ARMY GROUND RISK-MANAGEMENT PUBLICATION

COUNTERMEASURE

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Ammunition and Explosives. . .

What We Don't Know CAN Hurt Us!

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The Official Safety Magazine for Army Ground Risk-Management

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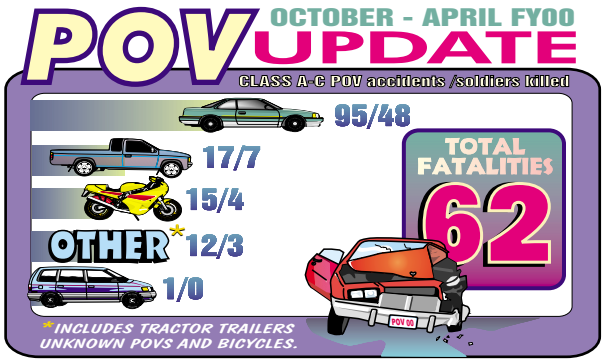
BG Gene M. LaCoste
Commander/Director of Army Safety
COL John S. Warren
Deputy Commander
LTC John D. Kirkland
Publishing Manager
Paula Allman
Managing Editor
Mike Wilkins
Graphics/Layout

Features



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Gene M. LaCoste
Brigadier General, U.S. Army
Commanding Officer

Ammunition and Explosives Safety on Ranges

The following is reprinted from a message to the field from General John M. Keane, Vice Chief of Staff

Over the past 5 years, 169 serious accidents involving ammunition or explosives occurred on Army ranges, resulting in the deaths of 10 soldiers and 1 civilian, and injuring 210 soldiers and civilians. Although some of these accidents resulted from ammunition malfunctions, analysis by the Army Safety Center and the U.S. Army Technical Center for Explosives Safety revealed that almost all were directly attributable to inadequate training, inadequate supervision, failure to follow procedures, improper handling of ammunition and explosives, or picking up unexploded ordnance. Far too many range injuries were caused by soldiers carelessly handling ammunition and explosives or simply failing to clear their weapons properly.

During a recent explosives safety assistance and evaluation visit at Fort Knox, KY, it was noted that after having experienced 15 explosives incidents on its ranges from 1988 to 1994, Fort Knox established an aggressive, proactive range explosives safety management program. Since establishing this program, Fort Knox has not experienced one reportable incident. The following is what we learned from the Knox experience, and therefore we pass it on to you:

- A strong, visible commitment to explosives safety from the commander to all levels involved in range activities.
- A close-working relationship between range control and the installation safety office.
- An investment in qualified range and explosives safety personnel, and adequate equipment and facilities.
- Integration of safety into initial planning and all subsequent phases of range operations.
- Regular monitoring of units during training by range control, safety, and quality assurance specialist (ammunition surveillance) personnel.
- Development and strict enforcement of safety and operating requirements. All unit officers-in-charge and range safety officers must be weapons qualified on the ranges where they train and attend safety briefings. Units should demonstrate a knowledge of required explosives safety distance fans and be able to determine fans for their operations before they are permitted on the range. Units that operate in an unsafe manner are removed from the range.

Commanders and leaders at range activities must periodically review their range safety programs to ensure that appropriate standards and procedures are developed, clearly communicated, and followed. We expect commanders and supervisors to set the example for safety on ranges. We ask you for your personal attention to this matter. ♦

"Soldiers on Point for the Nation"

Bad Ammo Poses a Hazard

A safety specialist was conducting a courtesy inspection of a unit arms room and found 9mm, 5.56mm, and 12-gauge ammunition in poor condition. Some projectiles turned in their casings; some were moldy and corroded. Records showed that all the ammunition had been issued more than 3 years earlier. Further inspection revealed that ammunition was not being inspected before issue or during turn-in. The need for such inspections was not mentioned in the unit's SOP. Lack of inspection guidelines created a dangerous situation for these soldiers.

Use of ammunition was immediately suspended locally when it was found to be in poor condition per Military Standard 636: *Visual Inspection Standards for Small Arms Ammunition.*

Operational loads include 9mm, 5.56mm, 12-gauge shotgun shells, 40mm grenades, riot-control agents, and other types of ammo up to 0.50 caliber. Use of local quality assurance specialist, ammunition surveillance (QASAS) is advised for ammunition inspections. If you don't know the QASAS that services your unit, ask your local safety office for a courtesy inspection of your arms room.

