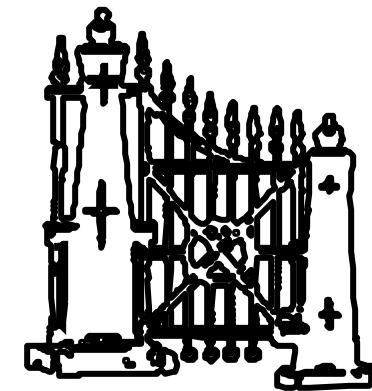
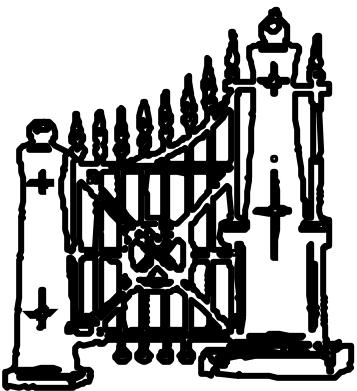


L lethality, Survivability, Mobility and
Sustainment for America's Army

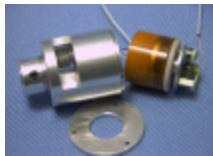
The Value of Systems Engineering and Integration in OCSW Development



John Edwards
TACOM-ARDEC

Objective Crew Served Weapon

Technology & Design Innovations



Mini Electronic Time Fuze w/ Point Detonating/Self Destruct Capability



Precision Air-Bursting
25 mm Munition, 2 km Range



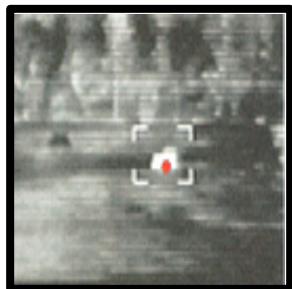
Armor Piercing Munition



Ammunition Velocity Correction



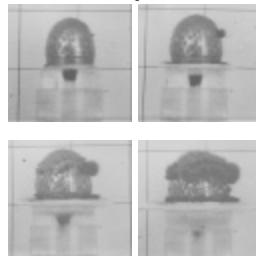
Impulse Averaging Soft Recoil
(No Sandbags Required)



Thermal Target Tracker



OICW's 1 km Thermal Module



Controlled Fragmentation Warheads



Lightweight (< 38 lb)
2-man Portable System

OCSW ATD EXIT CRITERIA

Range Measurable						
	MK19	M2	BASELINE(S) M240B	THRESHOLD	OCSW ATD	GOAL
I. <u>LIGHTWEIGHT</u>						
-SystemWeight (no Ammo), Lbs	144lb	128 lb	43.4 lb	57 lb		38.6 lb
- Crew (2 Man) Portable Modules (Transport Module Weight w/ ammo), Lbs	76 lb	84 lb	24.2 lb	38 lb/person		35 lb/person
II. <u>LETHALITY</u>						
- Accuracy / Dispersion (deflection error @ 600m)	-	-	-	2 mils		0.5 mils
- Fuze Function Set by Fire Control	N/A	N/A	N/A	Single Shot		Full Auto
- Air burst Point Range Error (known range, 600 m)	N/A	N/A	N/A	10 m (+/- 5m)		4 m (+/- 2m)
- Defeat of Defilade Target	Minimal	None	None	Yes		Yes
- High P(i) (*1)	x	y	z	3x / 12y / 8z		6x / 24y / 16 z
- Armor Penetration (at 0 deg. obliquity)	2"- 3" RHA @ 1,500 m	3/4" HHA @ 1,500 m	1/2" HHA @ 800 m	2" RHA (*2) 1,000 m		2" HHA (*2) 2,000 m
- P(h), Lt Vehicle Target @ 1,000m (Two 5 rd bursts; stationary 2.3 x 2.3m target)	-	-	-	.35		0.75
III. <u>DAY / NIGHT CAPABILITY</u>				1000 m		2,000 m
- Demonstrate Thermal Module				(modular interface to OCSW) (*3)		
IV. <u>LAND WARRIOR COMPATIBILITY</u>			Simulation Measurable		LW Interoperable	LW Wireless Interoperability
Based on Government approved Modeling & Simulation:						
V. <u>SURVIVABILITY</u>						
- Casualty Reduction (*4)				40 % Reduction		90 % Reduction
VI. <u>SUSTAINABILITY</u>						
- Lbs Ammo/ "Kill" (*1)	111	117	25	20		6
VII. <u>AFFORDABILITY</u>						
- Cost /'Kill' (Ammo) (*1)	\$1,420	\$600	\$130	\$300		\$130
- Design to Avg Unit Production Cost (HE Ctg)	\$ 24 (15)	\$ 2	\$.55	\$ 29 (incl. Facility)		\$ 22

