

EBSS-RSO

EXPLOSIVES BLAST SHIELD SYSTEM

"WE EXPECT INNOVATION. THE LIVES OF MY TEAMMATES AND THE SUCCESS OF OUR MISSION DEPEND ON ME"
EXCERPT, NAVY SEAL ETHOS

The EBSS-RSO is an Innovative Operator based solution¹ designed with the intent to reduce Range Safety Officer (RSO) Blast Over Pressure (BOP) exposure as brain injuries and mental health issues become an increasing concern. As our medical and scientific experts continue to analyze the cause of Traumatic Brain Injury (TBI) an all-in approach is needed to develop technologies to reduce exposure to BOP. DoD studies² have demonstrated that some military personnel experience cognitive deficits in delayed verbal memory, visual-spatial memory, and executive function after firing heavy weapons and shoulder fired rockets. Unchecked, these deficits may adversely affect operational readiness and potentially cause decreased veteran quality of life.

The BOP experienced by RSOs during training events with Carl Gustav rockets, as recorded by the B3 Blast Gauge[®], have a typical range of 7-9 psi with a maximum training exposure of 13 psi. BOP waves of greater than 4 psi³ have potential to cause damage⁴. Excessive BOP is thought to contribute to Traumatic Brain Injury (TBI) and has a history of causing memory loss and sleep disorders within the Naval Special Warfare (NSW) community, but an alarming new injury pattern is emerging⁵. Scientific experts are now exploring cases from chronic blast exposure that are showing a "distinct and previously undescribed pattern of interface astroglial scarring at boundaries between brain parenchyma and fluids, and at junctions between grey and white matter⁶." In contrast, similar civilian cases of brain injury without blast exposure did not show astroglial scarring. Further study is needed but NSW has taken lead studying the high suicide rates of its veterans and it's believed that repeated BOP exposure may be part of the cause in addition to other factors⁷.

Initial testing has shown that the EBSS-RSO patented design significantly reduces BOP experienced by RSOs while firing rockets by shielding them and redirecting the blast waves away from the shooter. By integrating the EBSS-RSO into a Carl Gustav rocket training event, BOP readings on the RSO were reduced from 10-13 psi to 1-2 psi (measured on the RSO helmet). Although the shooter and shooter assistant are not receiving nearly as much repetitive BOP exposure as the RSO it is the intent of the EBSS-RSO to minimize its reflection while contributing to the exploration of techniques and technologies to reduce the effects of BOP⁸.



Figure 1 Carl Gustav Firing w/EBSS-RSO

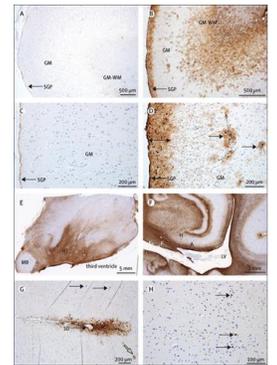


Figure 2 this is an image of Interface Astroglial Scarring (IAS) which Dr. Peal is reporting as the hallmark of blast exposure injury. Image from The Lancet Neurology



Figure 3 depicts how blast waves get redirected and captured within EBSS-RSO panels

¹ Innovative Operator is a JEDI Innovation, LLC term used to describe operators who take charge of their ideas to help their fellow teammates.

² Military-related traumatic brain injury and neurodegeneration, June 2014. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4255273/>

³ https://blastinjuryresearch.amedd.army.mil/assets/docs/injury_prevention/fy15/blast_exposure/Blast_Exposure_from_Shoulder-Mounted_Rocket_Launchers.pdf

⁴ Pressure Thresholds: What Your Medic Needs to Know. <https://quwdb2fvzocb4glwropj20o-wpengine.netdna-ssl.com/wp-content/uploads/2014/04/PressureThresholds-WhitePaperV3.pdf>

⁵ Reference SOFX article "Ryan's Story", <https://www.sofx.com/ryans-story/>

⁶ Characterization of interface astroglial scarring in the human brain after blast exposure: a post-mortem case series. Lancet Neurol/Aug 2016. Abstract, <https://www.ncbi.nlm.nih.gov/pubmed/27291520>

