

CRM LESSON PLAN REPORT
HHD COMPATIBILITY WITH CREW/COMMS
071-FREBB009 / 02.0 ©

Analysis
21 May 2013

Effective Date: N/A

SCOPE:

None

Distribution Restriction: Distribution authorized to U.S. Government agencies and their contractors only as approved by the MCOE. This determination was made on 02-26-2015. Insert MCOE, FT. Benning, GA

Destruction Notice: Destroy by any method that will prevent disclosure of contents or reconstruction of the document

Foreign Disclosure: FD3 - This training product has been reviewed by the developers in coordination with the MCOE Fort Benning, GA foreign disclosure officer. This training product cannot be used to instruct international military students.

SECTION I. ADMINISTRATIVE DATA

All Course Masters/POIs Including This Lesson

Courses				
<u>Course Number</u>	<u>Version</u>	<u>Title</u>	<u>Phase</u>	<u>Status</u>
9E-F59/950-F38	02.0	Dismounted Counter-IED Tactics Master Trainer	N/A	Analysis

POIs				
<u>POI Number</u>	<u>Version</u>	<u>Title</u>	<u>Phase</u>	<u>Status</u>
9E-F59/950-F38	02.0 ©	Dismounted Counter-IED Tactics Master Trainer	0	Analysis

Task(s) Taught(*) or Supported

<u>Task Number</u>	<u>Task Title</u>	<u>Status</u>
--------------------	-------------------	---------------

Reinforced Task(s)

<u>Task Number</u>	<u>Task Title</u>	<u>Status</u>
--------------------	-------------------	---------------

Knowledge

<u>Knowledge Id</u>	<u>Title</u>	<u>Taught</u>	<u>Required</u>
052-K-00093	Understands Contemporary Operational Environment	Yes	Yes
052-K-00106	Understands Plans and Orders	Yes	Yes
052-K-00121	Military Explosives and Demolitions	Yes	Yes
052-K-00126	Minimum Safe Distance for Explosives	Yes	Yes

Skill

<u>Skill Id</u>	<u>Title</u>	<u>Taught</u>	<u>Required</u>
052-S-00014	Possess Effective Communication Skills	No	Yes
052-S-00007	Ability to Recognize Battlefield Hazard Indicators	Yes	Yes
S0805	Ability to Determine Grid Coordinates	No	Yes
052-S-00010	Ability to Understand Verbal Instructions	No	Yes

Administrative/Academic Hours

The administrative/academic (50 min) hours required to teach this lesson are as follows:

<u>Academic</u>	<u>Resident Hours / Methods</u>		
Yes	0 hrs	10 mins	Discussion (small or large group)
Yes	0 hrs	40 mins	Practical Exercise (hands-on/written)
<hr/>			
Total Hours(50 min):	1 hr	0 mins	

**Instructor
Action
Hours**

The instructor action (60 min) hours required to teach this lesson are as follows:

Hours/Actions

0 hrs	15 mins	Training Event Clean-up/Breakdown (non-FTX)
0 hrs	30 mins	Training Event Prep/Setup (non-FTX)
1 hrs	0 mins	Training Rehearsal

Total Hours (60 min): 1 hrs 45 mins

Test Lesson(s)

<u>Hours</u>	<u>Lesson Number Version</u>	<u>Lesson Title</u>
None		

**Prerequisite
Lesson(s)**

<u>Hours</u>	<u>Lesson Number Version</u>	<u>Lesson Title</u>
None		

**Training
Material
Classification**

Security Level: This course/lesson will present information that has a Security Classification of: FOUO – For Official Use Only.

**Foreign
Disclosure
Restrictions**

FD3. This training product has been reviewed by the developers in coordination with the MCOE Fort Benning, GA foreign disclosure officer. This training product cannot be used to instruct international military students.

References

<u>Number</u>	<u>Title</u>	<u>Date</u>
ATP 5-19 (Change 001 09/08/2014 78 Pages)	RISK MANAGEMENT http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/atp5_19.pdf	14 Apr 2014
DD FORM 2977	DELIBERATE RISK ASSESSMENT WORKSHEET	01 Jan 2014
FB (Safety) Form 385-1-E	Daily Risk Management Assessment Matrix	01 Oct 2013
FM 3-24 (Change 001, June 02, 2014)	INSURGENCIES AND COUNTERING INSURGENCIES http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/fm3_24.pdf	13 May 2014
FM 3-24.2	TACTICS IN COUNTERINSURGENCY	21 Apr 2009
FM 3-34.5	Environmental Considerations	16 Feb 2010
FM 3-36	Electronic Warfare in Operations	09 Nov 2012
TB 5-6665-373-10	DETECTING SET, MINE, AN/PSS-14 (NSN 6665-01-504-7769)(EIC: YSR)	01 Sep 2006
TC 3-34.14	AN/PSS-14 Training Program	07 Oct 2011
THOR III	Technical Manual, Operation and Maintenance With Parts Breakdown Organization Level for the THOR III System P/N 118600-001	29 Sep 2009
TM 11-5865-1052-10	Operator's Manual for CREW-3.1 Countermeasures Set (THOR III) AN/PLQ-9(V)1 NSN 5865-01-580-4854 (EIC N/A)	28 Sep 2012
TM 5-6665-298-10	OPERATORS MANUAL FOR MINE DETECTING SET AN/PSS-12 (NSN 6665-21-906-1023) (EIC: ZW9) {TM 03701E-10}	01 Apr 2002
VMC1	Operating Manual, Gizmo Metal Detector VMC1	06 Feb 2009
VMR2	Operation Manual, Dual-Sensor-Detector Minehound VMR2	06 Feb 2009

Student Study Assignment

Prior to this class, have students review the PowerPoint Slides found on the course CD.