* 1 - Weighted AMSAA Analytical Model: Avg: 200-2000m; Standing/Prone/Defilade (5/20/75 %). "Kill" refers to fraction of threat squad incapacitated; current systems have significantly less incapacitation capability against defilade targets. AMSAA model not representative of actual operational engagement scenarios. Rev: 21 Jul 98 3/03/00 - JHE

* 2 - Test Warhead Only (no fuze). ORD will require 2" HHA capability.

* 3 - FUE Goal is 2,000 meter capable thermal module. ATD will assess weight vs. range of available uncooled thermal sensors.

* 4 - Reduction from small arms inflicted casualties in TRAC-WSMR CASTFOREM high resolution scenarios.

System Error Budget

OCCASION-TO-OCCASION

Range determination error
Air Density (Air Pressure & Air Temperature)
Coriolis (earth rate) (Latitude & Firing Direction)
Cant Angle
Cant Zeroing
Site Angle
Site Angle Zeroing
Muzzle Velocity Error (Temp.)
Fire Control Solution
Static Boresight (weapon)
Static Boresight (FCS)
Jump - Vertical
Jump - Horizontal
Gun Zeroing
Cross Wind Velocity
Cross Wind Direction
Range Wind Velocity
Range Wind Direction

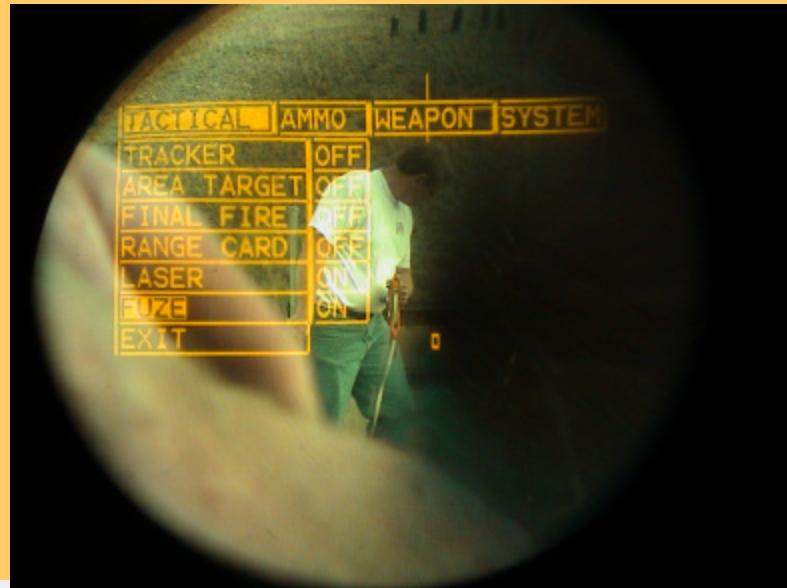
BURST-TO-BURST (B-B)

Initial Aiming
B-B Dispersion - Vertical
B-B Dispersion - Horizontal
T&E accuracy error (vertical)
T&E accuracy error (horizontal)
Visual Resolution
Muz. Vel. (lot-lot)

WITHIN-BURST (W-B)

Muzzle Velocity (within lot)
Muzzle Velocity Correction
W-B Weapon Dispersion - Vertical
W-B Weapon Dispersion - Horizontal
Ammunition Dispersion - Vertical
Ammunition Dispersion - Horizontal
Drag Variability
Projectile Mass Variation
MV Correction Algorithm
Fuze Timing

