



Product Manager  
Soldier Protective Equipment

# The Soldier

*Our Strength and Purpose*

# Product Manager Soldier Protective Equipment Female Soldier Initiatives & Body Armor Update

20 March 2018

LTC Ginger L. Whitehead  
Product Manager, Soldier Protective Equipment  
(703) 704-9321  
[Ginger.l.whitehead.mil@mail.mil](mailto:Ginger.l.whitehead.mil@mail.mil)



# Evaluation Practices To Determine Effectiveness of PPE



- **DEVELOPMENTAL PHASES:** The Army relies heavily on anthropometric studies and Soldier feedback to make adjustments to body armor designs and sizes. Until recently our personal protective equipment was designed to fit the 5<sup>th</sup> to 95<sup>th</sup> percentile Soldier. With our recent introduction of expanded sizes, our personal protective equipment is designed to fit the 2<sup>nd</sup> to 98<sup>th</sup> percentile Soldier. We continuously look to industry in the development of new armor materials to decrease armor weight for improved mobility
- **DEVELOPMENTAL AND OPERATIONAL TESTING:** Female Soldiers participate as part of the overall ground Soldier platoons and squads to gain valuable assessments of equipment performance in tactical scenarios and operational environments. Specific vehicle ingress/egress trials, individual movement tactics, urban operations, live fire ranges and marksmanship comparisons, road marches, obstacle course maneuvers are all examples of the activities conducted during a field user assessment. The test team controls and observes these events to collect timing and observational data. These also include assessments of fatigue and heat stress through physiological measures and observations
- **HUMAN FACTOR EVALUATIONS (HFE):** Female Soldiers are part of the HFE process and participate in the evaluation and critique of personal protective equipment, as well as provide user acceptance reporting as part of the Test Resource Planning (TRP) process vetted through United States Army Forces Command (FORSCOM). HFEs measure detailed and quantitative assessments of fit, comfort, and function of protective equipment. These include Range of Motion (ROM) measures, donning and doffing trials, Functional Movement Screening (FMS) for stability, and area of coverage measures. Often these HFEs compare new equipment and legacy systems side by side in a counter-balanced test design. Testing personnel measure all Soldiers participating in user assessments and operational tests to determine their individual percentile rankings for various body dimensions and to initially size and fit the tested equipment. The New Equipment Training team validates this fit
- **THE SOLDIER'S INFLUENCE:** The Army documents and qualifies the individual Soldier's personal experience with the PPE through Likert Scale survey responses regarding fit and comfort. This process serves to influence system design improvements, fine-tunes fit and function issues, and drives not only the design modifications for female Soldiers, but also the establishment of the most accurate sizing guidelines and tariffs across the Army's population. Upon redeployment, all Soldiers complete a survey to provide information on the equipment to include PPE fielded for use in combat. These surveys inform required modifications and upgrades to Soldier equipment





# Timeline and Process to Obtain Equipment in Supply Channels



## ▪ Equipment already in the supply channels:

- Core Soldier Organizational Clothing and Individual Equipment (OCIE), to include PPE, is sustained by the Life Cycle Management Command, TACOM. The Central Management Office controls and cross-levels Army OCIE assets among Central Issuing Facilities (CIFs). Soldiers obtain OCIE items from the CIF.
- Combat equipment is provided to all Soldier prior to deploying to Named Operations through the Rapid Fielding Initiative.