Instructor Requirements

Instructor must be certified in the following courses: Army Basic Instructor Course (ABIC) or DOD equivalent, Dismounted Counter-IED Tactics Master Trainer (DCT-MT) Course, Combat Life Saver (CLS), Small Group Instructor Course (SGIC), and Hand Held Device (HHD).

Support Personnel Requirements

NONE

Additional Support Personnel Requirements

<u>Name</u>	<u>Student Ratio</u>	<u>Qty</u>	<u>Man Hours</u>
Combat Lifesaver		1	1.0
NCOIC		1	1.0
Test Control Officer	1:30		1.0

Equipment Required for Instruction

<u>ID - Name</u>	<u>Student Ratio</u>	<u>Instructor Ratio</u>	<u>Spt</u>	<u>Qty</u>	<u>Exp</u>
4110-01-485-3548 - Chest, Ice Storage, White, 162 Quart Capacity	1:30	0:0	No	0	No
5820-00-NSN - SCREEN, PROJECTION	0:0	0:0	No	1	No
5820-00-T93-6432 - PROJECTOR, VIDEO, LCD EPSON ELP33 WITH REMOTE	0:0	0:0	No	1	No
5860-01-363-8730 - Laser Pointer	1:15	0:0	No	0	No
5895-01-540-4543 - Computer, Laptop	1:10	1:3	No	0	No
6530-01-290-9964 - Litter, Folding, Rigid Pole	1:15	0:0	No	0	No
6545-01-532-3674 - Medical Equipment Set, Combat Lifesaver, Version 2005, UA 245A	0:0	0:0	Yes	1	No
6665-01-381-3023 - Wet Bulb-Globe Temperature Kit	1:15	0:0	No	0	No
6685-01-590-1047 - Monitor, Heat Stress: Questemp 44	1:15	0:0	No	0	No
6760-00-985-6749 - Tripod, Photographic	1:30	0:0	No	0	No
7021-01-C17-2297 - PC Tablet, Data Entry: Galaxy Tab 2 WIFI 16GB Samsung	1:1	0:0	No	0	No
7240-00-098-3827 - Can, Military	1:30	0:0	No	0	No

(Note: Asterisk before ID indicates a TADSS.)

**Materials
Required**

Instructor Materials:

1. Lesson plan with Appendix A, C, and D as applicable
2. All references linked to this lesson plan
3. Visitor Book
4. Risk Assessment
5. PowerPoint Presentation
6. HandHeld Devices

Student Materials:

1. Student Disc
2. All references linked to this lesson
3. Pen/Pencil and note taking material

**Classroom,
Training Area,
and Range
Requirements**

<u>ID - Name</u>	<u>Quantity</u>	<u>Student Ratio</u>	<u>Setup Mins</u>	<u>Cleanup Mins</u>
17120-M-1200-30 Classroom, Multipurpose, 1200 Square Feet, 30 Students	1		15	15
74046-0-0 Consolidated Open Dining Facility, 0 Square Foot, 0 Seats	1		0	0
44224-0-0 Organizational Storage Building, 0 Square Foot, 0 Cubic Foot		1:30	0	0
72114-0-0 Enlisted Barracks, Transient Training, 0 Square Foot, 0 Starting Point , Service Points, or Persons Supported	1		0	0

**Ammunition
Requirements**

<u>DODIC - Name</u>	<u>Exp</u>	<u>Student Ratio</u>	<u>Instruct Ratio</u>	<u>Spt Qty</u>
None				

NOTE: Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

1. Have on hand identified reference materials linked to the lesson plan.
2. Review presentation and develop a list of questions to use during class.
3. Review and prepare conference/discussion material presented.
4. Ensure all equipment listed for this Lesson Plan (LP) is present, operable, and set up for use before class.
5. Refer to the practical exercise, Appendix C, of this lesson plan. When necessary develop additional situations to use during the practical exercise.
6. PowerPoint users: Ensure the Instructor's file has been called up using Microsoft PowerPoint Viewer and Instructor/slide 1 is displayed on the screen before class.
7. Whenever noted, slides are available to assist in explanation of task steps. Use slides as needed during class or practical exercise to reinforce training. The Instructor may choose to use/not use the LP SLIs as developed, modify the existing SLIs content/order or insert new material as is necessary based on audience analysis to assist in Soldier learning. Changes must be annotated as a pen/ink change on the vault file master LP, VIP LP, and Instructor LP.
8. Whenever necessary, ask leading questions of Soldiers in order to prompt Soldier discussion.
9. Most materials associated with this LP are provided to Soldiers in digital format loaded on their school issued CD and student handout unless stated within instructional notes. Instructor will have to issue all necessary materials to Soldiers in hard copy unless they have individual Soldier laptop/digital capability.
10. Encourage Soldiers to relate their first hand experiences during the activities.
11. Facilitate this lesson using Instructor's methodologies.
12. Control group activities using Instructor's techniques.

