



DEPARTMENT OF THE ARMY
UNITED STATES ARMY EVALUATION CENTER
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ABERDEEN PROVING GROUND, MD 21005-5055

TEAE-SE

25 June 2012

MEMORANDUM FOR Project Manager, US Army Rapid Equipping Force (PM REF/Westley Brin), 10236 Burbeck Road, Building 316-T, Fort Belvoir, VA 22060

SUBJECT: Amendment 2 Safety Confirmation for the Minehound in Support of Rapid Equipping Force (REF) Equipping

1. References.

- a. MIL-STD-882E, Standard Practice for System Safety, 11 May 12.
- b. Memorandum, Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT), SAAL-PE, 10 Dec 10, subject: Environmental, Safety, and Occupational Health (ESOH) Risk Assessment and Risk Acceptance Guidance.
- c. US Army Test and Evaluation Command (ATEC) Policy Bulletin No. X-12, Software Safety Verification Policy and Guidelines, 15 Jun 12.
- d. Memorandum, DTC, TEDT-TMW, 30 Mar 11, subject: Amendment 1 Safety Confirmation for the Minehound in Support of Rapid Equipping Force (REF) Fielding.
- e. Memorandum, ATC, TEDT-AT-FPM, 7 Jun 12, subject: Recommendation for Safety Confirmation of the Powerhound, ADSS Number 2012-DT-ATC-MIEDD-F4462.
- f. Operation Manual, Minehound VMR2 Dual Sensor Mine Detector, Version 12/2010, GPR-Firmware-Version V75, MD-Firmware-Version V300, Dec 2010.
- g. TB 43-0134, Battery Disposition and Disposal, 19 May 08.

2. Purpose. This US Army Evaluation Center (AEC) Safety Confirmation for the Minehound is provided in support of REF equipping. The purpose of this Safety Confirmation amendment is to address use of Powerhound with the Minehound. A safety assessment in accordance with (IAW) MIL-STD-882E (reference 1a) has been conducted. The overall risk for use of the Minehound system is considered LOW. The warnings, cautions, procedures, and mitigations identified in this document and in reference 1f and 1g should be implemented in order to minimize risk.

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3. System Description.

a. The Minehound (Vallon-VMR2) (figure 1) is a compact, dual-sensor mine detector that combines a metal detector and a ground penetrating radar unit. It is powered by lithium-polymer or D-cell batteries. The Minehound is designed to detect landmines (metallic or plastic with or without metallic parts) or similar buried objects. The system may also be used over shallow waters, provided the search head is not submerged, for detecting mines containing metallic components. The dual-sensor application is intended to reduce the false alarm rate caused by objects such as shrapnel, wire, and other metallic waste.

