Aerial Weapon Scoring System (AWSS)

NDIA 49th Annual Targets, UAVs, and Range Operations Symposium

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MEGGITT

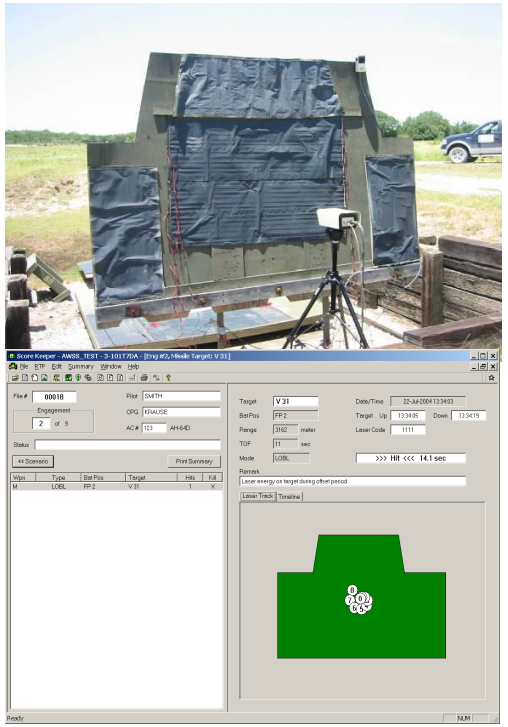
What is AWSS

Aerial Weapon Scoring System

- Scalable & portable system of computer controlled sensors used to score live-fire helicopter gunnery for evaluation of crew & weapons performance. This objective scoring system allows the commander to validate training standards, ensure training effectiveness, and substantiate training ammunition requirement levels.
- Consists of:
  - Acoustic sensors for 2.75” rocket impact location
  - Radar sensors for cannon/machine gun scoring
  - IR/Optical sensors for laser designator detection & tracking when used with the Hellfire Captive Training missile
- Seven fully portable systems delivered to the US Army for crew qualification gunnery training
- Only fielded system worldwide for Attack Helicopter live fire training

AWSS required operational capability

- AWSS is the standard objective scoring method for all US Army AH-64 & OH-58 crew qualification gunnery tables (6-8)
- Provide Commander with objective feedback of target effect for all Attack Helicopter weapons engagements
- Operate Day and Night with no degradation or limitation due to environmental conditions that would not preclude training
- Detect and score > 90% of all projectiles (rockets and bullets) in the target effect area (scored zone)
- Maintain > 95% equipment availability rate
- Sustain NO damage from environmental / EMI standard conditions for Army ranges & training devices



AWSS background

» Original Requirement	1984
» Prototype Operations (Ft Hood, TX)	1986-90
» Production Deliveries	1991
» ECPs Incorporated	1995-99
» Upgrades Funded	2000
» Production Start	2003
» Fielding	2004-07
» Continuous System Enhancements	2007-present

» Currently there are (4) Systems based at Ft. Hood, TX that are utilized for all US Army Attack Helicopter live-fire gunnery operations in North America. There is (1) System permanently based at Grafenwoehr, Germany, (1) System at Camp Casey, South Korea, and another (1) tailored system at Udairi, Kuwait.

System packaging for portability

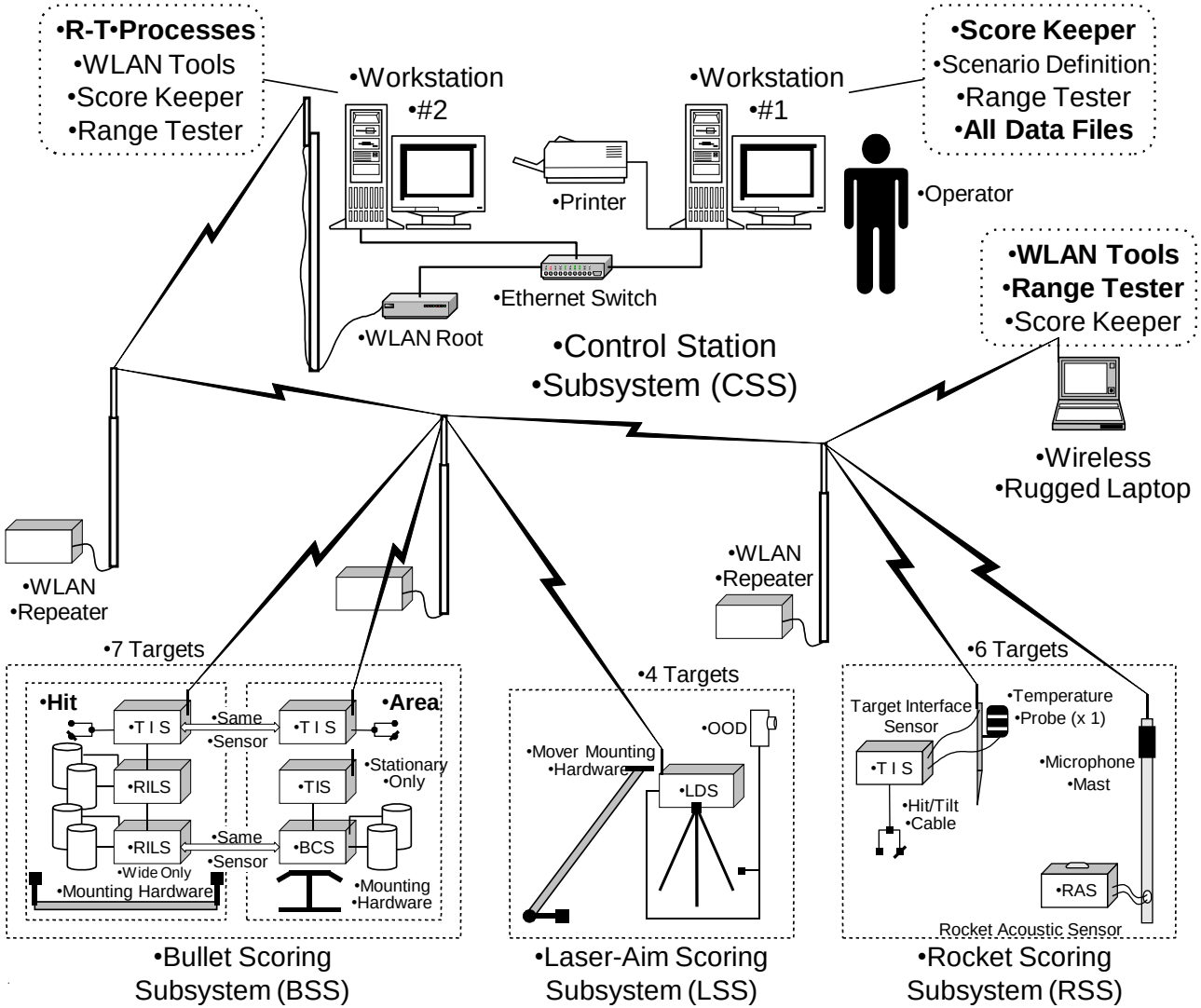
AWSS benefits

- Every Weapon Engagement is scored to same standard
- Target Effect of every Weapon Engagement is provided in near REAL-TIME
- Every Weapon Engagement is documented
- TTPs can be validated and standardized
- Crew Performance Improves Dramatically
- Training Resource Utilization is captured
- Performance can be tracked
- Crew Errors are separated from Bias Errors
  - Both can be identified and tracked
  - Weapons maintenance / bore sight accuracy improved
- OBJECTIVE MEASUREMENT OF COMBAT READINESS!