## ▪ Timelines for the above:

- If an item is stocked in the CIF, the item should be immediately available
- If an item must be requisitioned from Defense Logistics Agency (DLA): Requisitions are normally filled within 2-3 weeks
- If an item is on backorder, the time to fill a request depends on the production timeline of the vendors to fulfill the backorder

## ▪ Alternative Equipment

- Units can procure alternative OCIE using unit funds via General Services Administration (GSA) or other means such as Government Credit Card purchases when it falls within regulatory and statutory restrictions
- Timelines vary based on type of equipment, quantities required, and manufacturing lead times





# Equipment Procurement for Unique Fits Not in Normal Supply Systems



- PPE is designed to fit 5<sup>th</sup> to 98<sup>th</sup> percentile of Soldiers with expanded alternate sizes
- Soldiers are fitted at Central Issuing Facilities (CIFs) or Rapid Fielding Initiative (RFI) fieldings to ensure optimized PPE sizes (i.e., helmets, soft & hard armor)
- On a case-by-case basis for sizes outside of this range, Soldiers are measured for special deliveries
- RFI Fixed Issue Points (FIPs) are at various locations ( CONUS/OCONUS – Fort Bliss, TX; Fort Hood, TX; Buehring Kuwait and Bagram Afghanistan) with prepositioned equipment to replace items in the event of loss, damage or poor fit due to weight loss/gain.







# Training and Combat Equipment



## Is the same equipment used in training as for real world missions?

Soldiers who have orders for a deployment receive and train with real-world mission PPE prior to deployment. Soldiers who have not received orders for deployment on a named operation train with PPE issued to them based on Military Occupational Specialty (MOS) and environment.

## Is all combat equipment issued for training? If not, why?

Soldiers receive equipment based on mission and MOS. Soldiers train with the equipment they are issued. When a Soldier is deploying for a named operation, they may be fielded different equipment through a Rapid Fielding Initiative based on the threat and environment of the deployment.

In some training scenarios Commanders may use hard armor training plates, (non-ballistic protection), to avoid un-necessary damage to real-world equipment. The training plates simulate the weight and feel of real-world hard armor plates.





# Methods Used to Leverage New and Changing Technology to Improve PPE for Women



- Continued R&D efforts supporting high strength polyethylene tape, harder and stronger ceramics, and next generation Kevlar
- Continued collaboration with industry and academia and establishment of Cooperative Research and Development Agreements
- Continue to include the appropriate demographic/cross-section of the Army in all developmental and operational tests, and Human Factors and User Evaluations
- Close ties with combat developers (user community) and adjusting requirements as needed
- Share data and lessons learned with other Services and other partner Nations



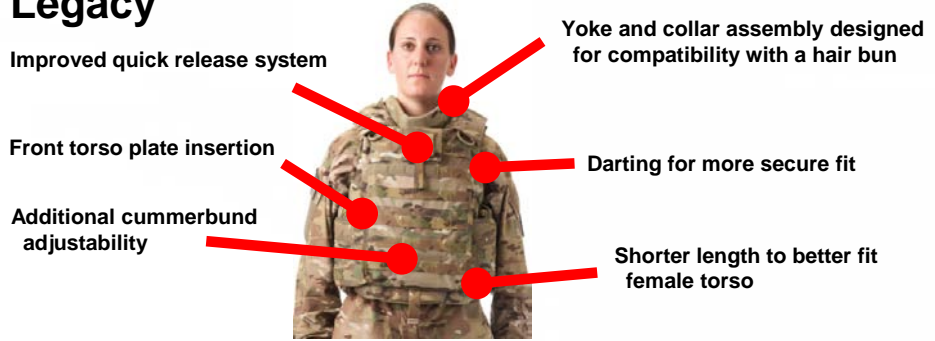


# Legacy



## Female Improved Outer Tactical Vest (FIOTV) Legacy

The base female IOTV provides several fit improvements for the female Soldier while providing the same high level of ballistic protection against conventional fragmenting munitions and 9mm handgun rounds that is provided by the standard IOTV. Rifle threat protection is provided when hard armor torso and side plate inserts are used.