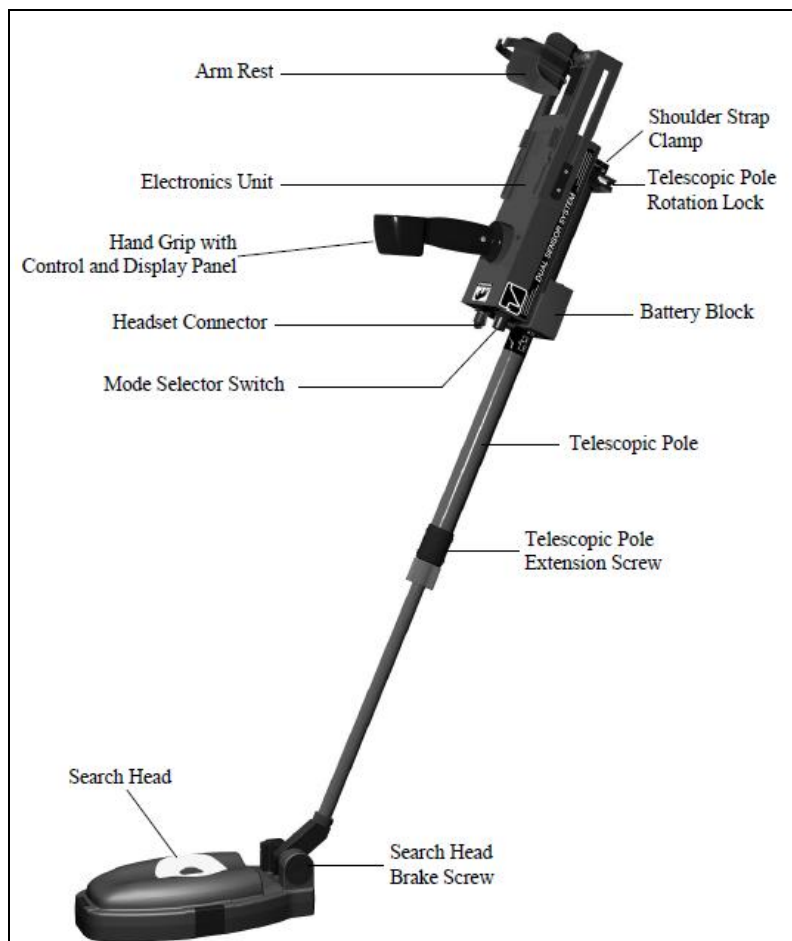


Figure 1. Minehound.

b. The Powerhound consists of an adapter that slides onto the battery rail of the Minehound detector and connects in the same fashion as the Minehound's original battery. The Powerhound kit consists of the adapter, connecting power cable, and battery pouch. The Powerhound adapter weighs slightly less than the Minehound battery. The battery pouch doubles as a carry case for

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the adapter and power cable when not in use and holds fielded BB-2557/BB2590 batteries. The Powerhound is shown below in figure 2.



Figure 2. Powerhound.

4. Evaluation Limiting Factors. Limited testing to support this Safety Confirmation was conducted on a minimal number of Minehound test articles. The scope was sufficient to characterize the basic safety and performance of the system; however, it was not sufficient for fully identifying failure modes or reliability/maintainability issues that may impact system safety.

5. Evaluation Results. This AEC Safety Confirmation is derived through Test Manager analysis of the results of testing conducted by the Yuma Test Center, Aberdeen Test Center, the Naval Surface Warfare Center Dahlgren Division, and a review of referenced documentation. The definitions from MIL-STD-882E were used to assign hazard severity and probability of occurrence of identified hazards. Risk Assessment Codes (RAC) were assigned IAW the guidelines given in the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)) Risk Acceptance Memorandum (reference 1b). The Minehound does not contain safety related software as defined by reference 1c. Identified safety hazards are summarized below.

a. Minor hand injury may result from contact with pinch and crush points created during assembly, disassembly, and adjusting of the telescoping pole or the search head of the

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Minehound, during transportation, or when attaching or detaching the Powerhound. To avoid injury, Soldiers should be instructed to use caution, to follow all assembly, disassembly, adjustment procedures and warnings in the manufacturer's manual (reference 1f), to wear gloves, and to only transport the Minehound in its designated transit case. Adhering to these precautions mitigates the risk of Soldier injury to a Negligible-Improbable hazard (RAC 4-E, LOW Risk).

b. The Minehound is powered by several different rechargeable and non-rechargeable batteries. These batteries are safe under normal conditions, but may become hot and emit smoke or flame when punctured, damaged, or misused. Soldier training and the Operation Manual (reference 1f) should warn Soldiers not to mishandle, mutilate, or short circuit batteries. Soldiers should handle and dispose of batteries IAW Technical Bulletin 43-0134 (reference 1g). The risk of damage or injury from properly handled batteries is assessed as a Negligible-Improbable hazard (RAC 4-E, LOW Risk).

c. Minor burns may occur due to heat generated by the Minehound's electronics panel as the panel may become warm during use. This risk can be mitigated to a Negligible-Improbable hazard (RAC 4-E, LOW Risk) by requiring operators to pause operations whenever the system's electronics panel becomes uncomfortably warm.

d. Minor injury may occur from arm fatigue as a result of operating the system for an extended period of time. This risk can be controlled to a Negligible-Improbable hazard (RAC 4-E, LOW Risk) by requiring operators to limit the frequency and duration of use to less than four one-hour sessions per day, to include frequent intermittent breaks, and to re-adjust equipment as necessary to prevent fatigue or strain. The provided shoulder strap should also be used to distribute the weight.

