

ARMAMENT ELECTRICAL EXPLOSIVE HAZARD TESTING IN AUSTRALIA

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Abstract. Avoidance of electrical explosive hazards from a proliferation of electrically initiated explosive devices in ordnance systems in an increasingly intense military electromagnetic environment, requires the proper determination of safe operating distances and procedures for emitter and ordnance combinations. This paper addresses threats arising in such situations. It presents some aspects of the policy, standards, philosophy, analysis and trials work performed in Australia to minimise such threats so that ordnance and weapon systems will remain safe and suitable for service. The current situation and capability in Australia are discussed, together with new and emerging techniques, which may have application in this field. Concern is expressed at the continuing lack of a suitable electromagnetic environment generation capability and the diminishing instrumentation, trials capability and experience within Australia. Recent changes to the role of the Australian Ordnance Council, and the creation of the Joint Armament Logistic Organisation have some potential to ameliorate this situation.

INTRODUCTION

Requirement

The intensity and complexity of the Electromagnetic Environment (EME) in both Civilian and Defence arenas continues to increase. At the same time complex hardware is being fielded which may be sensitive to unintentional electrical stimulation. Electronic control of aircraft, vehicles and other systems is becoming commonplace, and without rigorous design and evaluation, dangerous situations can arise from unwanted effects of the EME on the particular system. Paralleling this growth is, or should be, a heightened awareness of electrical effects including those from electromagnetic radiation hazards to personnel, fuel, ordnance and electronic devices. In addition there is an increasing requirement to establish safe operating procedures and stand-off distances from service emitters to maintain the risk from such hazards at an acceptable level.

Within the Defence arena, the EME intensity can be particularly severe, notably in the restricted confines found above decks of naval vessels or around mobile and fixed transmitter installations. In such situations, due attention must be paid to the hazards to ordnance arising from the uncommanded initiation of Electrically Initiated Explosive Devices (EEDs). Many ordnance items use EEDs to provide electrical initiation of the explosive sequence and without adequate control of Electrical Explosive Hazards (EEH), potentially lethal situations can easily arise. Although EEH can arise from a variety of causes, this paper concentrates on those that arise from Electromagnetic Radiation (EMR).

Terminology

In Australia, all direct and indirect electrical hazards to EEDs come under the general term 'Electrical Explosive Hazards'. The UK uses the term 'RADHAZ' for electromagnetic radiation hazards generally, including hazards to both personnel and armament/explosive. 'Hazards of Electromagnetic Radiation to Ordnance' (HERO) refers to hazards from EMR and is a term unique to the United States Navy (USN) and US Marines. It should be noted, however, that HERO is much more than just a terminology. HERO embraces the quite specific US Navy philosophy of assessment of ordnance electromagnetic hazards, a defined threat environment, igniter statistics, evaluation procedures,

and a host of other related issues, the majority of which have not been adopted by Australia or outside the USN. It is unfortunate that the term HERO is so often incorrectly used as a generic term to denote the electro-explosive hazards of ordnance.

The US Army and Airforce use the term 'RADHAZ'. NATO publications speak of 'Electromagnetic Environmental Effects' (E³) as a general term which, like RADHAZ, embraces EEH as well as electromagnetic threats to other systems and personnel.

Explosives Safety Responsibilities within Defence

As a consequence of the restructuring of the Australian Defence Organisation (ADO), there has been a substantial revision of the roles of various Australian agencies involved with explosives safety. On this matter Department of Defence Circular Memorandum No 20/99 of 27 April 1999 [1] gives the following information:

- The President of the Australian Ordnance Council (AOC) is responsible to Commander Support Australia for the following:
 - development and distribution of explosive safety policy and standards,
 - assessments of the safety and suitability for service of explosive ordnance procured or modified for use within the Australian Defence Organisation (ADO),
 - safety assessments of explosive ordnance intended for use at trials and demonstrations, and
 - auditing compliance with explosive safety policy and regulations throughout the ADO.
- The Joint Ammunition Logistics Organisation (JALO): responsible for the major logistics functions of replenishment, procurement, warehousing, servicing, distribution and transport of explosive ordnance. JALO provides consultancy services to many Defence Groups in the form of logistics advice, engineering support, and is the initial point of contact for concerns associated with explosives safety in the logistics and operational environments.
- Director-General Naval Materiel Requirements: responsible for defining explosive safety requirements for explosive ordnance handling and storage systems