MIL STD 636 can be used by safety personnel and armorers. It comes with pictures and should be a part of the publications file kept in the arms room. To get a copy, call the Defense Printing Service Detachment at DSN 442-2179 or visit their web site at **http://dodssp.daps.mil.** Once there, press "Assist Quick Search" and enter the publication you want. You do not have to have an account or password to retrieve this information, and it's free of charge.

The following are tips that will help ensure you have a good operational load:

- Rotate operational load ammunition once a year. Use your old ammo for training.
- Check with your local ammunition people before using training ammunition for operational load. It may not be acceptable.
- Check your suspended ammunition pub, TB 9-1300-385, and messages to see if any lot numbers match. If your unit is not on the

distribution list, get on it.

- Never mix lots—not even one round.

Soldiers being issued ammo should take an active part in inspection. Inspect ammunition during issue and turn-in, just like you inspect the serial number of the weapons. Inform the armorer and the chain of command if you see something wrong. Remember, you will be the firer of that ammunition. Does it look serviceable?

Guidelines for handling ammunition include the following:

- Keep ammunition dry.
- Don't wipe oil on ammunition.
- Never play with ammunition.

Once it is determined that ammunition is unserviceable, treat it with respect. ♦

POC: CW3 Juan Convers, USASC Ground Systems and Accident Investigation Division, DSN 558-2966 (334-255-2966), conversj@safetycenter.army.mil

Storage and Care of Explosives

Additional guidelines for storing ammunition follow. Check your local SOPs and other applicable regulations to assure you're using the most current information.

- **Handle explosives and ammunition carefully.**
- **Remove dirt, grit, and foreign materials from containers and ammunition before storing.**
- **Do not store explosives and ammunition in damaged containers.**
- **Keep all containers in magazine closed so that contents cannot be handled, examined, or removed.**
- **Do not open, repair, pack, or repack containers in or within 75 feet of magazine, except as permitted by applicable regulations.**
- **Do not keep empty containers, tools, or other materials in magazine.**
- **Maintain absolute cleanliness and order.**
- **Never mix ammo. Store each lot separately. Make stacks stable. Provide for circulation of air to all parts of the stack. Raise containers and ammunition off the floor.**
- **Use only approved electric lights, lanterns, or flashlights in magazines.**
- **Do not smoke or bring matches into magazine.**
- **Do not allow unauthorized persons in or near magazine.**
- **Keep magazine spark proof with ventilators well screened and no openings around doors or foundations.**
- **Keep doors locked when magazine is unattended. Close doors when vehicle is approaching platform unless vehicle is equipped with spark arrestor on exhaust.**
- **Keep a 50-foot cleared space around and above ground magazines free from combustible material.**
- **Open two or more doors when personnel are working in a magazine containing explosives or ammunition.**
- **Post one or more copies of these rules in the magazine.**

Weapons Clearing—A Loaded Issue

A soldier was killed when another soldier passed him a machinegun through the tank turret and the machinegun fired. It had not been cleared.

Weapons meant for the enemy can take out fellow soldiers unless cleared in sequence and by the book. Controls are found in Army regulations and technical manuals.

TM 9-2350-255-10-1 states that the first step upon completion of firing is to clear the commander's weapon. Make sure no round is in the chamber, T-slot, or receiver assembly.

FM 17-12-1-2 provides TM reference and tasks, conditions, and standards for the function check and loading of the M2 50-caliber machinegun with M10 charger.

FM 23-65 provides instructions and cautions for unloading and clearing the Browning 50-caliber machinegun.

In addition, according to AR 385-63:

- After firing, the officer-in-charge (OIC) will ensure that all weapons are cleared. Tank commanders and section chiefs will ensure that their weapons are cleared on completion of firing.
- The range safety officer (RSO) will, on completion of firing, verify to the OIC that weapons are clear. The RSO will also control and record duds and mark their approximate locations.
- Tank commanders are responsible for the safe firing and operation of their tanks. ♦

POC: SFC Johnny Torres, USASC Ground Systems and Accident Investigation Division, DSN 558-2381 (334-255-2381), torresj@safetycenter.army.mil

M2 HB Caliber .50 Machinegun with M10 Charger Clearing Procedures:

- Set safety switch to "S" (SAFE) position.
- Open cover.
- Lift extractor and remove ammunition belt from feedway.
- Move the locking selector on M10 charger to the rear (LOCKED) position.
- Pull back on the charging handle and lock the bolt to the rear.
- Open the cover.
- Look into both the chamber and T-slot for ammunition.
- Move locking selector on the M10 charger to the forward (RELEASE) position.
- Pull back on the charging handle and ease bolt forward.
- Close cover.
- Set safety to "F" (FIRE) position.
- Press trigger to fire weapon.