1. DURING INSTRUCTION

- a. Follow the lesson plan, show and discuss slides as appropriate, and facilitate group discussion.
- b. Ensure students stay attentive and pay proper military respect to senior officers, dignitaries, and/or guest speakers.
- c. Ensure students take notes and actively participate in group discussions and stay focused on the lesson training objectives.

2. AFTER INSTRUCTION

- a. Ensure proper police of classroom and other areas used by the students.
- b. Ensure that no classified/sensitive material is left in the classroom.
- c. Check classroom for security, cleanliness, and energy conservation before departing area.
- d. Annotate FB Form 1087a, Instructor/Evaluator Comment Record as appropriate.

3. BEFORE USING EQUIPMENT

- a. Ensure students are given a specific safety briefing, if necessary.
- b. Perform proper power up/down procedures for computer equipment.

Note: The above examples in no way limit the safety precautions that the individual instructor/facilitator may stress. There may be specific instances during conduct of lesson that the instructor/facilitator may caution students about.

**Proponent Lesson
Plan Approvals**

<u>Name</u>	<u>Rank</u>	<u>Position</u>	<u>Date</u>
None			NO DATA

SECTION II. INTRODUCTION

Method of Instruction: Discussion (small or large group)

Mode of Delivery: Resident Instruction

Instr Type (I:S Ratio): Military - ICH, ABIC/FIFC Qual and CIED SME (1:5)

Time of Instruction: 5 mins

Motivator

Slide 1: Introduction and Motivator

IEDs will continue to be a highly-effective weapon against dismounted and mounted patrols and will be used with impunity. Dismounted patrols are a primary function in the contemporary operating environment for Counter-IED operations and rely on the observation skills of the Troops to identify possible IED threats. Changing enemy Tactics, Techniques, and Procedures (TTPs) however, have reduced the visual signature of IEDs and made them more difficult to detect and locate.

Note: Use this statement or develop one of your own relating to the material.

Note for the Instructor/Facilitator (I/F)

1. TWO Options for conducting this class.

a. OPTION 1. Conduct the entire class outside a classroom environment i.e. a training area using actual HHD equipment.

1) You don't have to use the power point slides but you must cover the learning material and ensure that you meet the objective for this class.

2) You may have the students make notes on butcher paper or you may make key notes ahead of time.

3) If time permits, you may chose to make up a simple scenario to add realism to the PE. You should not give detailed instructions. The students should be able to determine how to solve the problem on their own.

4) This class may be taught in conjunction with another class that requires the use of HHDs as long as the class learning objectives are met.

b. OPTION 2. Conduct the one hour class as shown in this presentation.

Slide 2:

NOTE. Inform the students of the following Terminal Learning Objective requirements.

At the completion of this lesson, you [the student] will:

Action:	Recognize CREW/COMMS equipment and Electromagnetic Environment (EME) interference with HHDs
Conditions:	In a classroom or training area environment, given actual HHD equipment and/or presentation, student resources, lesson plan, and current reference material.
Standards:	

Terminal Learning Objective

	<p>Recognize CREW/COMMS equipment and EME interference with HHDs IAW HHD manuals and unit SOPs. Must score 80% or higher on examinations/rubrics. Recognition includes:</p> <ol style="list-style-type: none"> 1. Discuss compatibility issues when using HHDs in an Electromagnetic Environment. 2. Recognize sources of interference for the HHDs. <p>Learning Domain: Cognitive Learning Level: Knowledge</p>
Learning Domain - Level:	None assigned
No JPME Learning Areas Supported:	None

Safety Requirements

Safety Requirements in a Classroom Setting:

Safety is of the utmost importance in any training environment. During the training process, commanders will utilize the 5-Step Risk Management process to determine the safest and most complete method to train. Every precaution will be taken during the conduct of training. Safety is everyone's responsibility to recognize, mitigate, and report hazardous conditions.

Instructor note: The instructor will brief the students on the unit/facility SOP for classroom contingencies (i.e. what doors will be used to exit the classroom, rally points, severe weather, WBGT/Kestrel set up, etc).

Safety Requirements other than Classroom Settings:

Safety must be paramount in the complex outdoor environment. During the training process, commanders will utilize the 5-Step Risk Management process to determine the safest and most complete method to train. Every precaution will be taken while replicating realistic battlefield conditions. Safety is everyone's responsibility to recognize, mitigate, and report hazardous conditions. The instructor will brief the unit/site SOP and Risk Management Worksheet for all potential contingencies encountered during that training period/event (i.e. WBGT/Kestrel set up, trail vehicles for PT/foot marches, severe weather, fire, evacuation routes, muzzle awareness, range safety briefs, required medical FLA with driver and medics with emergency equipment, student injury procedures, and rally points etc).

Risk Assessment Level

Low - All Army Instructors will conduct a Risk Assessment Worksheet (FB Form 385-1-E, Daily Risk Management Assessment Matrix, OCT 2013) prior to training and brief Soldiers on identified hazards.

Assessment: The Principal Instructor will prepare a risk assessment using the before, during, and after checklist and the risk assessment matrixes contained in Risk Management FM 5-19.

Controls: See Attached FB Form 385-1-E.