USER Evaluation of Operational Utility



Nov 2000

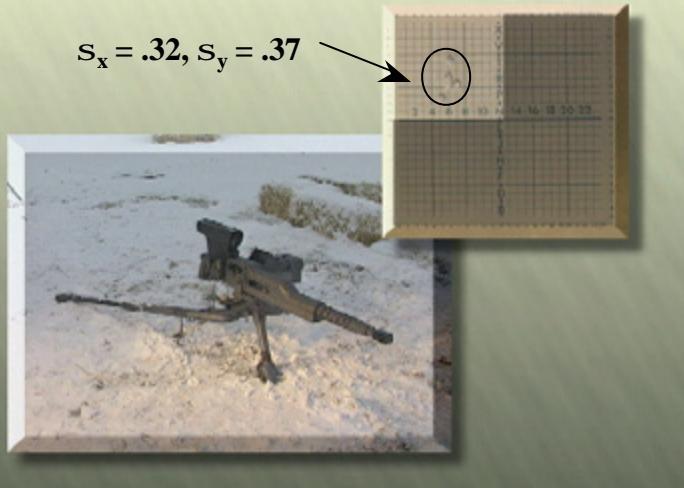
Exterior Ballistic Performance

Minimal Weapon Dispersion

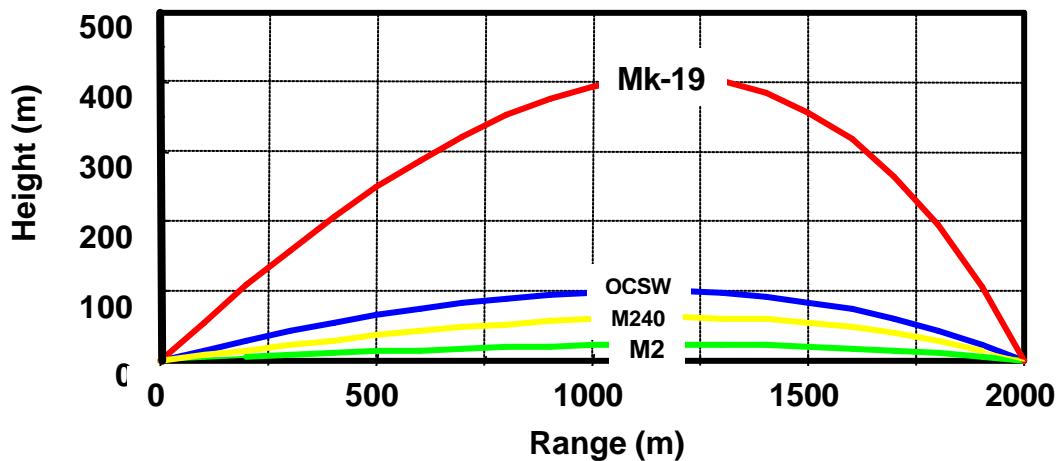
$$S_{xave} = 0.5 \text{ mrad}, S_{yave} = 0.5 \text{ mrad}$$

5 round burst, no sandbags, 100m target

$$S_x = .32, S_y = .37$$



- Ammunition dispersion demonstrated at less than 0.2mils from a Mann barrel.
- Ammunition dispersion demonstrated at less than 0.4 mil from the OCSW weapon in full automatic fire.



Time of flight to 2000 meters
half that of the MK19.

CREW SERVED WEAPON SYSTEMS

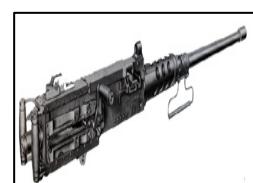
Heavy & Medium Machine Gun Comparisons



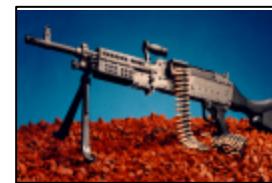
[MK 19](#)
(40 mm)



[Striker](#)
(40 mm)



[M2](#)
(.50 Cal)



[M240B](#)
(7.62 mm)



[OCSW](#)
(25 mm)

GUN	76 lbs		84 lbs	27.3 lbs	27/23 lbs
MOUNT	68 lbs	70-80 lbs (System)	44 lbs	15 lbs	11/9 lbs
FCS/Thermal	5 lbs		5 lbs	4.5 lbs	7/6 lbs
AMMO	59.5 lbs (48 rds)	59.5 lbs (48 rds)	38 lbs (100 rds)	18 lbs (200 rds-**)	28/28 lbs. <u>(62rds)</u>
TOTAL	208.5 lbs	139.5 lbs	171 lbs	64.8 lbs	73/64 lbs

OCSW Weight
60 % < M2, MK19

OCSW Defeats
Defilade Targets

Current/FUE

Logistics Comparison (Weight and Portability)