NOTE: Do not close cover with bolt locked to the rear.

SAFETY ALERT: M2 Machinegun Maintainers

Please take note of a Maintenance Advisory Message (MAM-00-009) that TACOM-Rock Island recently sent out on the defective accelerator stop lock: DTG 111418Z APR 00, Subject: .50 Caliber Machinegun, Model M296, NSN 1005-01-338-4766, on the OH-58D Kiowa helicopter and the following M2 .50 Caliber machinegun family. NSNs include: 1005-00-322-9715, 1005-00-957-3893, 1005-00-122-9339, 1005-00-122-9368, 1005-01-343-0747, 1005-01-303-5250, 1005-01-287-2518, 1005-00-165-4561, 1005-00-322-9716, 1005-00-726-5636, 1005-00-726-5650, 1005-00-726-5644, 1005-00-937-1831, 1005-00-937-1832, 1005-01-029-3428, 1005-01-250-5782, 1005-LL-L99-5058, 1005-LL-L99-5244, 1005-LL-L99-5892, and 1005-LL-L99-5893.

NCO Corner

Lightning

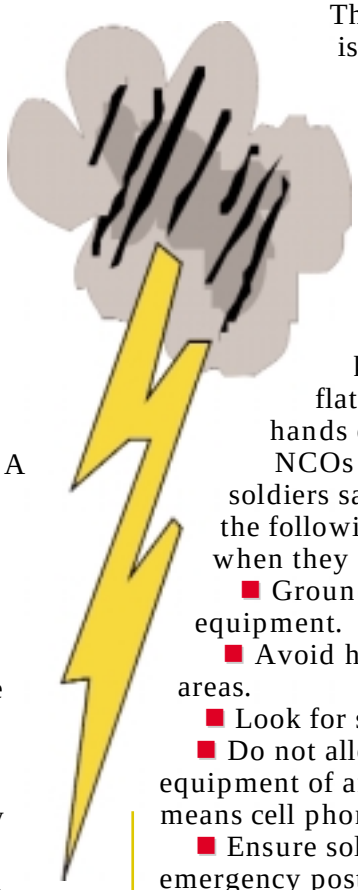
Lightning will strike what it wants, where it wants, when it wants. But by applying a few commonsense procedures, we can reduce the risk and still accomplish our mission.

- A soldier was in the process of turning in his weapon. He leaned his M-60 machinegun against a tree. A bolt of lightning hit the tree, traveled down the tree trunk, deflected from the tree to the M-60, and struck the soldier in the chest, knocking him to the ground immediately. The soldier died later.
- The soldiers went to their bivouac sites to sleep after conducting field training. Before dawn, it started raining heavily and the downpour was accompanied by thunder and lightning. A lightning bolt struck a tree near the tents and dispersed its energy throughout the tents, injuring five soldiers and killing one. All were sleeping on the ground as water was pooled around the tents.
- A soldier and fellow unit members ran into their tent during a storm. While reaching outside the tent to secure the radio, he was struck by lightning.
- A tank driver sitting in the driver's compartment of his tank was shocked by a nearby lightning strike.
- An engineer unit was cleaning up a job site when a severe storm blew in. One soldier was killed when he was struck by lightning.

Since October 1989, approximately 124 soldiers have been injured by lightning strikes; 7 of those died. Most of these strikes occurred while soldiers were operating electrical equipment such as computers, field phones, switchboards, and radios. Leaders should take precautions to lessen the likelihood of losing troops to lightning strikes.

The Weather Eye

Leaders must always be alert to changing weather conditions, and they should teach their soldiers to do likewise. Whether they're working in an office, on the way to an FTX, or going to the golf course, soldiers should constantly be aware of what's going on weather-wise. Of course, leaders will check the weather forecast before taking soldiers to the field during times that storms are likely, such as preceding a cold front or in the spring or summer.



The best place to be during a storm is indoors. However, a soldier's environment can't be limited to large buildings and vehicles with rubber tires. When caught in the field, soldiers should be led into a densely wooded area or a depression in the ground. Soldiers should drop to their knees and bend forward, putting hands on knees. Do not allow soldiers to lie flat on the ground or place their hands on the ground.