e. Exposure to electromagnetic (EM) radiation will occur if the Minehound electronics case is opened or damaged. Exposure to EM radiation will result in Soldier injury. This risk can be mitigated to a Negligible-Improbable hazard (RAC 4-E, LOW Risk) by requiring the operator to return the system to the manufacturer (per the OM) if there are any cracks in the system display or if certain error messages are present. If damage to the system display is discovered, operators should immediately stop operation and return the system to the manufacturer for repair or replacement.

f. The search head contains a shield on the top side to prevent EM radiation exposure during normal operation. However, injury may occur through EM radiation exposure if the unshielded bottom of the search head is pointed at personnel. Not pointing the bottom of the search head at personnel during system operation eliminates this risk.

g. The Hazards of Electromagnetic Radiation to Personnel (HERP) safe separation distance was determined to be 0 m (0 ft) (reference 1f). The HERP Maximum Permissible Exposure is

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not exceeded through normal operation. However, IAW the warning in reference 1f, operators must not touch the antenna (search head) when the system is turned on.

h. Serious injury from burns may occur due to a fuel fire initiated by Electromagnetic (EM) radiation when the Minehound is operated near open fuel containers. Ensuring the system is not operated within 3 m (10 ft) of open fuel containers (reference 1f) eliminates this risk.

i. Minehound is not waterproof. Injury may occur due to electrocution if water enters electrical components. This risk can be mitigated to a Negligible-Improbable hazard (RAC 4-E, LOW Risk) by not submerging the system in water. Operators should only use the Minehound to detect buried land targets or targets in shallow water where the search head is not submerged.

j. Frostbite and burns to hands and arms may occur when touching Minehound metal components in extreme hot and cold operating environments. Requiring operators to lower shirt sleeves and wear gloves when operating the system in extreme environments eliminates this risk.

6. Conclusions and Recommendations. This AEC Safety Confirmation is issued for the Minehound in support of REF equipping. A safety assessment IAW MIL-STD-882E (reference 1a) has been conducted. The Minehound has 6 identified LOW hazards. The overall risk for use of the Minehound is considered LOW. The warnings, cautions, procedures, and mitigations identified in this document and in references 1f and 1g should be implemented in order to minimize risk.

a. Hazards identified in paragraph 5 should be eliminated or controlled to an acceptable level. If the hazards are not eliminated, the residual hazards must be accepted by the appropriate decision authority IAW the ASA(ALT) Risk Acceptance Memorandum, dated 10 Dec 10 (reference 1b). The technical or operational limitations or precautions identified herein, needed to prevent injury and property damage during operation, are the responsibility of the Materiel Developer. To permit revision of this Safety Confirmation, all design changes effect by the Materiel Developer to reduce or eliminate hazards identified above will be verified and validated as acceptable through analysis or testing.

b. All Soldiers operating the Minehound must be trained and qualified for use of the system. All operators must also be trained and qualified in Army mine detection doctrine.

c. As with all handheld electronic mine detectors, serious injury or death may occur if the search head (antenna) contacts HERO Unsafe/Susceptible ordnance or their initiators, and triggers an explosion. To avoid this hazard:

(1) Before sweeping an area with the Minehound, operators must visually scan the area to identify any surface-laid manmade objects. They must also clear the area of debris or vegetation that may hide such objects before they begin sweeping.

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(2) Operators must adhere to the following warning in the OM (reference 1i): “Do not touch wires or UXOs (Unexploded Ordnance) with the search head. DANGER OF EXPLOSION!!!” This warning is also noted in the HERO/HERP/HERF Quick-Look Report (reference 1f), identifying the search head as the antenna.

(3) Operators must adhere to doctrinal guidance that any unidentified ordnance is considered “HERO Unsafe” (reference 1l). As such, they must avoid touching it with the search head.

d. This Safety Confirmation is valid only for the current configuration of the Minehound, as described in paragraph 3 of this memorandum. Any modifications to the system, including those from the manufacturer, will necessitate an amendment to this document.

e. This AEC Safety Confirmation does not negate the need for other safety activities or documents required for materiel release IAW AR 700-142.

7. The AEC point of contact is Ms. Anita Williams, TEAE-SE, anita.m.williams42.civ@mail.mil, DSN 298-1376 or commercial (410) 278-1376.

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