ARMY GROUND RISK-MANAGEMENT PUBLICATION

COUNTERMEASURE

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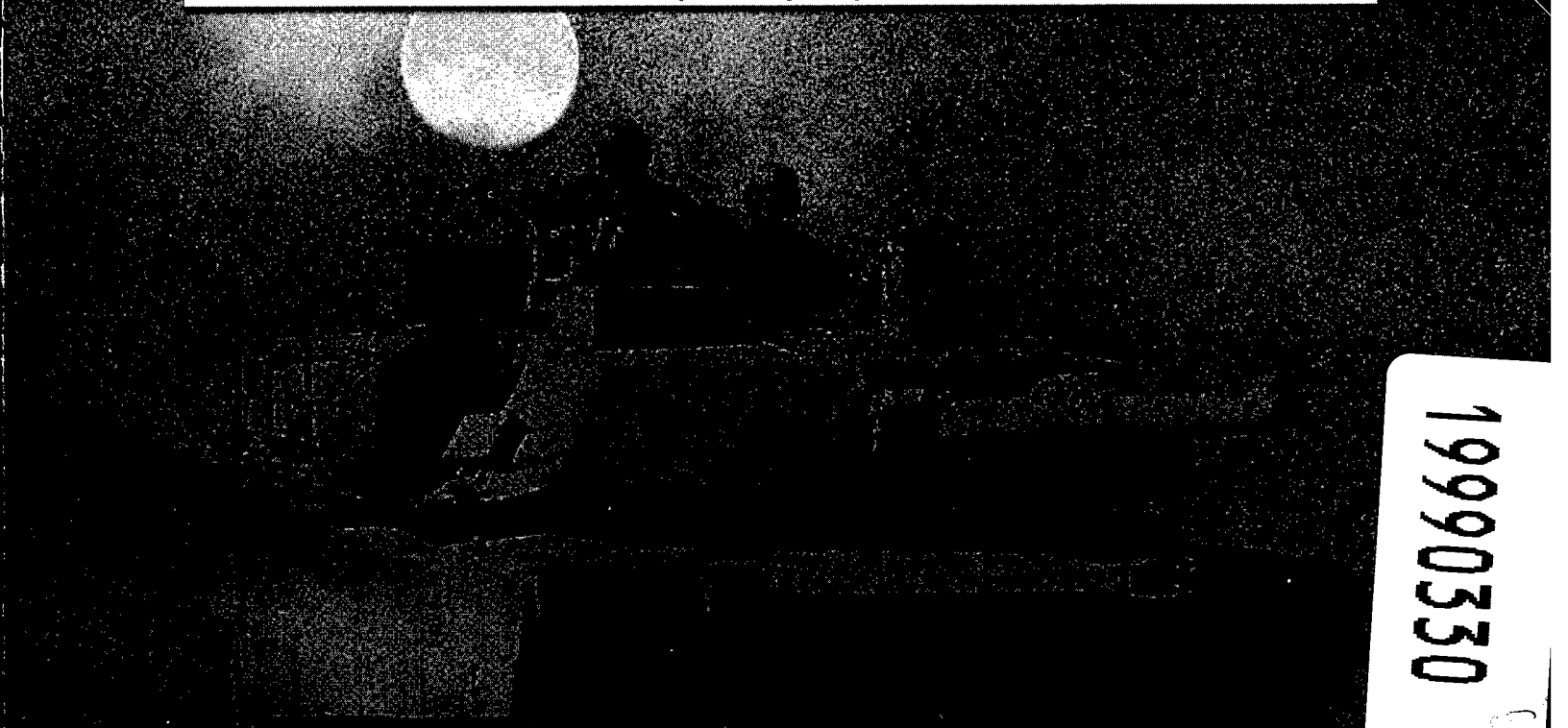
POV MOTOR VEHICLE FATALITIES
THRU JAN FY 99: 45
THRU JAN FY 98: 40



Keeping Safety on Track

Safety must be paramount in every soldier's mind when working on or around tracked vehicles. Most accidents happen when the equipment is operated improperly or procedures are violated. Your best protection from accidents is solid training and good crew discipline. At all times, practice exactly what you were taught. Safety--First and Foremost!