Legacy IOTV non gender specific sizes (11)
XS, SM, MD, MD-Long, LG, LG-Long, XL, XL-Long, 2XL, 3XL, 4XL

8 new female sizes
XS, SM, SM-Long, MD, MD-Long, LG, LG-Long, XL

## Female Protective Under Garment (PUG) Legacy

### PUG



Legacy PUG non gender specific sizes	
Nomenclature	Sizes
PUG	XS-3XL (24"-46+" waist)

### POG



7 new female sizes	
Nomenclature	Sizes
Female PUG	XS-3XL (34"-48+" hip)







# Next Generation Torso Extremity Protection Female Improvements



- **Modular Scalable Vest (MSV)**
  - Three (3) expanded sizes for female and small statured male Soldiers are Small-Long, Small-Short, and X-Small-Short (available FY19)
  - Two (2) expanded size plate carriers (6x6, 6x8) to accommodate female and small statured male Soldiers
- **Female Ballistic Combat Shirt (FBCS)**
  - Five (5) sizes for female Soldiers: XS, SM, MED, LG, XL
  - Shorter arm lengths
  - Hair bun cut-out in the back of the collar
  - Flared sweep for wider hips and to prevent the shirt from riding up
- **Blast Pelvic Protector (BPP) and Load Distribution System (LDS)**
  - Four (4) core sizes (SM, MD, LG, XL) currently available
  - Two (2) alternative sizes (XS, XXL) planned for FY19
  - LDS will be available late FY18 with optional shoulder harness to accommodate all body types







# Head Protection Female Specific Adjustments



## Common female feedback from Human Factor Evaluations

- Chin strap fits poorly
- Retention straps interfere with peripheral vision and ear lobes
- X-Back interfered with hair buns



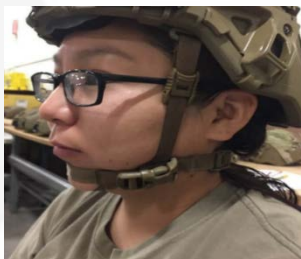
Poor chin strap fit



X-Back

## Solutions

- Retention straps redesigned to reduce peripheral vision and ear interference
- Female specific H-Back design being implemented to fit around hair buns
- Solutions evaluated during HFEs and widely accepted by female Soldier community



Correct chin strap fit



H-Back



# Vital Torso Protection Plate Sizes

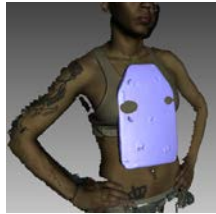
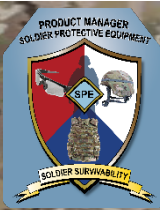


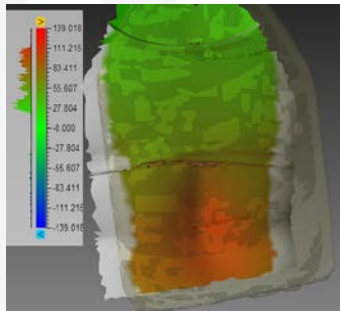
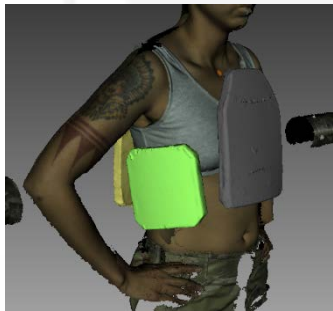
Plate Carrier

Small Plate

Extra Small Plate

### Example:

Extracting plate location in order to determine location of plates and relevance to vital organ coverage



TORSO PLATES	
Extra Small Short	
Extra Small	
Small Short	
Small	
Small Long	
Medium	
Large	
Extra Large	
SIDE PLATES	
Small	
Medium	
Large	

## PM SPE conducted two efforts: Human Factor Evaluations and Fit Test with Soldiers

- Testing Agency: Army Test and Evaluation Command
- Three additional ESAPI sizes evaluated: XSS, SS, SL
  - One additional ESBI size evaluated: XS

## Evaluation of SPS Vital Organ Coverage using Surface Scanning and Image Processing

- Air Force Research Laboratory (Anthro Lab)
- First time AFRL/ARL conducted full body scanning using a hand held scanning system
  - Data is currently being analyzed

New Sizes

### Measurement Locations:

