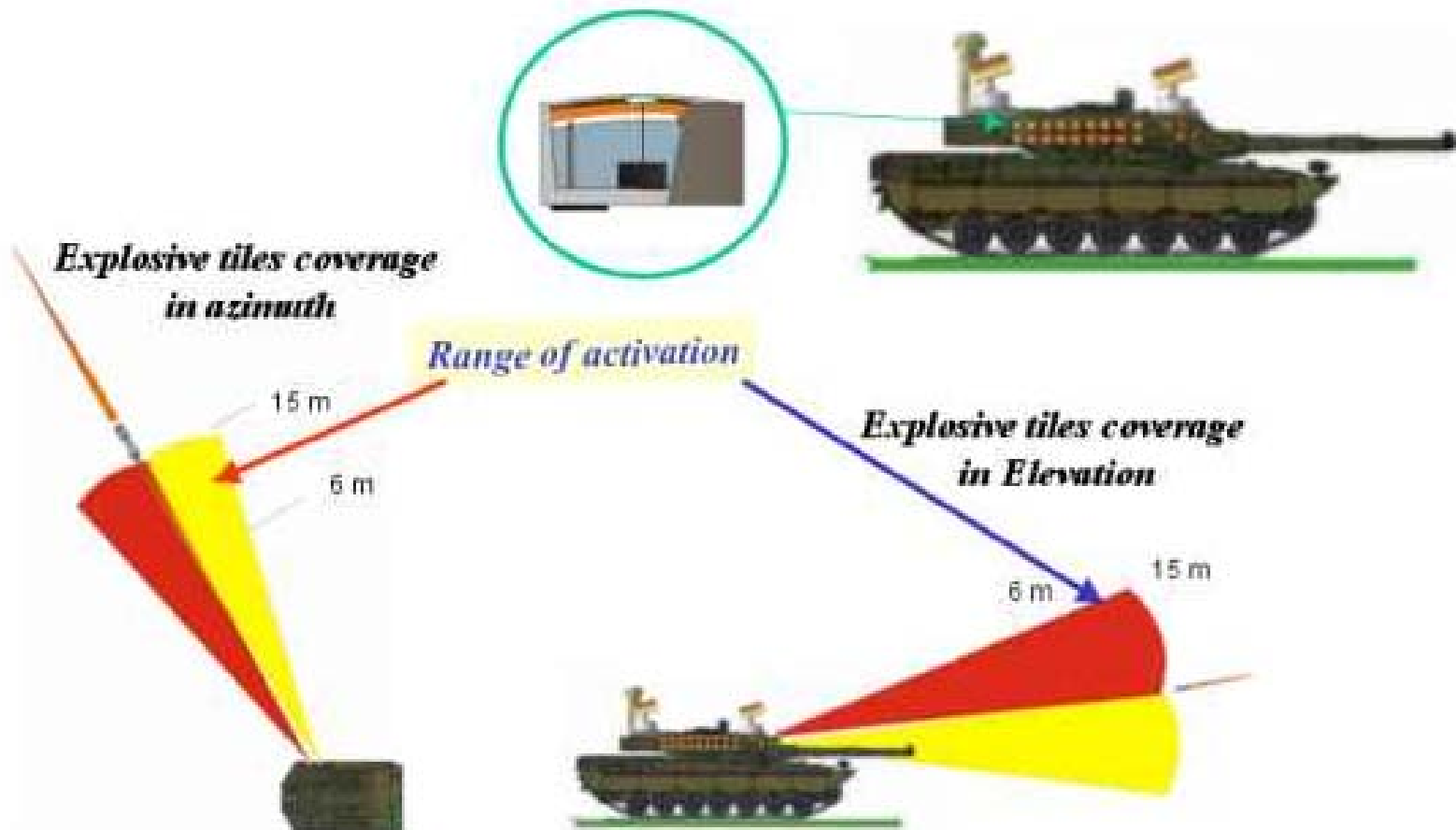
SECOND LAYER ARRAY OF EXPLOSIVE TILES

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