AWSS subsystems

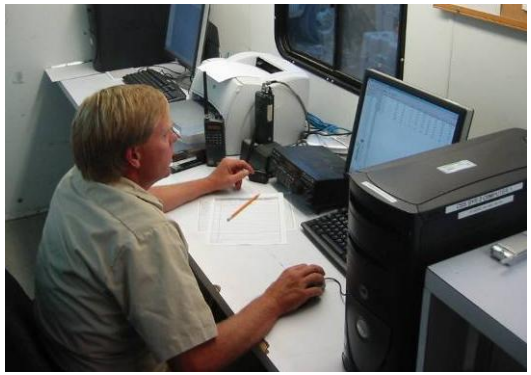
- Control Station Subsystem (CSS)
  - (CSS) Computers, Printer, WLAN Data Link, System Software
- Bullet Scoring Subsystem (BSS)
  - 7.62mm, .50 cal, 20mm, 30mm, 40mm
  - Real-Time Hit Scoring (98% Detection/Location On-Target)
  - Area Scoring (98% Detection within 50X20 meters area)
- Laser-Aim Scoring Subsystem (LSS)
  - LOAL and LOBL Missile Launch Modes
  - Real-Time Hit Indication
- Rocket Scoring Subsystem (RSS)
  - PD (M274) and MPSM (M267) Rockets (90% Detection/Location within the TEA)
  - Real-Time Scoring with Target Effect (90% Detection/Location within the TEA)

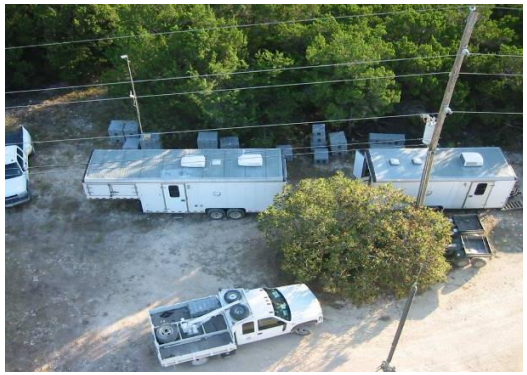
Subsystems and components



Control Station Subsystem (CSS)

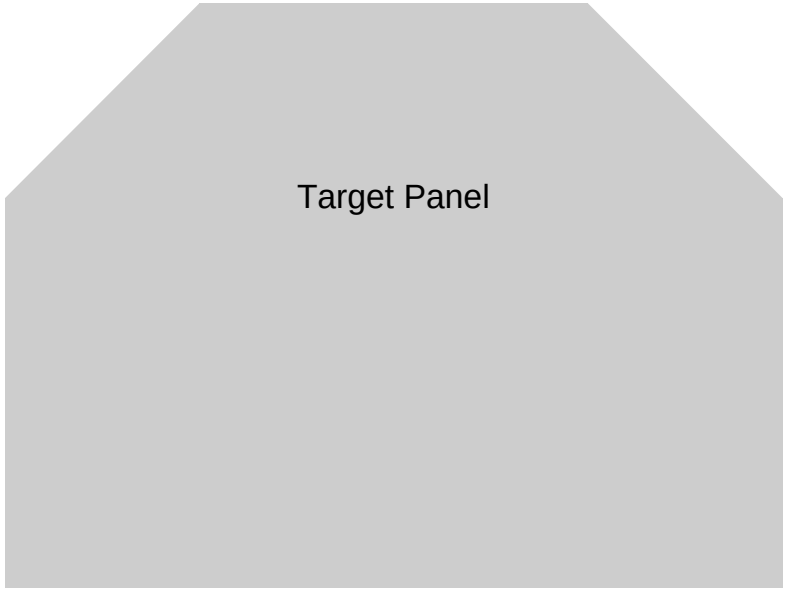
- Workstation #1
  - Primary Control Station for scoring engagements
  - Holds all shared data including score files
  - Only station requiring data back up
- Workstation #2
  - Runs Real-Time Processes automatically
  - Performs sensor communication and rocket scoring
  - Secondary scoring station (backup)
- Rugged Laptop
  - Supports downrange operations (setup/BIT)
  - Remote scoring station
  - May be used to observe engagement results in real time at remote location (tower)

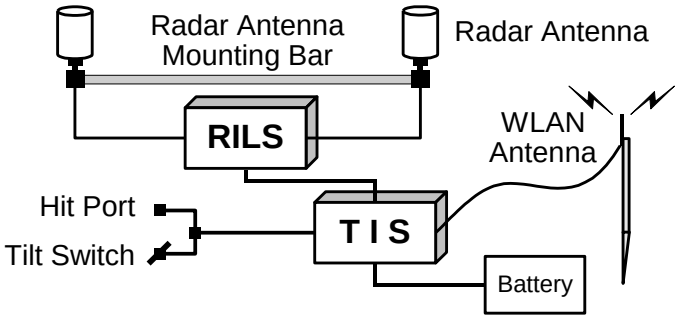




Bullet hit scoring stationary target

Round Identification Location System (RILS)



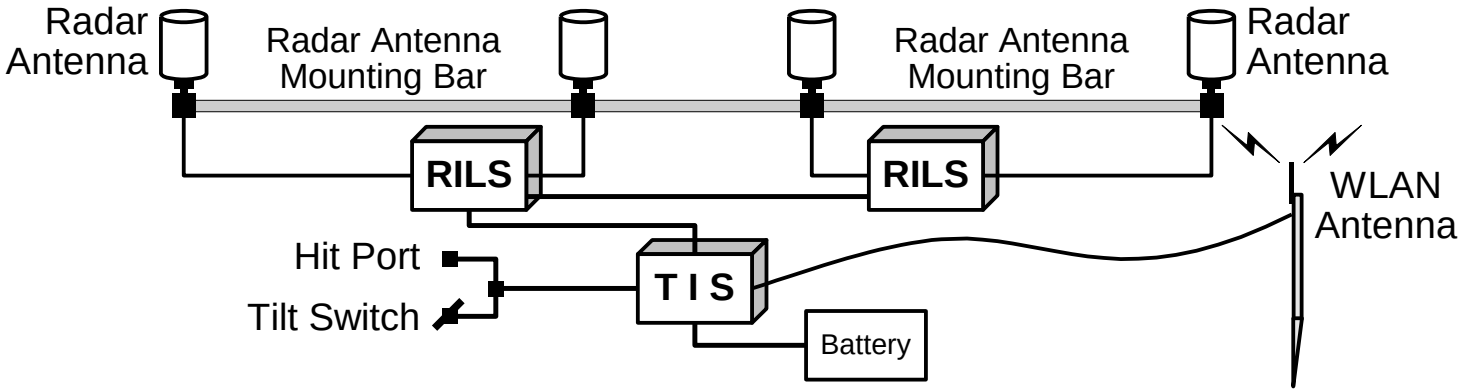


Round Identification & Location System (RILS)

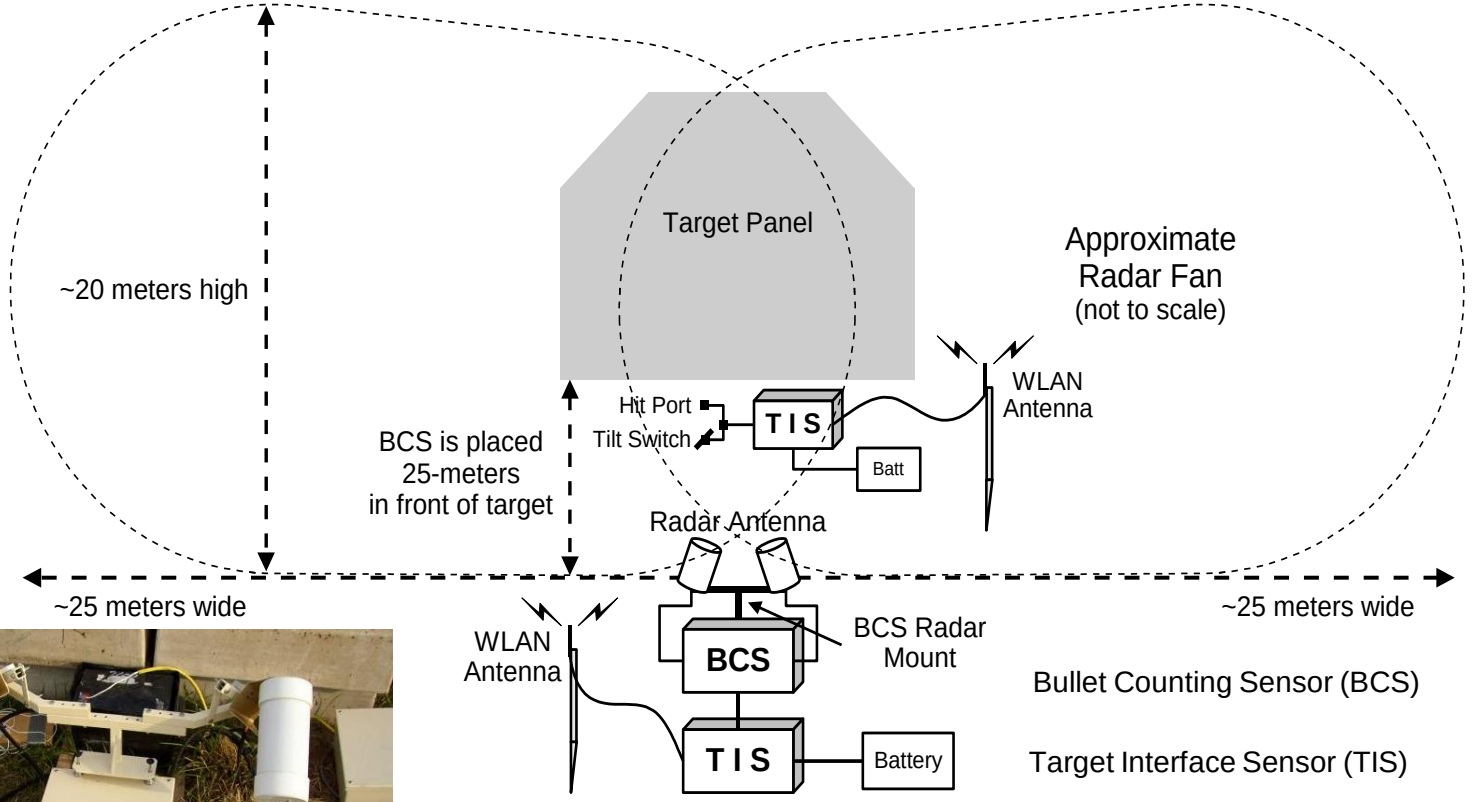
Target Interface Sensor (TIS)