Leader Actions: See Attached FB Form 385-1-E.

**Environmental
Considerations**

NOTE: Instructor should conduct a Risk Assessment to include Environmental Considerations IAW FM 3-34.5, Environmental Considerations {MCRP 4-11B}, and ensure students are briefed on hazards and control measures.

It is the responsibility of all Soldiers and DA civilians to protect the environmental from damage. There are no environment concerns during this block of training.

**Instructional
Lead-in**

The purpose of this lesson is to provide Soldiers and leaders with the knowledge to effectively employ Hand Held Detectors (HHDs) in support of dismounted IED missions.

Note: Use this statement or develop one of your own relating to the material.

Instructor/Facilitator's Note (I/F)

The instructional lead in is in the note page of slide # 2 (TLO)

SECTION III. PRESENTATION

TLO - LSA 1. Learning Step / Activity TLO - LSA 1. Discuss compatibility issues when using HHDs in an Electromagnetic Environment (EME)

Method of Instruction: Practical Exercise (hands-on/written)

Mode of Delivery: Resident Instruction

Instr Type (I:S Ratio): Military - ICH, ABIC/FIFC Qual and CIED SME (1:5)

Time of Instruction: 15 mins

Media Type: Actual Equipment / Oral Presentation / Practical Exercise / Slides

Other Media: Unassigned

Security Classification: This course/lesson will present information that has a Security Classification of: FOUO – For Official Use Only.

Slide 3: Discuss compatibility issues when using HHDs in an EME

1. The use of any HHD requires that it be compatible with the ElectroMagnetic Environment (EME) in which it is operated to include:
 - a. mounted CREW/Communications (COMMS),
 - b. military electric generation equipment,
 - c. other HHDs when deployed together.
2. EME interference of HHDs may occur for a variety of reasons
3. There are mitigation strategies dependent on the source of the interference.

Instructor/Facilitator's Note:

1. Highlight that the primary interference source to HHDs are CREW/COMMS and other HHDs in close proximity there are other sources native to the environment that can cause interference.
2. Examples of these sources are: power lines, generators, transmission towers, etc.
3. HHD interference can be mitigated to some extent depending on the source.
4. Discuss EME. DEFINE AND EXPLAIN SOURCES.

Slide 4: Discuss compatibility issues when using HHDs in an EME (Cont)

HHD Overview

1. The AN/PSS-12 and AN/PSS-14 are the Program of Record (POR) for mine detecting equipment.
 - a. The AN/PSS-12 is a Metal Detector (MD).
 - b. The AN/PSS-14 is a dual sensor HHD with a Ground Penetrating Radar (GPR) slaved to a MD.
2. There are five HHDs fielded by JIEDDO that are used by US Forces Globally.
 - a. CEIA CMD 2.0 is a continuous wave (CW) MD.
 - b. Vallon VMC1 (GIZMO) is a pulse-induction MD.
 - c. Vallon VMR2 Minehound is a dual sensor, HHD incorporating a GPR and a MD (same as GIZMO).
 - d. DSP-27.
3. There are a variety of other HHDs in use around the world that are inferior to those above either due to performance deficiencies or compatibility deficiencies.

Instructor/Facilitator's Note:

1. AN/PSS-12 and AN/PSS-14 are included here because, as the POR, it is

equipment available to operational units. However, the focus of this brief is on the JIEDDO fielded HHDs.

2. A CW MD provides a continuous signal to the detector coil in the form of a Sine wave (or multiple Sine waves for multi-frequency systems). The Sine wave will be centered at 0 and have both a negative and positive peak. It detects by subtracting the CW signal from any return signals to make detection declarations. Very effective for material discrimination but struggles with mineralized soils.

3. A PI system provides periodic signals to the coil in the form of short rectangular pulses; systems are often bipolar meaning positive and negative pulses are alternated in the coil. It detects by measuring any return signal during the time when no signal is provided to the coil. Very effective in mineralized ground and salt water and detecting larger metal at deeper depths.

Slide 5: Discuss compatibility issues when using HHDs in an EME (Cont)

HHD Overview (cont.)

1. All HHDs are susceptible to interference from any radiation source depending on the generated Electrical and Mechanical Engineers (EME) and power.

2. All JIEDDO HHDs have been tested multiple times for compatibility with CREW/COMMS devices and load sets.

3. Four Eyes compatibility assessments occur annually.

4. Interference has never damaged an HHD though error codes may occur during the interference event.

5. Current US CREW load sets cause minimal interference:

a. DUKE, CVRJ and MMBJ are worst case for Minehound.

b. Current THOR III load set is compatible with all HHDs.

6. Vehicle engines (generators/alternators) are worst case for MDs.

Instructor/Facilitator's Note:

1. Over the course of testing the past 4 years interference has occurred for all HHDs by a variety of CREW/COMMS equipment.

2. There are many factors influencing whether interference occurs, foremost being the load set employed by the CREW system and waveform employed by the COMMS system. Other factors include terrain, proximity of other EME sources, Minehound detector head height above the ground, and the Minehound GPR parameter values.

3. Vehicle engines generate low frequency signals that are similar to both CW and PI MDs. Gasoline engines have spark plugs that spark ~ 250 times per second, multiply this by 6 or 8 cylinders and you have pulse rates similar to the Gizmo. The stators in any alternator have brushes that generate both pulse and CW signals that have frequencies similar to both CEIA and Gizmo.