NCOs can take precautions to keep soldiers safe. Soldiers should be trained on the following controls to reduce the risks when they are caught in electrical storms—

- Ground or drop metal tools or equipment.
- Avoid hilltops, isolated trees, and watery areas.
- Look for shelter in low places.
- Do not allow soldiers to use electrical equipment of any kind—especially phones (this means cell phones too!).
- Ensure soldiers are trained in correct emergency posture.
- Indoors, avoid using appliances, power tools, telephones, electric typewriters, and computers. In addition, avoid baths, open porches, and balconies.
- Ensure soldiers are trained in correct emergency first-aid procedures, especially CPR. Even mild exposure can knock a soldier unconscious or sear the skin and cause painful burns. Soldiers who are struck should be given immediate medical attention.

Leaders, plan emergency actions for lightning strikes/electrical shock. Implement these plans into your OPORD, brief and train personnel, and then conduct rehearsals to complement your team's lifesaving skills. ♦

POC: SFC Alan Schrader, USASC Ground Systems and Accident Investigation Division, DSN 558-2644 (334-255-2644), schradea@safetycenter.army.mil

Written by accident investigators to provide major lessons learned from recent centralized accident investigations.

Investigators' Forum

Whew! That Was A Close One!

The Multiple Launch Rocket System (MLRS) battery was conducting live fire missions as part of its crew certification program. They were firing a series of M28A1 reduced range practice rockets. Each crew was to upload a loaded pod and fire their missions from a doctrinal hide position in accordance with commands from their fire direction center.

The day before the accident, the assigned crew of one launcher fired one rocket from the pod's number 3 tube before experiencing communications problems that required them to return to the unit area for maintenance. They had to download the partially expended rocket pod at the ammunition holding area en route to the maintenance point. They did this without incident.

The following day, a second crew needed to fire. Their vehicle was inoperative, so they had to use the same launcher as the first crew. After performing pre-mission maintenance checks, they went to the ammunition holding area to upload the partially expended rocket pod from the day before. Again, this was done without incident, and the crew moved their launcher to the hide position to await fire missions.

At about 1600, they received their first mission. They laid the launcher, verified the lay, verified the safety data, and pressurized the crew compartment. They then launched the rocket from the number 4 tube, which landed in the impact area as intended.

At approximately 1652, they received another mission and fired the rocket from the number 1 position in the pod. Again, the rocket hit the intended impact point and the crew returned to the hide position. At this time, there were 3 rockets remaining in the pod—in the number 2, 5, and 6 positions.

At approximately 1715, the crew received its third fire mission. Again, they moved to the firing point and

Mission: Conduct Crew Certification Live Fire on M270 MLRS

Hazards

- Defective rocket motor
- No fire detection system in LLM

Results

- 1 M270 MLRS destroyed

Controls

- Validate rocket motor quality control procedures
- Develop crew drills for this type of accident
- Risk manage the hazard of no fire detection system in LLM

conducted their firing procedures. After firing the number 5 rocket, the crew noted a larger than normal recoil effect inside the cab. Observers outside the vehicle reported to them that the rocket appeared to have exploded as it came out of the launcher. The driver looked out his rearview mirror and saw that the launcher appeared to be on fire. The section chief opened the roof hatch to assess the situation; when he did this, one of the remaining rockets exploded, knocking him into the cab and filling it with smoke. He then ordered the crew to don their protective masks and ordered the evacuation of the vehicle. The crewmen left the burning vehicle and ran to an adjacent firing point where they were secured and checked for injury. Fortunately, all three soldiers were unhurt.

About 45 minutes later, the final rocket in the pod exploded. This explosion tore the roof from the launcher module and created a larger fire that consumed the rear portion of the vehicle and the adjacent wooded terrain.

The driver looked out his rearview mirror and saw that the launcher appeared to be on fire. The section chief opened the roof hatch to assess the situation; when he did this, one of the remaining rockets exploded, knocking him into the cab and filling it with smoke.

What went wrong?

The rocket exploded shortly after it began to move down the launch tube. The front portion of the rocket containing ballast weight and a smoke charge (to mark the impact point) landed on the road about 150 meters in front of the launcher. The physical remains of the rocket motor and nature and timing of the explosion indicate a flaw in the rocket motor grain. This flaw could be a crack or void in the propellant, which can dramatically increase the pressure inside the motor case. If this pressure gets too high, the case ruptures and the motor explodes.