⁷ Blast Article Summer 2018, Page 7

⁸ Initial testing done with Dr. Duckworth and the Neurotactical Research Team



Furthermore, ongoing **studies of repeated blast exposures**, (as part of standard training operations) indicate a cumulative effect may exist causing transient cognitive changes, gait alteration, and vascular response in certain individuals with repeated sub-concussive blast exposure⁹. The EBSS-RSO is intended to help shield the RSO due to their increased exposure to BOP. On average an RSO within a training command (that regularly shoots rockets) can be exposed to BOP from 72-108 rockets throughout their tenure¹⁰. Initial testing has shown the EBSS-RSO to significantly reduce RSO exposure and is the result of countless hours of trial and error while working with Dr. Josh Duckworth and his Neurotactical Research Team¹¹.



Figure 4 EBSS-RSO just prior to firing

Training: The EBSS-RSO was designed to help protect RSOs during the firing of rockets, heavy weapons and artillery while allowing them to perform their normal duties. RSO's can easily exit and enter the EBSS-RSO and have an option to view (and record) the firing by remote camera or through a clear blast proof window (see figure 5). The EBSS-RSO is designed to work as a single unit but our initial testing has shown that multiple rocket firings, done in unison, can potentially compound the effects of BOP yielding dangerously high readings¹². We recommend installing the EBSS-RSO across all firing lanes to offer greater protection from neighboring firing lanes and to expedite training events.

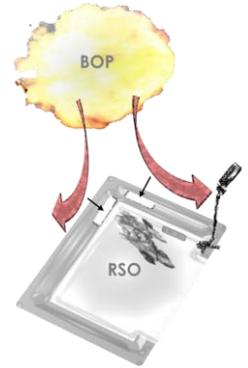


Figure 5 small black arrows depict window locations

The System Design: The EBSS-RSO sits atop a steel cage and is built to survive 10 years of range service. Aside from the addition of the clear viewing window the EBSS-RSO is unchanged and will yield BOP protection consistent with the beta model tested by the Neurotactical Research Team.

EBSS-RSO Tech-Kit:

GromaTech Ruggedized Video Recording and Display System: The EBSS Tech-kit is a video viewing and recording system that is easily installed/removed. The kit is designed to provide the RSO with an enhanced view of the firing in real-time while safely located behind the protection of the EBSS. The recording feature of the kit enables playback for future analysis. The Tech-kit is delivered in a pelican case and includes a GoPro Hero5 Black w/GoPro Hero5 Black Super Suit case, Jaws – Flex Clamp, Samsung Tablet (iOS/Android), SanDisk Extreme 64GB MicroSD, Juggernaut Case Tabs 8.4, RAM Large Tough Claw and RAM Double Socket Swivel Arm.



Figure 6 Samsung tablet with mounting arm and GoPro camera

The Wireless Blast Gauge® System: The EBSS-RSO includes five Wireless Blast Gauges® for industry-leading objective blast monitoring. Unit medics and leadership are alerted wirelessly when further evaluation is required after blast exposure. Detailed data can be downloaded and analyzed by medical personnel using the user-friendly mobile application, allowing them to Measure the Unseen™ and take action to reduce blast overpressure exposure now.



Figure 7 B3 Blast Gauge® System

EBSS-RSO Continuing Research: EBSS-RSO is the first product rapidly developed to tackle BOP. Both Orion Solutions and its development partners welcome opportunities to further research EBSS-RSO to enhance safety across a number training environments. For inquiries or more information, contact Orion Solutions at 904-394-0934 or email jmurphy@orionsolutionsllc.com.

⁹ Cognitive changes and dementia risk after traumatic brain injury: Implications for aging military personnel, Alzheimer's & Dementia Vol. 10, June 2014.
¹⁰ Based on having an RSO cadre of 10-12, with limits of 6 Carl Gustav rockets fired per 24-hour period covering 6 classes of 25-75 students per year.
¹¹ Neurotactical Research Team YouTube Video <https://www.youtube.com/watch?v=clvEdnMQGqA>
¹² Our tests showed two rockets fired near simultaneously in lanes next to each other had potential to produce BOP waves of 12 psi.