4. Discuss emi radiation principals (not CBRN but wave propagation)

5. Discuss meaning of Four Eyes (US, Canada, England, ?)

Slide 6: Discuss compatibility issues when using HHDs in an EME (Cont)

Threats

1. This slide depicts various HHDs and some of the items that may cause interference.

2. If it radiates electromagnetic energy it could be a source of interference

Instructor/Facilitator's Note:

1. Any source of electromagnetic radiation in the environment could be a cause for interference depending on frequency, power and proximity.
2. Always be aware of potential threats in the immediate area.
- 3 This could include native sources such as power lines, generation stations or transmission towers (to include cell towers) or transient sources such as Coalition CREW/COMMS systems operating within your AO.
4. In the same way radios can conflict with each other if transmit/receive frequencies are not coordinated; EME can cause interference to an HHD.

Slide 7:

Check on Learning:

1. What are some of the interference sources associated with HHDs?

Answer: CREW, HHDs, Power Lines, Generators, Transmission towers (cell Towers)

2. HHDs are required to be compatible with other electronic equipment utilized by CFs. True or False?

Answer: True

3. Interference can cause damage to an HHD. True or False?

Answer: False

Review Summary:

During this LSA we discussed compatibility issues when using HHDs in an Electromagnetic Environment (EME). The discussion included:

1. An overview of HHD equipment.
2. That one should be aware that all HHDs are susceptible to interference from any radiation source

depending on the generated EME and power.

TLO - LSA 2. Learning Step / Activity TLO - LSA 2. Recognize sources of interference for the HHDs

Method of Instruction: Practical Exercise (hands-on/written)

Mode of Delivery: Resident Instruction

Instr Type (I:S Ratio): Military - ICH, ABIC/FIFC Qual and CIED SME (1:5)

Time of Instruction: 25 mins

Media Type: Actual Equipment / Oral Presentation / Practical Exercise / Slides

Other Media: Unassigned

Security Classification: This course/lesson will present information that has a Security Classification of: FOUO – For Official Use Only.

Slide 8: Recognize sources of interference for the HHDs

<u>DSP-27 Interference</u>		
<u>Source</u>	<u>/ Effect</u>	<u>/ Mitigation</u>
COMMS on transmit	Not Observed	
Vehicle CREW	Erratic or continuous alert < 5 m	Maintain Standoff
Vehicle engine	Erratic or continuous alert < 5 m	Maintain Standoff or engine turn off
THOR III/Manpacks	Not Observed	
Other handhelds	Erratic or continuous alert < 5 m	Maintain Standoff

Instructor/Facilitator's Note:

1. DSP-27 is most susceptible to any electronic device in close proximity to one antenna pod or the other.
2. Interference is not distinct but generates the same sound as a detection alert.
3. Typically, a radio, cell phone or other pocket device carried on the same side of the body as the DSP-27 can cause these false alarms (FA).
4. HHDs operated in close proximity can also generate FAs.
5. Tactical spacing should mitigate any of these FAs.
6. Remedy changed to mitigation.

Slide 9: Recognize sources of interference for the HHDs

STRIDER

1. System Interoperability: Separation Distances
2. The Strider system must never be switched on or used within proximity of the following systems:
 - a. 5 Meters: Blue Force Tracker, Comms Equipment, Hand Held Detectors (CEIA, VMC-1, VMR-2, DSP-27), Man Pack Crew Systems and Cell phones
 - b. 10 meters: Vehicle Mounted CREW Systems (Except Duke v3)
 - c. 35 meters: Duke v3 CREW System

Slide 10: VMC1 (GIZMO) Interference

<u>Source</u>	<u>/ Effect</u>	<u>/ Mitigation</u>
COMMS on transmit	Noisy alert burst < 5 m	Avoid transmit while

sweeping

Vehicle CREW	Pulse tone < 5 m	Maintain Standoff
Vehicle engine	Erratic alerts < 5 m	Maintain Standoff or engine turn off

THOR III/Manpacks Not Observed

Other handhelds Erratic or continuous alert < 5 m Maintain Standoff

Note: In all instances of interference the auto and/or manual channel select feature should be utilized to mitigate effects

Instructor/Facilitator's Note:

1. VMC1 interference generates the same sound as an alert but is distinguished by the erratic nature of the FAs.

2. Interference from vehicle mounted CREW is distinct in the periodic pulsing of the alert that it generates.

3. Discuss working with other GIZMO

Slide 11: CEIA CMD 2.0X Interference

<u>Source</u>	<u>/ Effect</u>	<u>/ Mitigation</u>
COMMS on transmit	Not observed	
Vehicle CREW	Continuous alert <5 m	Maintain Standoff
Vehicle engine	Continuous alert < 5 m	Maintain Standoff or engine turn off

THOR III/Manpacks Not Observed

Other handhelds Erratic or continuous alert < 5 m Maintain Standoff

*CEIA HDDs *18 m

Note: CEIA MDs are fielded with 1 of 5 channels, any 2 with the same channel must be 18 m apart otherwise 2 m. Channel indicated by last digit of SN 0 & 5, 1 & 6, 2 & 7, 3 & 8, 4 & 9 are equivalent channels

Instructor/Facilitator's Note:

1. CEIA interference generates the same sound as either a metal or carbon rod alert, though it is typically the metal alert.