ARMY GROUND RISK-MANAGEMENT PUBLICATION
COUNTERMEASURE

The Official Safety Magazine for Army Ground Risk-Management

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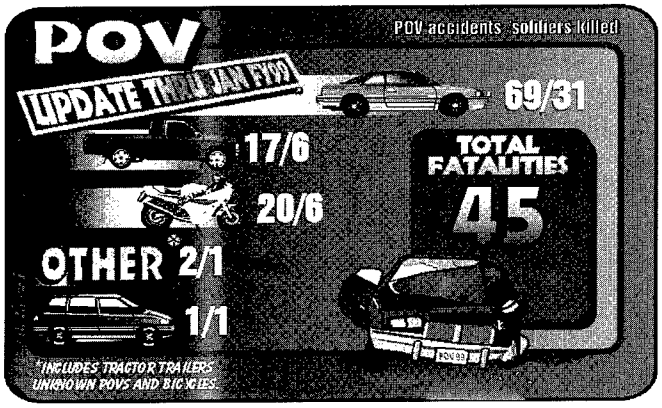

U.S. ARMY SAFETY CENTER

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Charles M. Burke
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Tracked Vehicle Safety Performance

Tracked vehicle accidents continue to be a concern throughout the Army. This issue addresses the Army's tracked vehicle accident record for FYs 97, 98, and thus far in 99, as well as the significant accident trends identified over that period.

Accident data shows that driving into other vehicles, roadside objects (such as trees, power poles, etc.), or into obstacles while maneuvering cross-country (such as ditches or rocks) comprise the largest type of tracked vehicle accidents.

Driving. There are several common causes for accidents related to driving tracked vehicles. These include driving too fast for the road conditions, improper use of (or failure to use) night vision devices (NVDs), and failure to identify other vehicles or personnel in the vicinity before moving.

Tracked vehicles can be hard to control on slippery road surfaces. Roads can become slick after rains and when covered by snow, sand, or mud. By driving too quickly, the vehicle can skid out of control, striking whatever is in its path. Leaders need to consider these hazards when defining movement speeds as part of their risk management process. Drivers and vehicle commanders need to be familiar with their particular vehicle's performance on slippery roads and must adjust their speed to prevent trouble.

During night operations, some crews fail to use their NVDs. They can then run into other vehicles or even dismounted soldiers that they cannot see. Leaders must enforce the proper use of NVDs during night operations. They must also ensure that NVDs are maintained in accordance with technical manuals, and that their soldiers are well trained in the proper way to use them.

Tracked vehicles are often much larger than other vehicles. Drivers and commanders often have limited visibility from their stations. Before moving the vehicle, they must be sure to positively look around to make sure nothing is in the way of their intended path. In congested

areas such as motor pools, assembly areas, or wash racks, ground guides must be used.

Hand and finger injuries. Another common type of tracked vehicle injury involves hand and finger injuries. These include situations where hands and fingers become caught in moving parts of the vehicle or are crushed when something falls on them. Rings and other jewelry can also cause injury.

Soldiers must be sure to keep their hands and fingers away from moving parts in and around a vehicle. These parts include engine fans, fan belts, winches, cables, and turrets. Fingers can be severed if they get caught on a fan belt while working on an engine. Be sure to follow the procedures in the technical manuals when working near moving parts. Shortcuts can cost fingers!

Fingers and hands can be crushed when heavy items fall on them. Examples include ammunition dropping during loading, machine gun mounts moving against turret walls or roofs, and engine power packs moving, dropping, or slipping during maintenance. Crews and mechanics must be aware of what is happening around them. Take precaution. Do not place hands near large movable objects.

Finally, too many soldiers lose fingers every year because of rings catching on some piece of the vehicle. This happens when jumping off of vehicles or near moving cables or ropes. The technical manuals require all rings to be removed before working on a vehicle. This includes wedding rings. If you catch it on something as you leap from the vehicle, the ring WILL come off...along with a good portion of the finger. So take it off before you get on the vehicle and save yourself this crippling injury.