There are several possible causes of this sort of flaw. It could have been introduced during the manufacturing process or it could have come later as a result of damage while in storage or transit.

Lessons learned

The first lesson learned is a success story. The cab of the MLRS vehicle completely protected the crew from harm during the three explosions. When the crew evacuated the vehicle, they left the cab doors open. The doors remained open throughout the third explosion and the fire consumed most of the vehicle. But the contents of the cab, to include grease pencils and Styrofoam, did not show any damage at all from heat, flame or smoke. The crew was completely protected during the first two explosions.

This accident also highlighted the fact that there is no way to tell if a rocket or pod has been damaged in shipment or storage other than by a visual examination of the exterior of the pod. This pod might have been dropped, subjecting the contents to shock or acceleration damage without showing any external signs of damage. Crews and ammunition handlers must take care when handling pods to ensure that the rockets inside them are not damaged. If they drop a pod, they must report it, even if there is no outward sign of damage. ♦

POC: USASC Ground Systems and Accident Investigation Division, DSN 558-3562 (334-255-3562)

Fuel and Water Can Safety

A Risk Management Approach

A soldier, up early to prepare breakfast for his fellow troops, is tired from yesterday's activities. He reaches for the 5-gallon water can to make hot cereal on the M-2A burner. As he pours water into the pot, the burner's flame intensifies, burning the soldier and destroying the mobile kitchen. He had mistakenly grabbed the fuel can instead of the water can.

Another soldier uses a 5-gallon fuel can to refuel his vehicle with diesel fuel. Unbeknownst to him, this fuel can is full of MOGAS and is not properly labeled. This error causes serious engine problems and a maintenance nightmare.

Several soldiers are refilling their canteens from a water can. They don't know it yet, but this water can is full of antifreeze. This oversight causes grave health problems.

Mistaking a 5-gallon fuel can for a 5-gallon water can causes serious problems, including burns and fires. These 5-gallon fuel cans can also be used to store a variety of fuels. To avoid potential problems, cans need to be labeled correctly.

To give you an example, the Safety Center noted at one facility, 30 cans were identified as either containing the wrong liquid or being mislabeled. These mistakes **will** lead to maintenance and safety problems. Use the following information to help distinguish between the two cans.

5-Gallon Fuel Can

5-Gallon Water Can

■ Fuel and water cans have the same dimensions (see photos on page 10). Both cans are labeled with an "X" on each side. The "X" has a circle in the middle that surrounds the identity of the liquid in the can: "WATER" for the water can and "FUEL" for the fuel can. Fuel and water cans can be the same color (tan or black), so it is not possible to identify the liquid in the can by its color. Fuel and water can differences are listed in the chart below.

Fuel cans could also be labeled with different colors according to which fuel they store. To prevent confusion with improperly marked cans in the field, adhere to the following directions.

■ Mark each container with either the standard or short nomenclature identification on the side ends of the can. The short nomenclatures authorized for field use are MOGAS (for motor gasoline), DF (for diesel fuel), or JP (for turbine fuel/jet propulsion). When labeling turbine fuel, make sure to mark the appropriate number: JP-4, JP-5, or JP-8. Additional information that may be placed on the can is the NATO code number, the filling date, the weight or volume of contents, and safety markings. All markings on 5-gallon cans should be in ¾" letters.

■ When coloring the cans, paint the upper third of the can the appropriate color. Use an oil base enamel such as automotive spray paint and prepare the surface by first washing off with isopropyl alcohol (rubbing alcohol) and roughen lightly with sand paper. Cans containing MOGAS should be painted red in the upper third of the can. Cans containing diesel fuel should be painted yellow in the upper third of the can. Do not paint cans containing turbine fuel (JP-4, JP-5, or JP-8), but mark them instead. Remember to get your CO's approval before painting and stenciling your can. ♦

POC: Ms. Carey Mitchell, Petroleum and Water Business Area, U.S. Army TACOM-TARDEC, AMSTA-TR-D/210, Warren, MI 48397-5000, DSN 786-4154 (810-574-4154)

FUEL AND WATER CAN DIFFERENCES

	Fuel Can	Water Can
Cap Assemblies	Smooth on top (minus the retaining strap)	Two smaller caps on top
Number of Handles	3	1
Marking	"FUEL" is embossed inwardly	"WATER" protrudes from the can
Odor	Distinctive fuel odor	No odor

WHICH CAN AM I USING?