Bullet hit scoring moving target

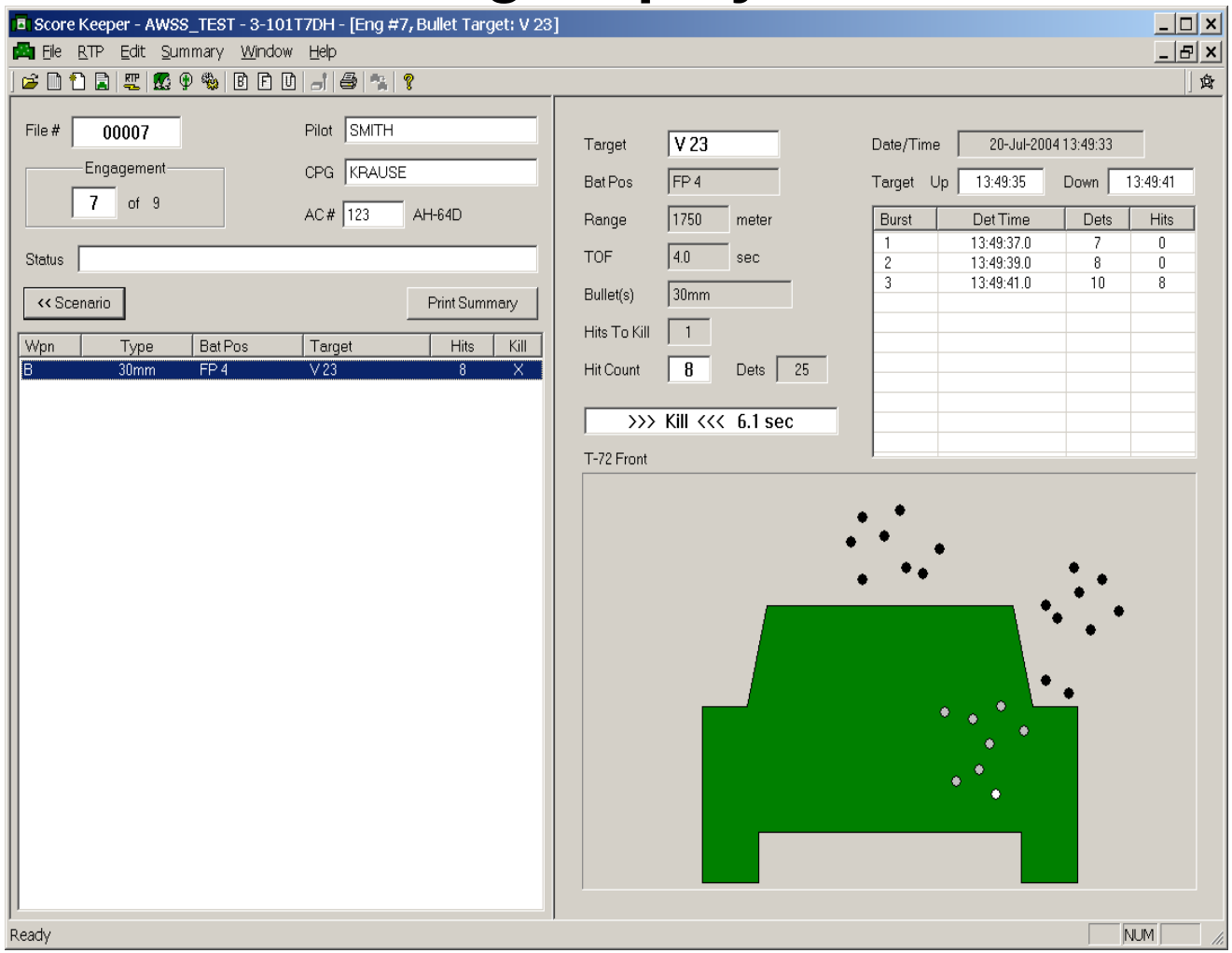
T-72 Silhouette
Target Panel



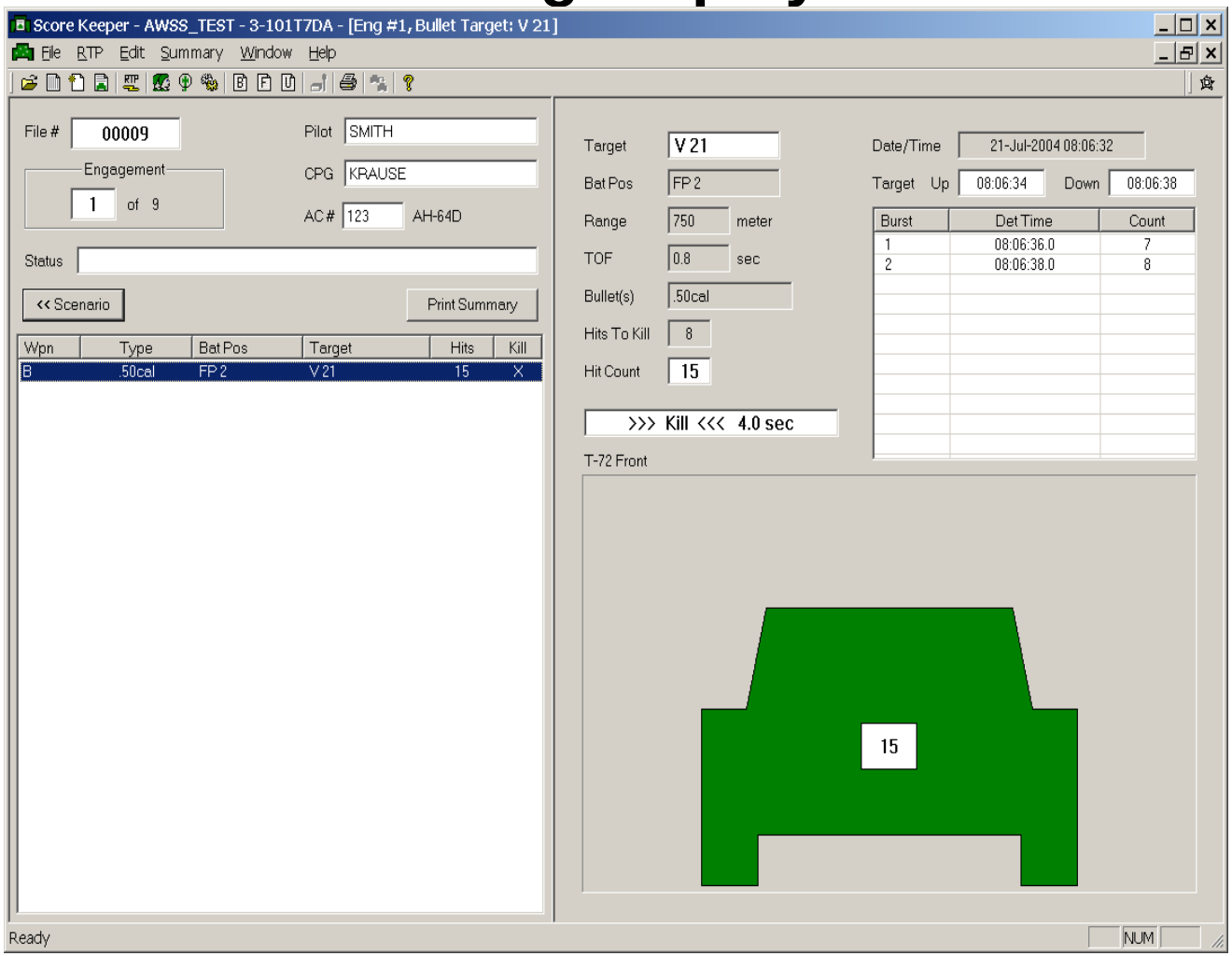
Bullet area scoring



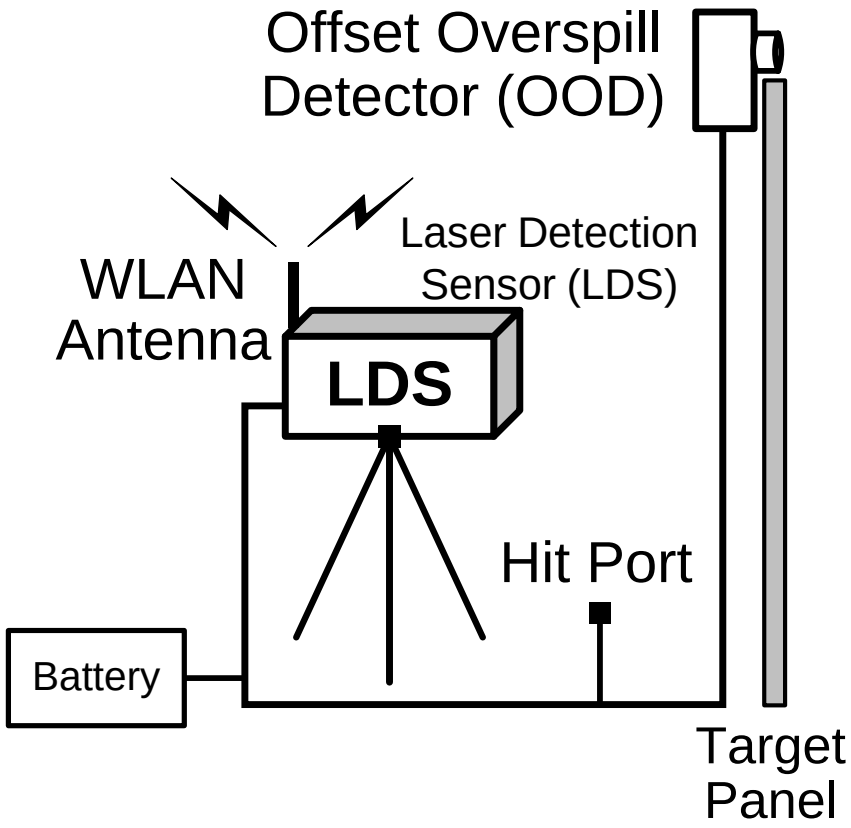
