

Measurement

[Design](#)



The experiments to be conducted are designed to prove the capability and effectiveness of the SPIES. Comparisons between current Line and Range FOSS Scoring methods and SPIES will be made through Trial and Observation methods. Fidelity and accuracy of data obtained through both methods will be compared and evaluated In terms of Effectiveness, Performance and Suitability. The end result will demonstrate the benefits and capability gained by introducing SPIES to Target Services Australia's (TTS) inventory.

Measurement of Effectiveness utility Rationale Measure line and range errors of projectile impact point Removes the requirement for firing ship to provide line error spotters Ann-Surface Gunnery serials can commence without the requirements of visual spotting from the firing unit which results in the open fire range to Increase to the Max effective range of the gun Accuracy of Identifying Impact point (Shots fired/detected) Enables precise analysis of ballistics as advancements in naval gunnery improves A requirement of modern warfare is the increased accuracy of modern naval gunfire.

Precise analysis of weapons practice will enable ships gunnery crews to hone their skills. Detect impact of various calibers of naval non-guided projectiles Enables the system to be used for analysis across the breadth of Naval Surface Units To improve efficiency and gain standardization, the system should be able to analyses a wide Table 1 - Measure of Effectiveness to be tested in experiment Measurement of Performance Utility Operate in up to Sea State 5 Enables year round analysis to occur, even during winter months.

The system must be able to operate in Sea States that Naval Ships would conduct gunnery serials without breach of personnel/equipment safety. Impact detection of up to 350 yards FOSS in excess of 350 yards does not meet accuracy requirements and determined as a miss.

Accuracy requirements set as stated in Operational Requirements Detect Fall-of-Shot in up to 80 rounds per minute System is required to detect Fall-of-Shot at maximum rate of fire for Ann-Surface Non-Guided weaponry Current doctrine for applying Max rate of fire against targets Table 2 - Measure of Performance to be tested in the experiment Measurement of Suitability System must be able to be fitted to existing Surface Targets employed by TTS System just be portable and adaptable to fit different types of surface targets TTS has no plans to procure additional surface targets at this time System must provide a useable fidelity of data required to make accurate assessments of gunnery performance TTS Analysts System must provide the same or improved output of data than existing methods or procurement would be a waste of resources and finances System must provide a performance TTS Customer Extracted data must be able to be put in to terms and descriptions easily understood by the customer Table 3 - Measures of Suitability to be tested in the experiment . The baseline for the experiment will be the current line and range recording method being range; measured from the Target Towing Vessel (TV) utilizing Rake and Video, and line; measured from the firing unit by spotters with binoculars. All Weapon Crews, TTS Analysts and TV Operators will be fully qualified and practiced in the conduct of Anti-Surface Gunnery procedures to ensure elements

throughout the trial are not missed due to lack of understanding of requirements. 4.

The success of the experiment will depend on a number of controllable and uncontrollable factors. In order for achieve success; all factors that can influence the overall outcome must be assessed. Variables are classed into two groups: Controllable and Uncontrollable. As this experiment is focused on the performance of a new capability compared with an existing capability, the controllable variables will be strictly managed and regulated to ensure standardization across the experiment. The uncontrollable variables will need to be monitored to ensure these variables do not affect the outcome of the experiment. Controllable Uncontrollable Staff Training Sea State Rate of Fire

Wind Speed Projectile Type Wind Direction Cartridge Temperature
Precipitation Projectile/Cartridge Lot Number Humidity Internal Ballistic
Settings External Temperature External Ballistic Settings Ducting Target
Attributes (Size, Range, Speed, height) TV Reliability Length of Tow Gunnery
System Reliability Communications Projectile/Cartridge Reliability Table 4 -
Controllable and Uncontrollable Elements 5. The experiment will determine
the impact of the independent controllable variables (inputs) on the
dependent variables (outputs) utilizing both forms of FOSS scoring methods.
6. Inadequate staff training, both in-house and external, may impact on the
successful execution of the experiment. A Megabit Training Systems
representative will be arranged for the duration of the experiment and in-
house training on SPIES will occur prior. Naval units participating will require
successful demonstration and three months. 7.

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Participating Naval units will be firing Ballistic type ammunition manufactured in the same Lot. This will ensure ballistic characteristics of the projectiles and propellant to be of similar composition and characteristics thus reducing the risk of Wild' FOSS. The FIG unit will be allowed to alter its rate of fire on direction of the Experiment Director to trial 'recommended' and maximum rates of fire that the mm Gun is capable of. The OFF unit's rate of fire varies dependent on barrel elevation; however, the variable will not affect experiment outcome for OFF firings. 8. Internal ballistic settings of each participating unit will be specific unto that unit and noted on manual records, detailed later in this document.

External ballistic information such as wind speed and direction, humidity, and temperature will be hared between the units Just prior to the events to ensure a uniform set of inputs are entered. In order for the experiment to proceed, the prevailing weather conditions must not exceed certain thresholds. As most external weather elements are uncontrollable, the experiment will not go ahead unless the weather conditions are within specified parameters.