2. It can be distinguished by an erratic warble rather than the consistent whistle.

3. Interference may also present as both alarms alerting erratically.

4. working with multiple CEIA and compatibility

Slide 12: AN/PSS-14 - GPR Interference

<u>Source</u>	<u>/ Effect</u>	<u>/ Mitigation</u>
COMMS on transmit	Not observed	
Vehicle CREW	<20 m	Maintain Standoff
Vehicle engine	Not observed	
THOR III/Manpacks	Not Observed	
Other handhelds	Not observed	

Note: The MD performance is similar to the VMC1 with <10 m stand-off required

Instructor/Facilitator's Note:

- Discuss sources of interference

Slide 13: VMR2 (Minehound) - GPR Interference

<u>Source</u>	<u>/ Effect</u>	<u>/ Mitigation</u>
COMMS on transmit	Not observed	
Vehicle CREW	<20 m	Maintain Standoff Adjust GPR parameters
Vehicle engine	Not observed	
THOR III/Manpacks	Not Observed	
Other handhelds	Not observed	

Note: The MD performance is the same as the VMC1

Instructor/Facilitator's Note:

1. The VMR2 MD interference presents the same as the VMC1.
2. The GPR interference is distinguishable by the jumble of sounds, such as a flock of turkeys, rather than a unique tone that correlates with the sweep of the detector head.
3. It is possible to detect through the interference because of these features

Slide 14: VMR2 – GPR Parameter Summary

This slide depicts the VMR2 parameter settings.

<u>LED</u>	<u>ADJUSTMENT</u>	<u>RANGE</u>	<u>DEFAULT</u>
11	Start Point (Top Down)	30-80	30
11F	Start Point (Top Down)	255-100	255
12	Linear Gain	1-60	28
11+12	Time Variable Gain (TVG)	1-10	1

Instructor/Facilitator's Note:

1. Review Minehound GPR parameters
2. 11 top down
3. 11flashing bottom up
4. 12 linear gain
5. Discuss linear gain

Slide 15: GPR Parameters–Start Point

1. Allows adjustment of the sample start time moving the minimum detection depth of the GPR.
2. Range 30-80 (50 increments)
3. Actual depth depends on the soil dielectric constant
4. Deeper in loose, dry sand
5. Shallower in packed, wet clay

Instructor/Facilitator's Note:

1. Start Point: Also known as “Top-Down”.
2. This parameter is based on the RF signal propagation time, which in free space (i.e., no soil or material) is the speed of light= 3×10^8 meters/second. This restricts GPR alerts to occur only after the RF energy has traveled some minimum distance.
3. If the operator wants to eliminate GPR signals caused by gravel and uneven soil on the surface he presses the (+) button to increase the time for the start point delaying the detection of the return RF pulse after a specified distance.

4. Soil dielectric constant

Slide 16: GPR Parameters-Stop Point

1. Allows adjustment of the sample stop time moving the maximum detection depth of the GPR.
2. Range 255-100 (155 increments)
3. Actual depth depends on the soil dielectric constant
4. Deeper in loose, dry sand
5. Shallower in packed, wet clay

Instructor/Facilitator's Note:

1. Stop Point: Also known as "Bottom Up", this will allow you to narrow the detection zone.
2. This parameter is based on the RF signal propagation time, which in free space (i.e.. no soil or material) is the speed of light= 3×10^8 meters/second and works like the Start Point.
3. This restricts GPR alerts to occur only after the RF energy has traveled some maximum distance.
4. If the operator wants to eliminate GPR signals caused by bedrock or a water table he presses the (-) button to decrease the time for the stop point stopping the detection of the return RF pulse at a specified distance.
5. This parameter is the first to adjust in an attempt to mitigate interference. By reducing it to 100 it will eliminate low frequency interference but it will also limit detection to the top surface of the ground (4"-16").

Slide 17: Linear Gain (LG)

1. Amplifies all signals equally
2. Range 1-60 (60 increments)
3. Effective gain determined by the soil dielectric constant.
4. Lower values needed for loose, dry sand
5. Higher values needed in packed, wet clay

Instructor/Facilitator's Note:

1. This parameter is the third parameter to adjust in an attempt to mitigate interference.
2. This should only be adjusted if there is an item in the ground to calibrate against – increase LG in an attempt to raise the target signal above the background noise.

Slide 18: Time Variable Gain (TVG)

1. Amplifies signals later in time more than signals earlier in time.
2. Range 1-10 (10 increments)
3. TVG is added to LG and is based on a simple multiplication applied to each point in the detection window (Stop-Start points) with the Stop point multiplied by the set value.
4. Effective gain determined by the soil dielectric constant
5. Lower values needed for loose, dry sand
6. Higher values needed in packed, wet clay

Instructor/Facilitator's Note:

1. This parameter is the second parameter to adjust in an attempt to mitigate

interference.

2. Reduce TVG to 1.

Slide 19: Contingencies

1. Why work through HHD Interference?
 - a. Loss of operational control over the source
 - 1) THOR III operator is down
 - 2) Vehicle with active CREW is down
 - b. Mission critical
 - Need to approach infrastructure with interfering sources
2. Increase the volume whenever attempting to detect through interference.