Bullet hit scoring display



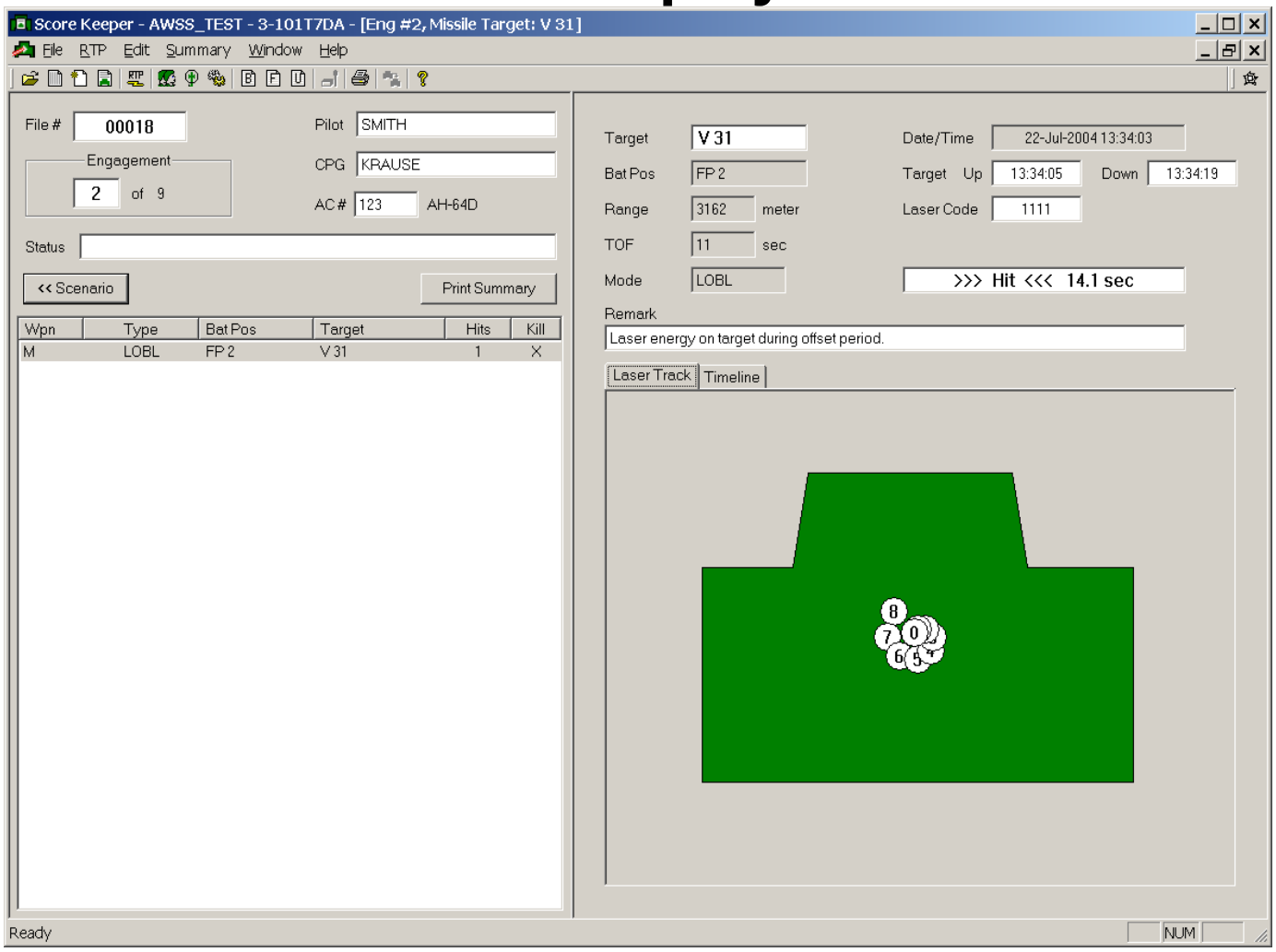
Bullet area scoring display



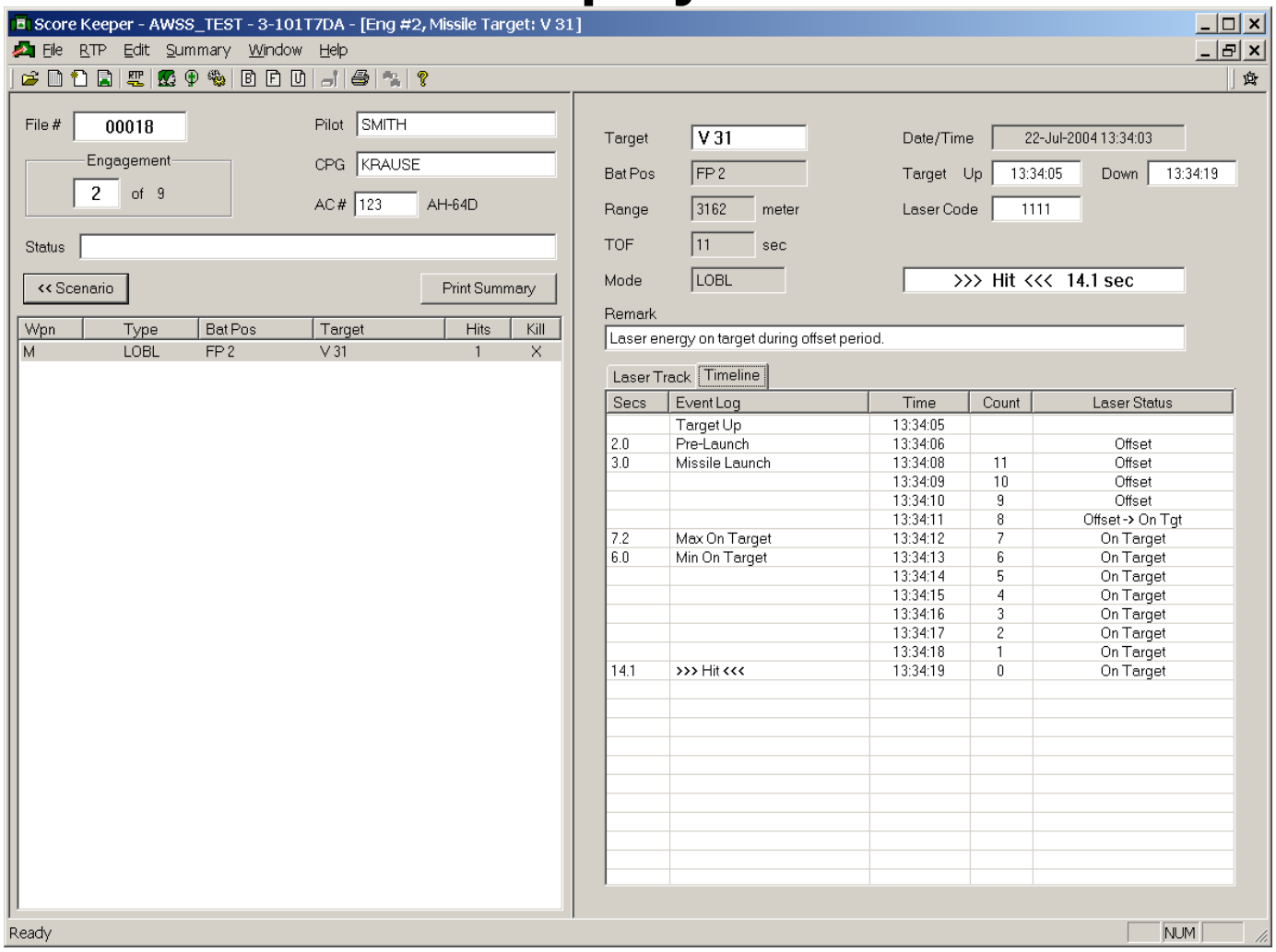
Laser Scoring Subsystem (LSS)