	Fuel Can	Water Can
Sight	"FUEL" label and 3 handles	"WATER" label and 1 handle
Touch	3 handles / smooth cap / label embossed inwardly	1 handle / 2 small caps on large cap / protruding label
Smell	Distinctive fuel odor	No odor
Hear	Hissing sound when opened	No sound when cap opened
Taste	Do not taste the liquid inside the can. Ingestion of fuel can be damaging to your health.	

Accident Briefs

Oops, I didn't know it was loaded!

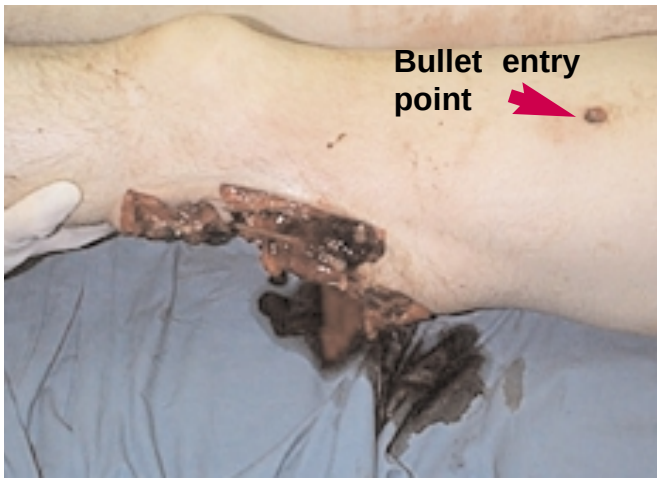
The soldier put his loaded 10mm Colt Delta Elite handgun on the coffee table before retiring to bed. The next morning, he got up, turned on the television, and started cleaning his weapon. He held the weapon in front of his body pointing to the left wall. While still watching TV, the soldier brought his left hand in front of the 10mm muzzle with the intention of pushing the slide back to eject the round that was chambered. Before his left hand touched the slide, his right index finger accidentally pulled the trigger. The round went through his left hand, ricocheted off the coffee table, and hit a picture hanging on the wall. He spent a week in the hospital, 10 days on quarters, and another 60 days on restricted duty.

Machinegun accident

The gunner and an instructor fired a 100-round belt on a .50-caliber machinegun. It took about 2 minutes for them to empty the weapon and then open the feed tray to recharge. When the gunner pulled the charging handle to the rear, both soldiers saw a round stuck in the bolt. Although they immediately began to close the bolt, the round chambered and cooked-off in the barrel. Fragments from the brass casing caused cuts and lacerations to both soldiers, who also received powder burns.

I shot myself in the leg!

The soldier was given his supervisor's M9 pistol to store in the arms room until he returned from TDY. The soldier turned the weapon into the arms room. On the day that his supervisor was to return, the soldier checked out the weapon to give back to him, but his supervisor failed to return with the convoy. Therefore, the soldier kept the weapon and went back to his room. A fellow soldier observed him inserting a magazine into the M9 and pulling the slide back to chamber a round. The fellow soldier warned him that he had a round chambered. However, the soldier ignored him and attempted to ride the hammer forward, resulting in the round being fired into his left thigh and exiting the back of his left leg. The injured soldier was transported to a nearby hospital, but unfortunately his condition deteriorated and his leg had to be amputated. ♦



Soldier accidentally fired a round from an M9 weapon into his left thigh. His leg was later amputated due to the injury.

Action Photos Wanted

Get your photos published in Countermeasure

Here are tips on what we're looking for:

■ Color photos of soldiers, NCOs, and officers working hard (versus looking posed or smiling for the camera), with names and credits for photography. We also need photos of off-duty activities, particularly people performing home/auto repairs, playing winter and summer sports, riding motorcycles or ATVs, and operating powerboats, sail boats or other watercraft.

■ Digital images of professional quality may be submitted, using at least 200 dpi, but 300 dpi is preferred. Submit image files in JPEG (RGB) format, either on 3.5" diskette, Zip disk, or e-mail to wilkinsm@safetycenter.army.mil. ♦

POC: Mike Wilkins, Countermeasure Illustrator, USASC Media & Marketing Division, DSN 558-9867 (334-255-9867)