Typically, detection signals are increased greater than noise signals and may be raised above the interference.

Instructor/Facilitator's Note:

1. In the case of a downed THOR III operator or an overturned vehicle, the antennae are much closer to the ground or even in contact with the ground.
2. The chances for interference will be much greater and highly dependent on the ground conditions. Clearing a safe route to render aid may require working through GPR interference.
3. Must know what normal operation sounds like in your handheld device

Slide 20: Threat Assessment

- This slide depicts an armored vehicle rollover in a ditch with multiple forms of possible interference. In the picture shows:

1. Radio towers
2. Concertina wires
3. CREW/COMM antennas
4. Ground condition water

WARNING. Never touch or hold an active3 antenna

Instructor/Facilitator's Note:

- What are the potential interference sources?
- 1 Radio Towers: DSP-27, MD, GPR
 2. Water on the ground: GPR
 3. Barb Wire: MD, DSP-27
 4. Vehicle Antennae: MD, GPR, DSP-27

Slide 21: Threat Assessment (Cont)

- This slide depicts an armored vehicle rollover in a ditch with multiple forms of possible interference. In the picture shows:

1. Power lines
2. Running engine
3. CREW/COMM antennas
4. Optional Equipment – RHINO (Iraq) – could be HMDS

WARNING. Never touch or hold an active3 antenna

Instructor/Facilitator's Note:

- What are the potential interference sources?
1. Radio Towers: DSP-27, MD, GPR

2. Water on the ground: GPR
3. Barb Wire: MD, DSP-27
4. Vehicle Antennae: MD, GPR, DSP-27

Slide 22: Other Considerations

1. Sweeping walls and clearing multi-level compounds
2. Reset GPR Parameters TVG = 10
3. Stop = 255
4. LG – Adjust as needed
5. Increase MD sensitivity
6. GPR alert that increases/decreases in pitch could indicate motion behind wall

Instructor/Facilitator's Note:

1. It is important for operators to remember that the Minehound was compensated for the ground.
2. Walls and floors in huts and compounds will be composed of material different than the ground.
3. Increase Stop Point to 255 - ensures max penetration through the wall, listen for constant low warble (similar to bottom of lane) to determine if the other side of the wall is being detected.
4. Increase TVG to 10 - ensures max signal detection. There is likely nothing to cause a false alarm “deep” in a wall or floor since it should only have air behind it. Adjust LG as needed – could need increase or decrease depending on consistency of the wall/floor, composition, moisture, etc.
5. Increase MD sensitivity – metal contamination of the wall is less likely than ground and conductivity/resistivity likely more consistent than the ground. Use mineralized mode (VMC1/VMR2-MD) or ground balance (CEIA) as required.
6. BLUF – don't assume ground settings are adequate.

Slide 23:

Check on Learning:

1. Which of the following HHD is the most susceptible to interference with any electronic device?
 - a. GIZMO
 - b. DSP-27
 - c. Minehound
 - d. CEIA

Answer: b. DSP-27

2. What is linear gain?

Answer: Amplifies all signals equally

3. The Minehound is normally compensated for the ground, but can be adjusted to sweep walls and floors in huts. True or False?

Answer: True

Review Summary:

In this LSA we coverd sources of interference for the HHDs that you should recognize which includes:

1. Radio Towers – DSP-27, MD, GPR
2. Water on the ground – GPR
3. Barb Wire – MD, DSP-27
4. Vehicle Antenna – MD, GPR, DSP-27

SECTION IV. SUMMARY

Method of Instruction:	Discussion (small or large group)
Mode of Delivery:	Resident Instruction
Instr Type(I:S Ratio):	Military - ICH, ABIC/FIFC Qual and CIED SME (1:5)
Time of Instruction:	5 mins

Check on Learning

Check on learning is covered under each LSA to determine if the students have learned the material presented by soliciting student questions and explanations. Ask the students questions and correct misunderstandings.

Make sure that students met the objective which is recognize CREW/COMMS equipment and Electromagnetic Environment (EME) interference with HHDs including:

1. Discussed compatibility issues when using HHDs in an EME
2. Recognized sources of interference for the HHDs

Review/ Summary

Slide 24:

Lesson: Hand Held Detector Compatibility with CREW /COMMS

In this lesson we covered two LSAs:

1. Discussed compatibility issues when using HHDs in an Electromagnetic Environment (EME). The discussion included an overview of HHD equipment and that we now know that all HHDs are susceptible to interference from any radiation source depending on the generated EME and power.
2. Sources of interference for the HHDs that you should recognize which includes:
 - a. Radio Towers – DSP-27, MD, GPR
 - b. Water on the ground – GPR
 - c. Barb Wire – MD, DSP-27
 - d. Vehicle Antenna – MD, GPR, DSP-27

Instructor/Facilitator's Note:

-Action (TLO): Recognize CREW/COMMS equipment and Electromagnetic Environment (EME) interference with HHDs

Slide 25: Questions

- Allow students to ask question and provide input as necessary.

SECTION V. STUDENT EVALUATION

Testing Requirements

Students will apply what they learn in this class in mission 1, 2 and 3 exercise conducted in the second week of the course.