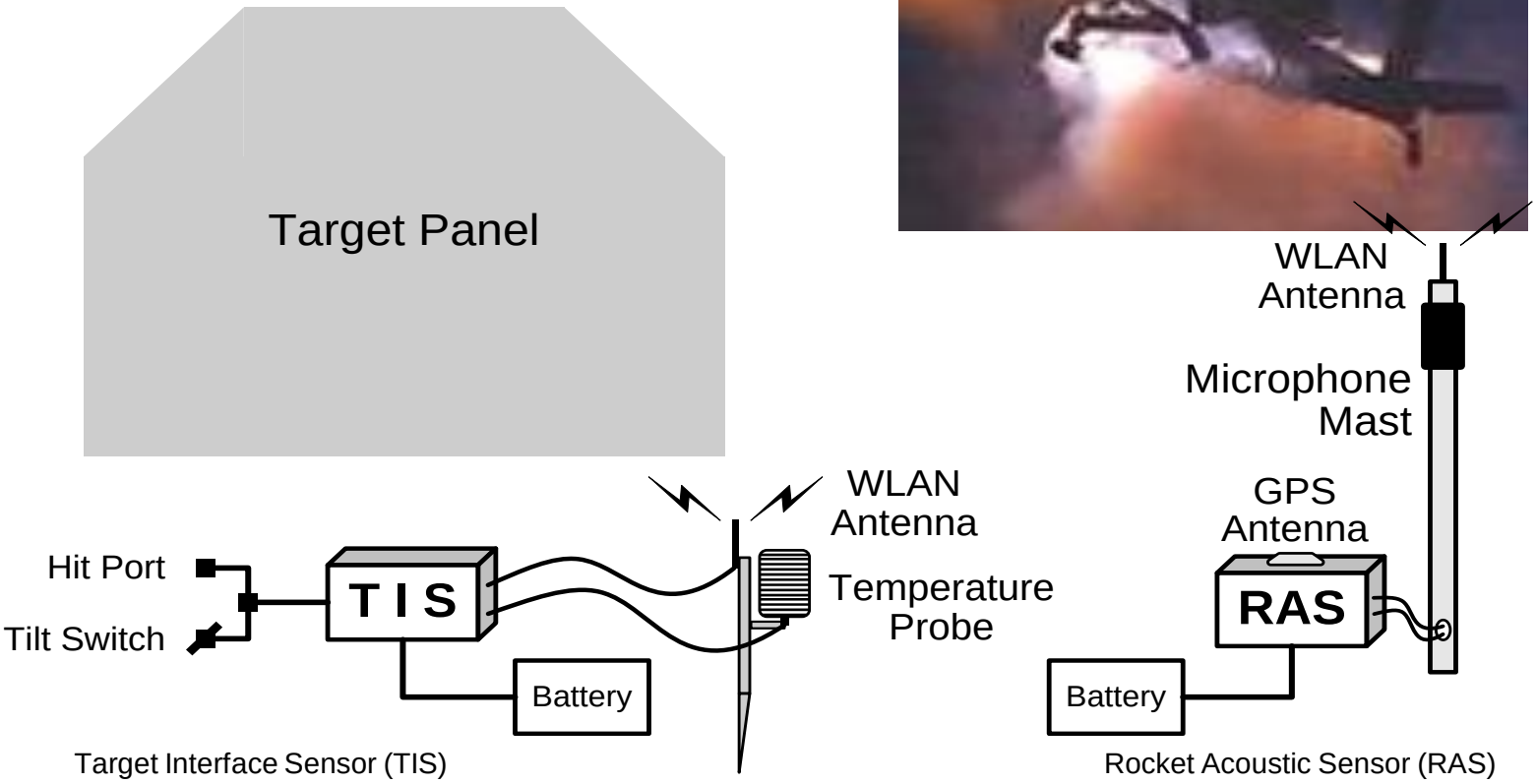
Missile laser track display



Missile timeline display

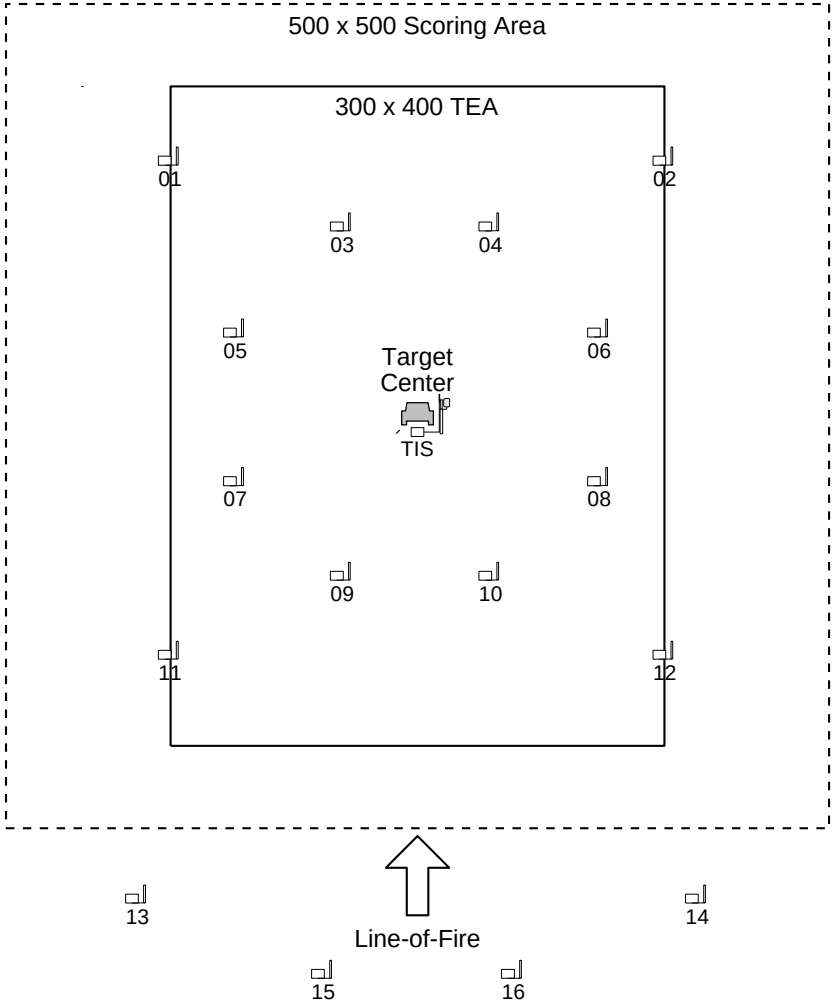


Rocket scoring subsystem

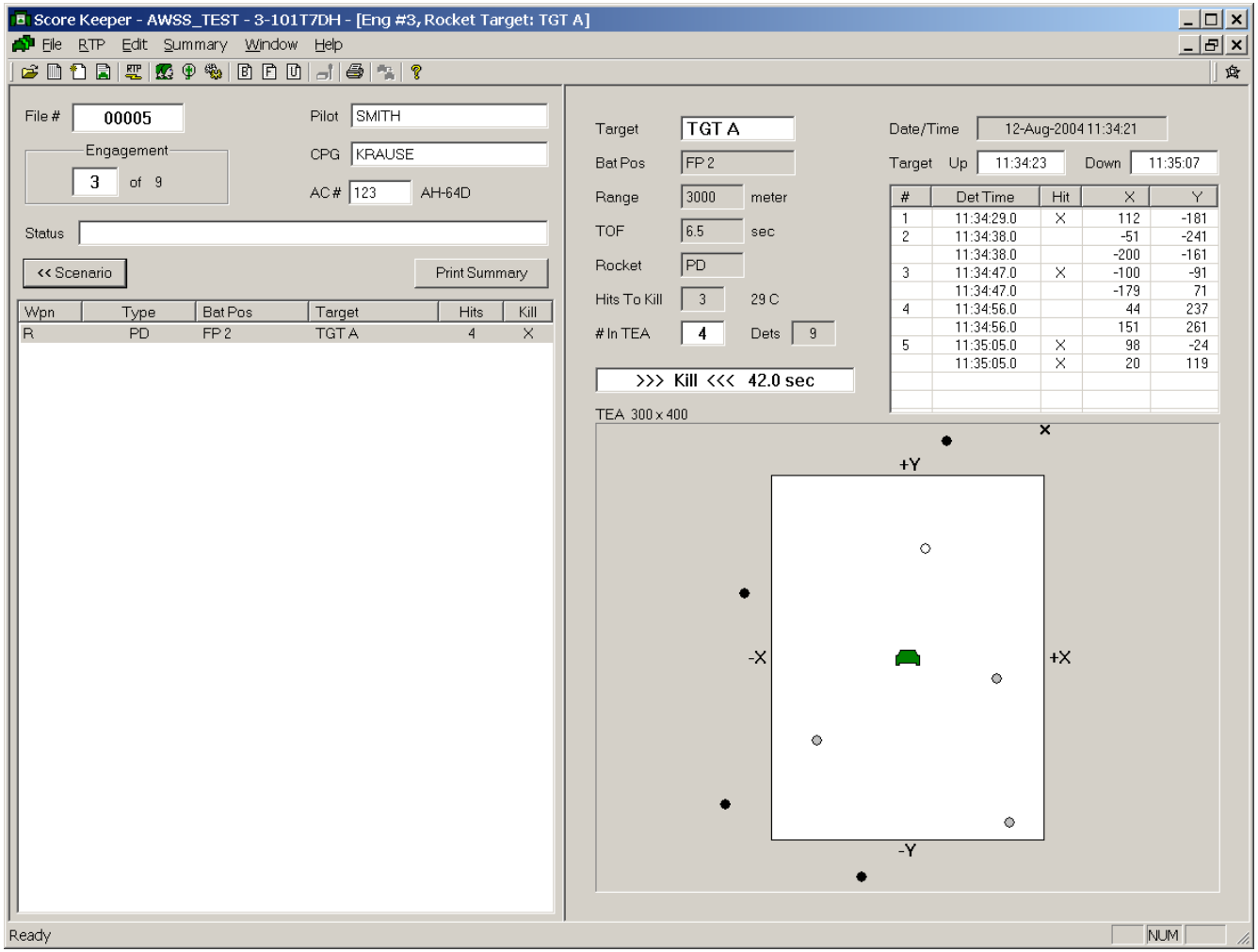


Rocket scoring area

- Impacts are accurately located within 500m X 500m zone.
- Impacts within user defined Target Effect Area (TEA) area are indicated as target hits.
- All impacts detected and resolved are indicated on score sheet for each target.



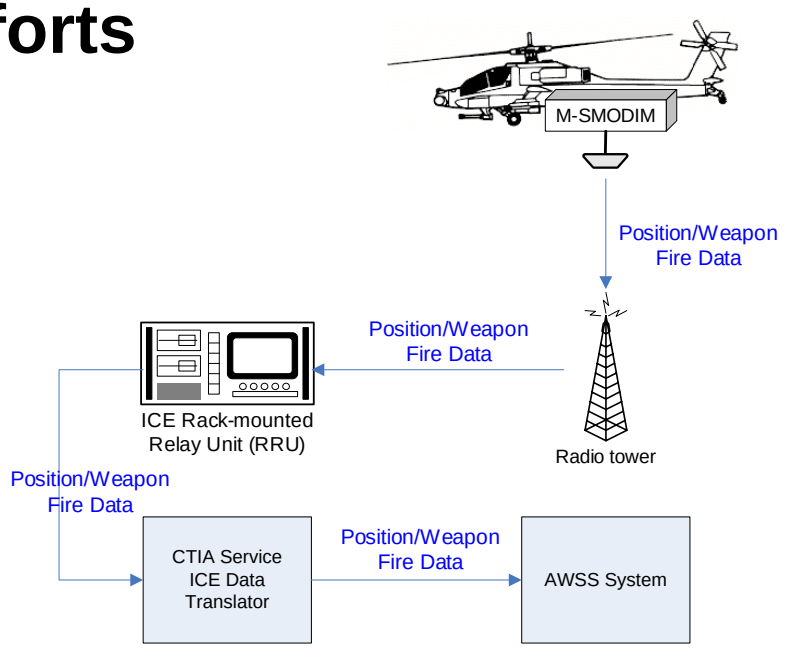
Rocket scoring display

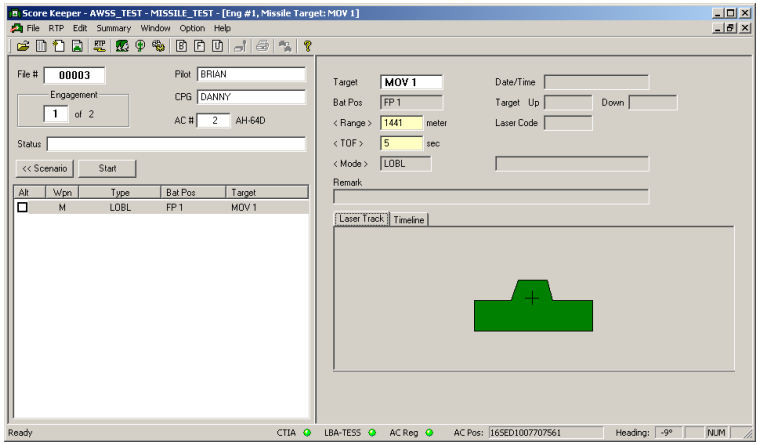


Current system upgrade efforts

Aviation data capture