Conventional Weapons



28 Weapons

2136 Lbs

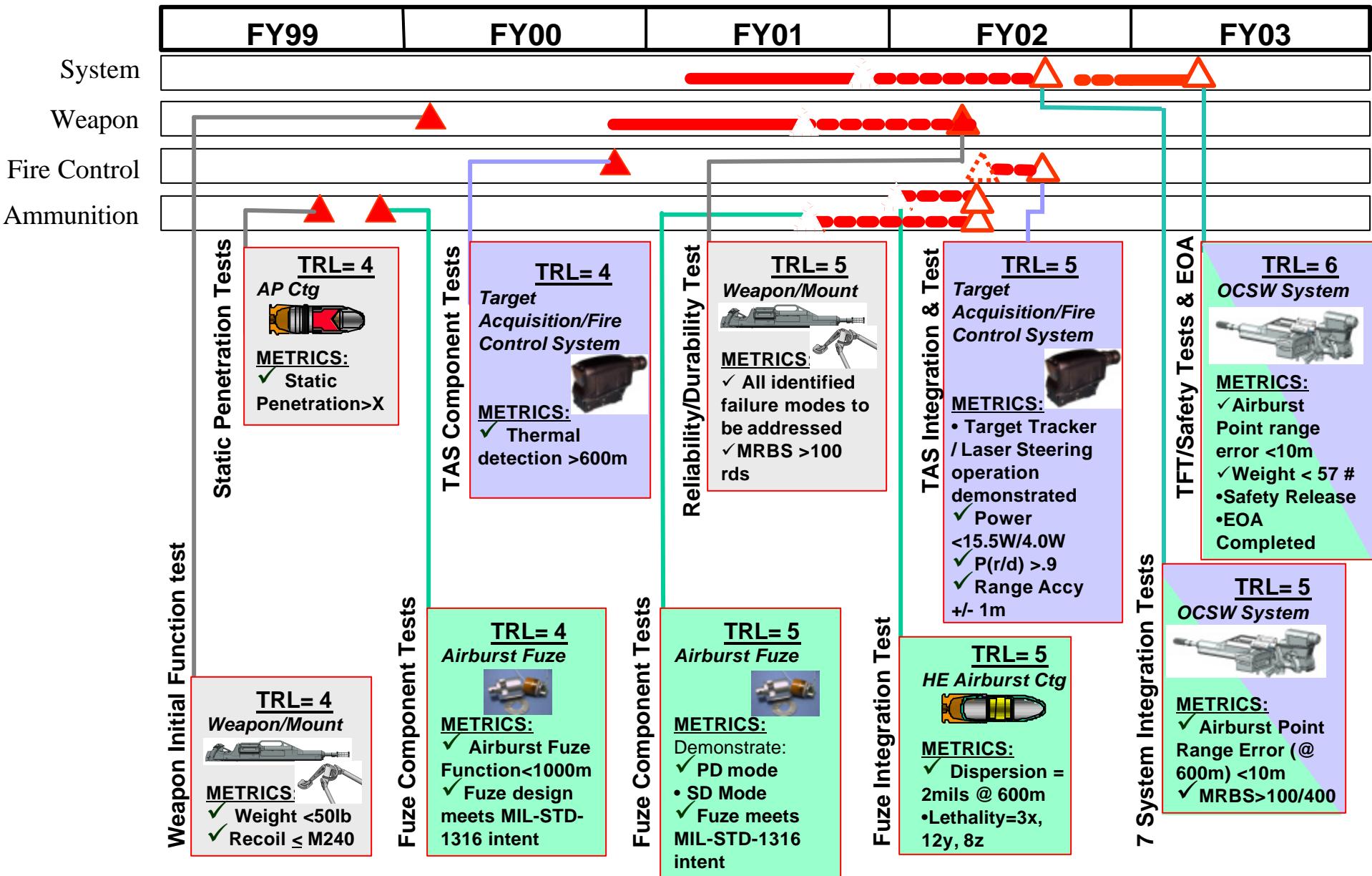
OCSW Weapon



28 Weapons

1134 Lbs

Objective Crew Served Weapon System



OCSW System Integration Summary

- 5 of the 7 System Integration Tests have demonstrated maturity growth led by General Dynamics AS group
- Remaining 2 Systems Integration Test will increase reliability and refine dynamic subsystem interaction