Feedback Requirements

Note: Feedback is essential to effective learning. Schedule and provide feedback on the assessment and any information to help answer student questions about the training exercise.

Appendix A - Viewgraph Masters

**HHD Compatibility with CREW/COMMS
071-FREBB009 / Version 02.0 ©**

Sequence	Media Name	Media Type
None		

Appendix B - Assessment Statement and Assessment Plan

Assessment Statement: None.

Assessment Plan: None.

Appendix C - Practical Exercises and Solutions

PRACTICAL EXERCISE(S)/SOLUTION(S) FOR LESSON 071-FREBB009 Version 02.0 ©

Appendix D - Student Handouts

**HHD Compatibility with CREW/COMMS
071-FREBB009 / Version 02.0 ©**

Sequence	Media Name	Media Type
None		

Appendix E - TRAINER'S LESSON OUTLINE

HHD Compatibility with CREW/COMMS

071-FREBB009 / Version 02.0 ©

DRAFT

1. The importance of this lesson: (Why)

Recognize CREW/COMMS equipment and Electromagnetic Environment (EME) interference with HHDs

2. What we want our Soldiers to Achieve: (Outcomes/Standard)

Recognize CREW/COMMS equipment and EME interference with HHDs IAW HHD manuals and unit SOPs. Must score 80% or higher on examinations/rubrics. Recognition includes:

1. Discuss compatibility issues when using HHDs in an Electromagnetic Environment.
2. Recognize sources of interference for the HHDs.

Learning Domain: Cognitive

Learning Level: Knowledge

3. Tasks to be taught

Task Number

Task Title

Task Type

None

Additional Non-Standard Tasks

None

4. References:

<u>Reference Number</u>	<u>Reference Title</u>	<u>Date</u>
ATP 5-19 (Change 001 09/08/2014 78 Pages)	RISK MANAGEMENT http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/atp5_19.pdf	14 Apr 2014
DD FORM 2977	DELIBERATE RISK ASSESSMENT WORKSHEET	01 Jan 2014
FB (Safety) Form 385-1-E	Daily Risk Management Assessment Matrix	01 Oct 2013
FM 3-24 (Change 001, June 02, 2014)	INSURGENCIES AND COUNTERING INSURGENCIES http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/fm3_24.pdf	13 May 2014
FM 3-24.2	TACTICS IN COUNTERINSURGENCY	21 Apr 2009
FM 3-34.5	Environmental Considerations	16 Feb 2010
FM 3-36	Electronic Warfare in Operations	09 Nov 2012
TB 5-6665-373-10	DETECTING SET, MINE, AN/PSS-14 (NSN 6665-01-504-7769)(EIC: YSR)	01 Sep 2006
TC 3-34.14	AN/PSS-14 Training Program	07 Oct 2011
THOR III	Technical Manual, Operation and Maintenance With Parts Breakdown Organization Level for the THOR III System P/N 118600-001	29 Sep 2009
TM 11-5865-1052-10	Operator's Manual for CREW-3.1 Countermeasures Set (THOR III) AN/PLQ-9(V)1 NSN 5865-01-580-4854 (EIC N/A)	28 Sep 2012
TM 5-6665-298-10	OPERATORS MANUAL FOR MINE DETECTING SET AN/PSS-12 (NSN 6665-21-906-1023) (EIC: ZW9) {TM 03701E-10}	01 Apr 2002
VMC1	Operating Manual, Gizmo Metal Detector VMC1	06 Feb 2009
VMR2	Operation Manual, Dual-Sensor-Detector Minehound VMR2	06 Feb 2009

Additional Non-Standard References

None

5. Resources

TIME: Time of Instruction: 1 hr 0 mins

LAND: Classroom, Training Area, and Range Requirements

<u>Id</u>	<u>Name</u>
17120-M-1200-30	Classroom, Multipurpose, 1200 Square Feet, 30 Students
74046	Consolidated Open Dining Facility
44224	Organizational Storage Building
72114	Enlisted Barracks, Transient Training

AMMO: Ammunition Requirements

DODIC

Name

None

MISC: Materiel Items and TADSS Requirements

Id

Name

4110-01-485-3548	Chest, Ice Storage, White, 162 Quart Capacity
5820-00-NSN	SCREEN, PROJECTION
5820-00-T93-6432	PROJECTOR, VIDEO, LCD EPSON ELP33 WITH REMOTE
5860-01-363-8730	Laser Pointer
5895-01-540-4543	Computer, Laptop
6530-01-290-9964	Litter, Folding, Rigid Pole
6545-01-532-3674	Medical Equipment Set, Combat Lifesaver, Version 2005, UA 245A
6665-01-381-3023	Wet Bulb-Globe Temperature Kit
6685-01-590-1047	Monitor, Heat Stress: Questemp 44
6760-00-985-6749	Tripod, Photographic
7021-01-C17-2297	PC Tablet, Data Entry: Galaxy Tab 2 WIFI 16GB Samsung
7240-00-098-3827	Can, Military

(Note: Asterisk before ID indicates a TADSS.)

Additional Non-Standard Resources

None

6. A possible technique to achieve the outcome:

None

7. Conduct AAR with Soldier and Cadre.

None

NOTE: Before presenting this lesson, Instructors must be thoroughly prepared by studying the appropriate lesson plan and identified reference material.