- Integration of AWSS Control Station Subsystem with Aviation Tactical Engagement Simulation System (TESS)
  - Pulls A/C status & weapons data from the 1553 bus into the AWSS Control Station for improved scoring via the TESS, Smart Onboard Data Interface Module (SMODIM)
  - Automates the scoring process for the Hellfire Missile Engagements (using the Captive Training Missile) & eliminates the need for Pilot shot call
  - Provides a common GPS time base to sync the A/C weapon firing events to the AWSS score reporting





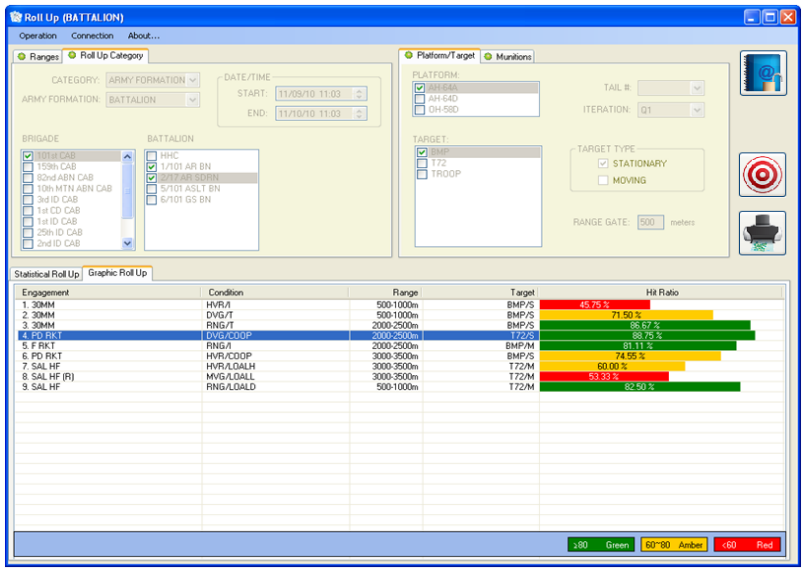
Current system upgrade efforts cont.

