Aerial Weapons Scoring System (AWSS)

Presented at NDIA 47th Annual Targets, UAVs and Range Operations Symposium 10/23/09 by Derek Foster, Program Director, Electronic Systems, Meggitt Defense Systems Inc. (949) 465-7700 ext 2041 derek.foster@meggitt.com
What is AWSS?

- 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

- Six 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 and another (1) System at Camp Casey, South Korea.
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 / boresight 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)
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

Target Panel

Radar Antenna Mounting Bar

RILS

Tilt Switch

Hit Port

Radar Antenna

WLAN Antenna

Battery

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Bullet Hit Scoring Moving Target

- Radar Antenna
- Radar Antenna Mounting Bar
- RILS
- Hit Port
- Tilt Switch
- TIS
- Battery
- Radar Antenna
- Radar Antenna Mounting Bar
- RILS
- WLAN Antenna
Bullet Area Scoring

BCS is placed 25-meters in front of target.

Approximate Radar Fan (not to scale)

~20 meters high

~25 meters wide

~25 meters wide

Target Panel

Radar Antenna

BCS Radar Mount

Battery

WLAN Antenna

BCS

TIS

Hit Port

Tilt Switch

Batt

WLAN

Antenna
Bullet Hit Scoring Display

<table>
<thead>
<tr>
<th>File #</th>
<th>Target</th>
<th>Date/Time</th>
</tr>
</thead>
</table>

- **File #**: 00007
- **Target**: V23
- **Date/Time**: 20-Jul-2014 13:49:33

**Engagement**
- **Engagement**: 7 of 9

**Status**
- **Status**: 

**Burst**
- 1: 13:49:37.0 - 7 hits - 0
- 2: 13:49:39.0 - 8 hits - 0
- 3: 13:49:41.0 - 10 hits - 8

**Hits To Kill**
- **Hits To Kill**: 1

**Hit Count**
- **Hit Count**: 8 of 25

**T-72 Front**

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Bullet Area Scoring Display

Image of a computer interface displaying bullet area scoring data.
Laser Scoring Subsystem (LSS)
Missile Laser Track Display

![Missile Laser Track Display Interface](image)
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Missile Timeline Display

- **Target**: V31
- **Date/Time**: 22-Jul-2004 13:34:03
- **Lat Pos**: PP2
- **Target Up**: 13:34:05
- **Target Down**: 13:34:19
- **Range**: 3162 meters
- **Laser Code**: 1111
- **TDF**: 11 sec
- **Mode**: LOBL
- **Remark**: Laser energy on target during offset period.

<table>
<thead>
<tr>
<th>Laser Track Time Line</th>
<th>Time</th>
<th>Count</th>
<th>Laser Status</th>
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<tr>
<td>0.0</td>
<td>13:34:05</td>
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<tr>
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<td>13:34:08</td>
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</tr>
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<td>3.0</td>
<td>13:34:10</td>
<td>Offset</td>
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<tr>
<td>7.2</td>
<td>13:34:12</td>
<td>Offset On Target</td>
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</tr>
<tr>
<td>8.0</td>
<td>13:34:13</td>
<td>On Target</td>
<td></td>
</tr>
<tr>
<td>14.1</td>
<td>13:34:13</td>
<td>On Target</td>
<td></td>
</tr>
</tbody>
</table>

- **Ready**

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Rocket Scoring Subsystem

Target Panel

- TIS
- Battery
- Hit Port
- Tilt Switch
- Temperature Probe
- WLAN Antenna

- RAS
- GPS Antenna
- Microwave Mast
- Battery
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

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.

- Evaluation of Radar for Short range, Rapid Fire Rocket Scoring
  - NAWC/WD Targets System Division, Point Mugu/Port Hueneme is cooperating with multiservice Army (PM ITTS, TMO) and Air Force (86th FWS/ACC) 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 is 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
Government & Service Contractor POC’s

Training Requirements/Doctrine:
- CW5 Steve Kilgore – USAACE, Gunnery Branch, Ft. Rucker
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- CW4 Ed King – USAACE, Gunnery Branch, Ft. Rucker
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Engineering/Development/Production:
- Mr. Barry Hatchett – AWSS PD, PEO-STRI, PM-ITTS, Targets Management Office
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Operations:
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- Mr. Troy Stevens – AWSS Operations Manager – Warrior Training Alliance, CSC
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Questions / Comments?