Unit gunnery summary report

- Modified the AWSS CSS S/W to add a new database that allows for USAACE Gunnery Branch to perform unit level and Army-wide rollup to justify ammunition levels and track unit readiness

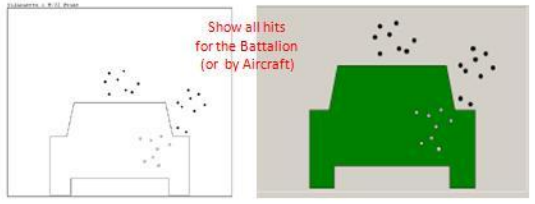
Sample Graphic Roll Up (Battalion)

Engagement	Condition	Range	Target	Hit ratio
1. 30MM	HVR / IHADSS	600	TROOP / S	85%
2. PD RKT	DVG / COOP	2000	BMP / S	65%
3. SAL HF	HVR / LOALH	4800	T72 / S	79%
4. SAL HF	RNG / LOALD	4000	T72 / M	90%
5. 30MM	RNG / TADS	1200	TECH/S	88%
6. SAL HF (R)	MVG / LOALL	2500	T72/S	96%
7. 30MM	DVG / TADS	1500	BMP / M	86%
8. F RKT	RNG /IHADSS	1200	BMP / M	75%
9. PD RKT	HVR / COOP	3200	TRUCK/S	49%
10. 30MM	DVG / IHADSS	900	TECH/S	85%
11. PD RKT	RNG / IHADSS	2000	TROOPS/S	80%
12. SAL HF	HVR / LOALD	2500	T72	95%



≥80% - Green
60-80% - Amber
<60% - Red

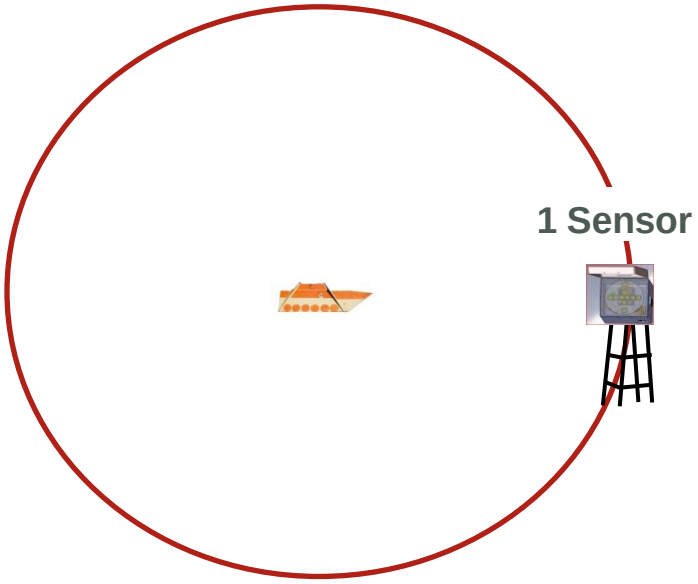
Roll Up (Table 7DN and 8DN / Engagement 1 – 30MM IHADSS)



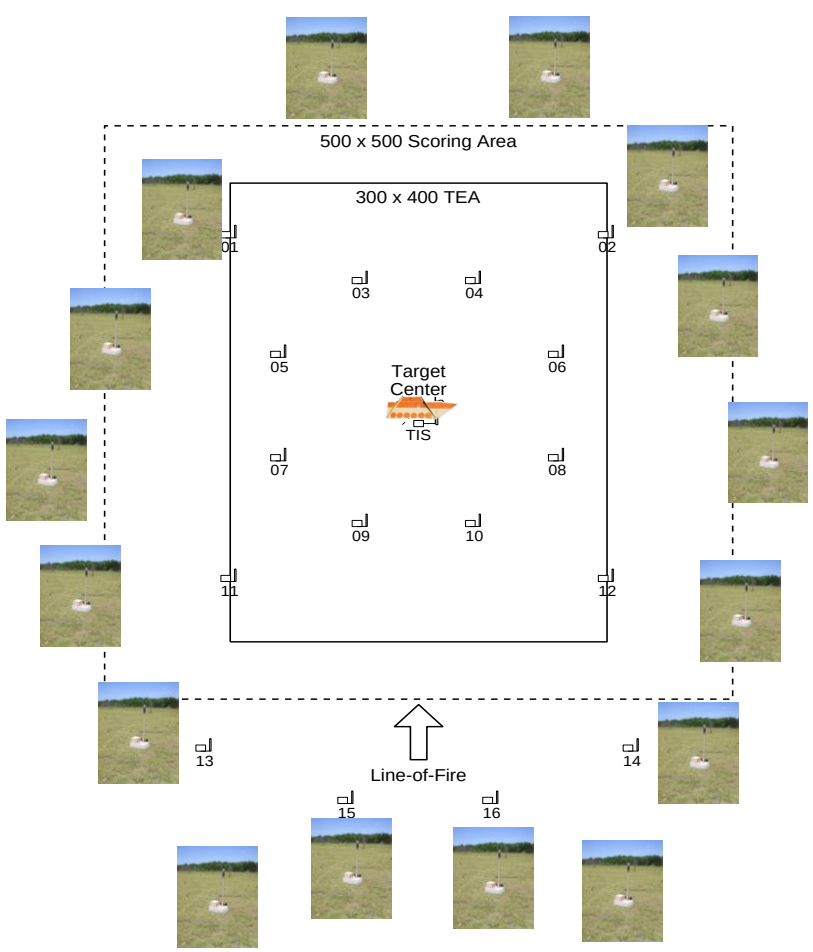
Bullet Size	Battle Position	Target Mnemonic	Total Hits	Total Rounds
30MM	FP1A	A-7	1601	2040

Current system upgrade efforts cont.

Radar vs. Acoustic Rocket Scoring



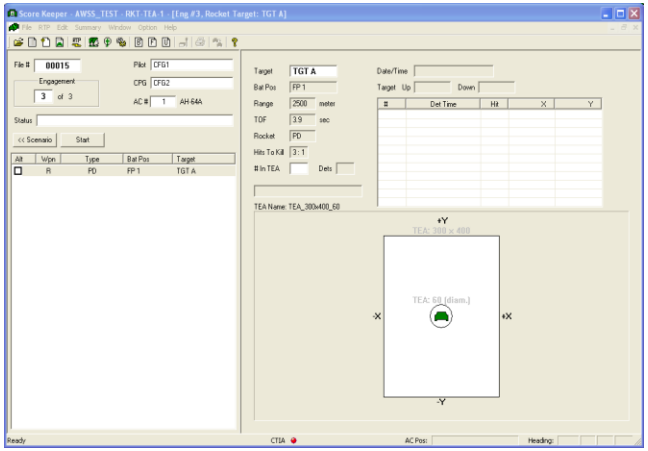
Enables diving fire:
Rapid rocket scoring
Paired rocket scoring



Current system upgrade efforts cont.

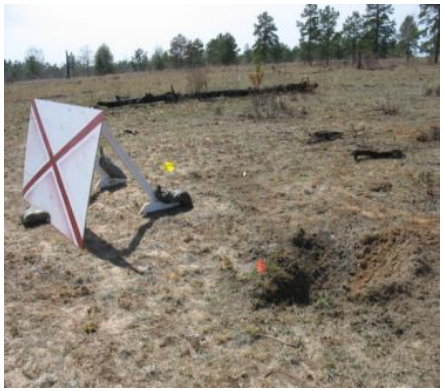
Radar rocket scoring

- Evaluation of Radar for Short range, Rapid Fire Rocket Scoring
  - NAWC/WD Targets System Division, Point Mugu/Port Hueneme entered a loan agreement with the US Army (PM ITTS, TMO) to conduct evaluations of the Surface Target Vector Scorer (STVS) for data collection and proof of concept
    - NAWC/WD Targets System Division
    - POC: Mr. Dae Hong 805-989-5996 dae.hong@navy.mil
  - STVS was recently developed for the US Navy for enhanced fleet training capabilities during gun weapon system & missile firing
  - Goal was to enable the AWSS to provide accurate scoring of single, pairs & ripple fire M274 Point Detonation 2.75” Training Rockets when fired at range to target of less than 1500 meters



Current system upgrade efforts cont.
Radar rocket scoring

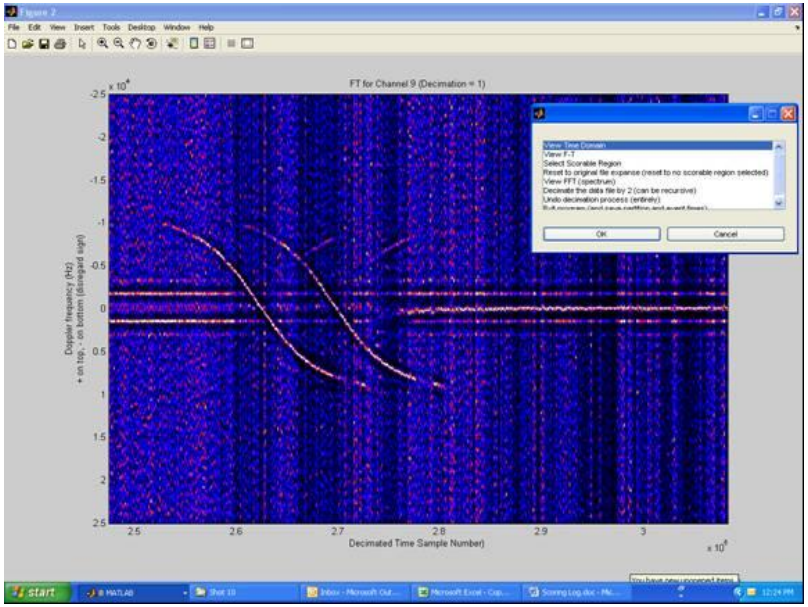
- Evaluation of Radar for Short range, Rapid Fire Rocket Scoring
- Work performed
  - MDSI received the transfer of STVS hardware from USN (NAWC/WD Targets System Division)
  - Prototype Antenna design was completed
  - Initial algorithms were refined and all hardware was tested
  - Successful live-fire data collection was carried out 4-16 March 2010
  - Processed all data for shots within the designated TEA (100 Meter Circle)

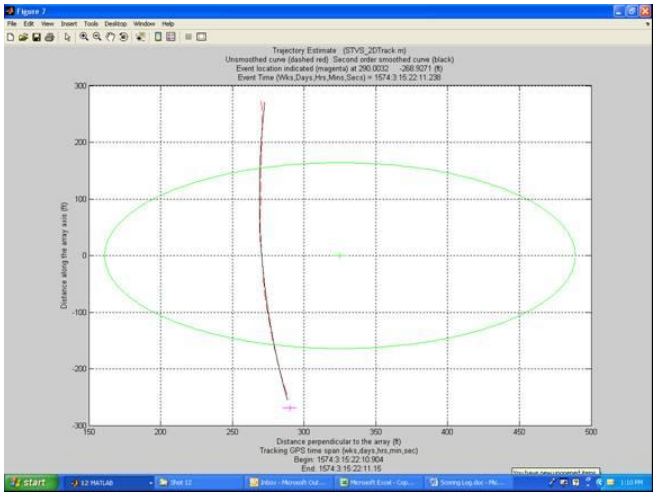


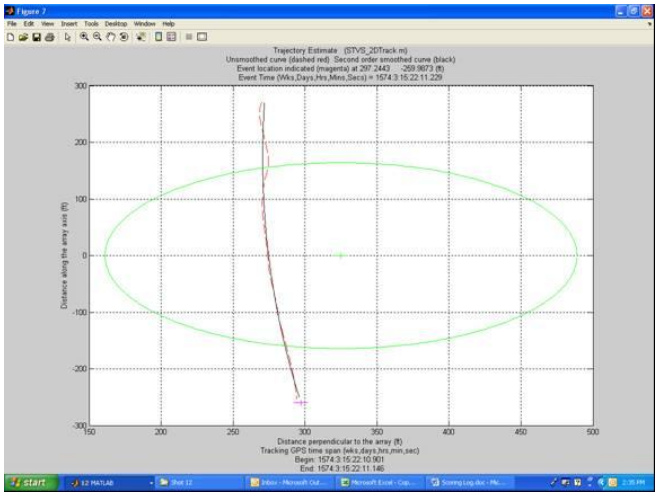
Current system upgrade efforts cont.

Radar rocket scoring

- Data shows two individual rockets fired as a pair in a color frequency vs. time display
- Each rocket was tracked separately to process the impact points

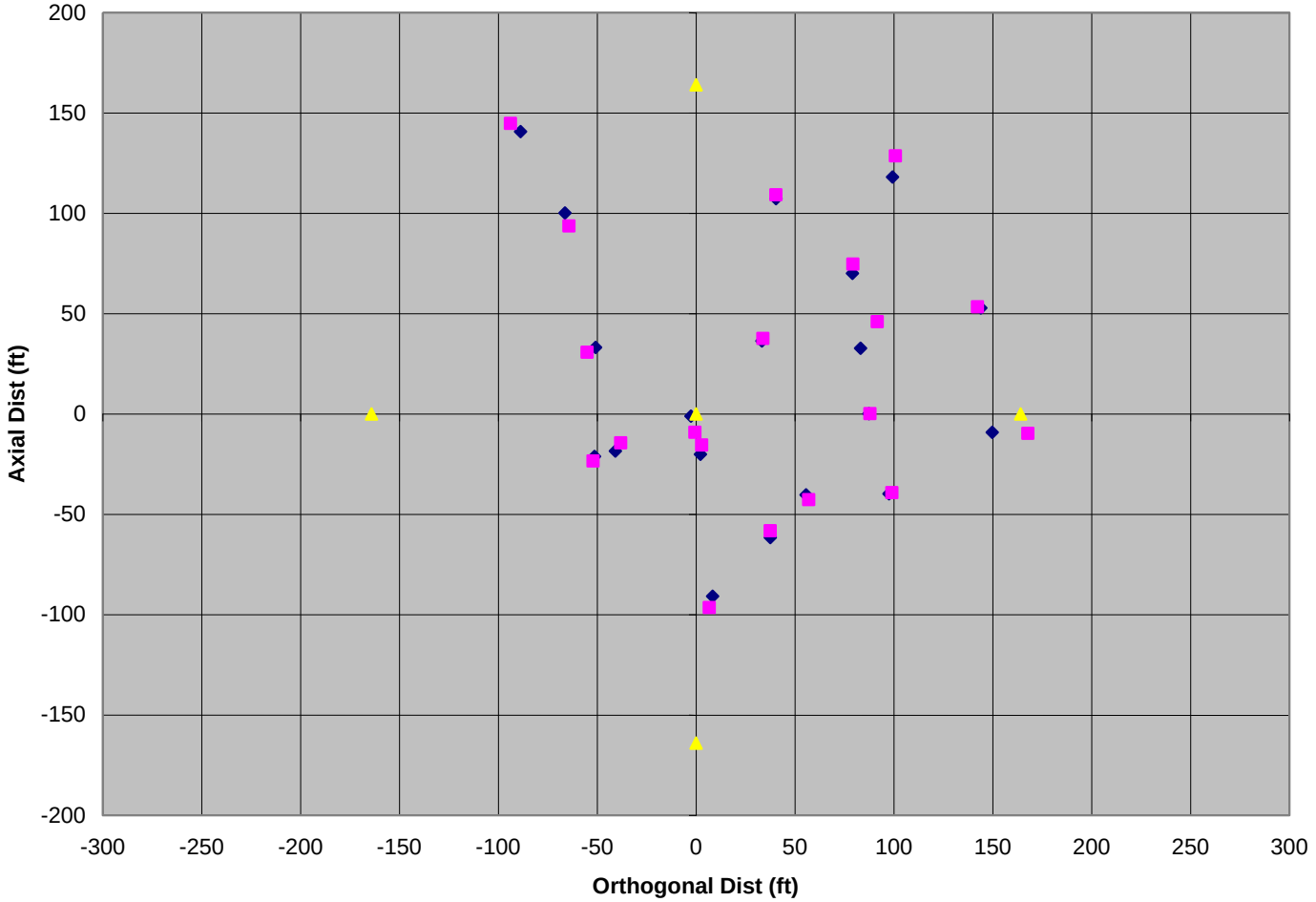






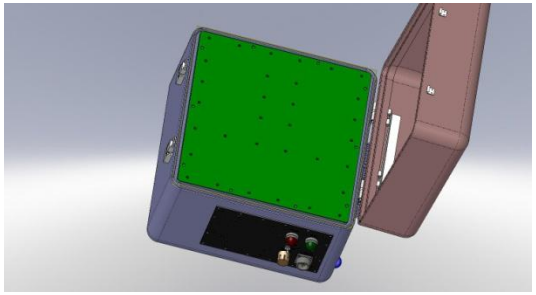
Summary of rocket impacts vs. processed

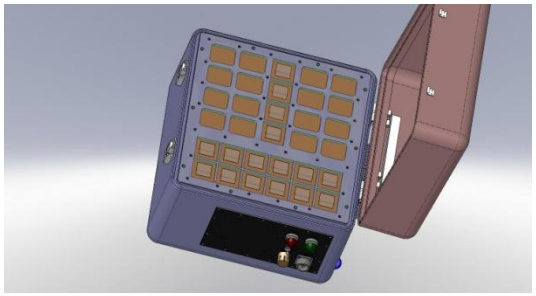
Radar Rocket Scoring Using STVS

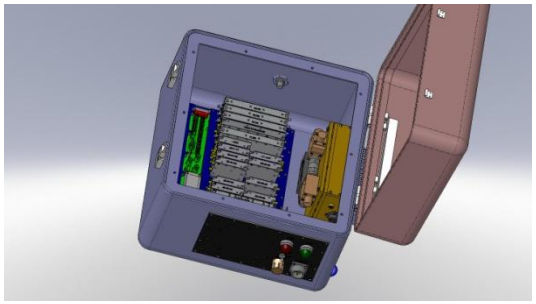


(Overall circular RMS error = 7.3 feet/2.2 meters)

Conceptual radar design







Government & service contractor POC's

- Training Requirements/Doctrine:
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  - Mr. Ron Moring – Army Aviation Training Specialist - ATSC, TCM-Live, LTD
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- Engineering/Development/Production:
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- Operations:
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Questions / comments ?

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Thank you