Hatches. Soldiers can be injured by falling hatches. Most hatch-related injuries are caused by a failure to properly secure the hatch before moving the vehicle. If the hatch is not properly pinned in position, it may fall on the crewman when the vehicle hits a bump or makes a sudden stop. These hatches can be very heavy and being struck by one can cause serious head injuries if no helmet is worn. The weight of the hatch can also push your head down, causing neck or facial injuries as your head is pushed into some other object on the vehicle. Soldiers must know what pins or locks are necessary to secure their hatches, and these items must be checked in accordance with the vehicle technical manuals. ♦

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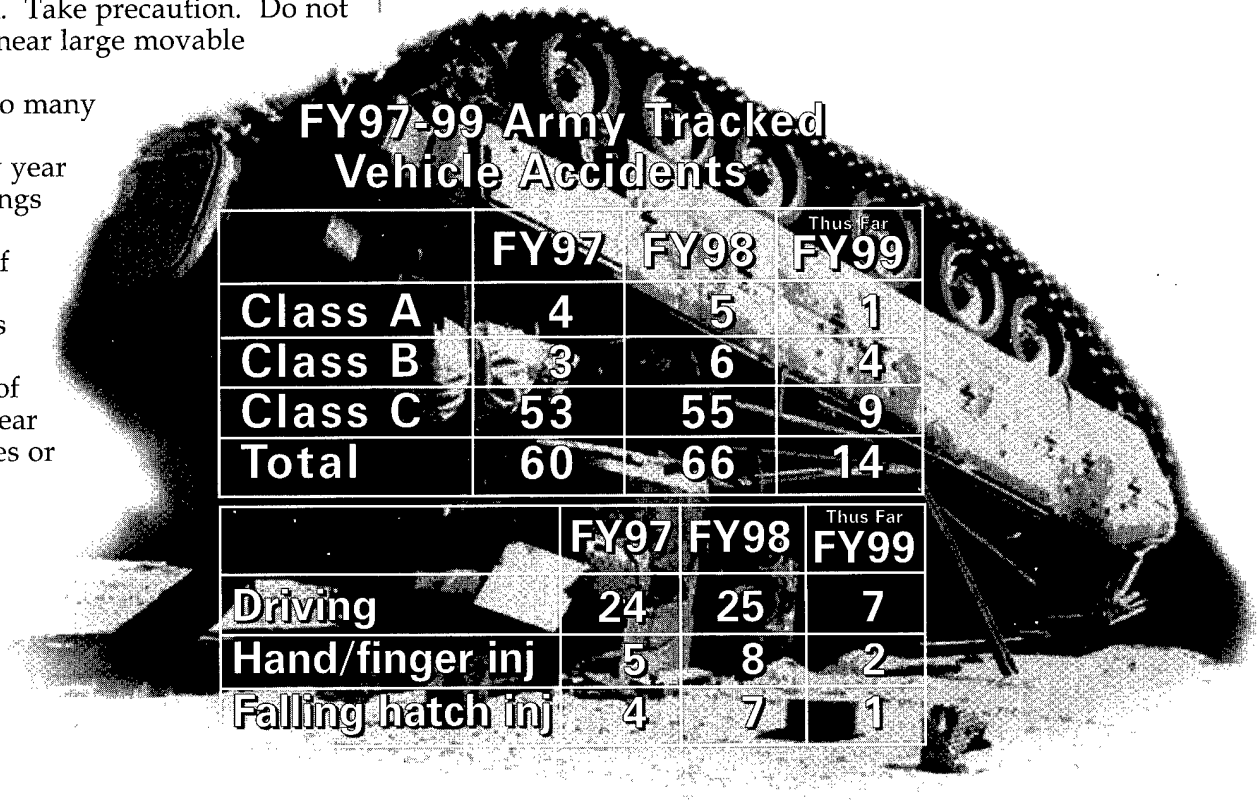

FY97-99 Army Tracked Vehicle Accidents

	FY97	FY98	Thus Far FY99
Class A	4	5	1
Class B	3	6	4
Class C	53	55	9
Total	60	66	14

	FY97	FY98	Thus Far FY99
Driving	24	25	7
Hand/finger inj	5	8	2
Falling hatch inj	4	7	1

Accident Review

Routine Mission Turns Tragic

It was supposed to be a routine mission—administrative redeployment of an infantry company and its attachments. The unit had completed its mission and was preparing to road march back to home station at night using white lights. The convoy consisted of twelve M2A2s, two M998s, four M106s, three M35s, three M113A3s, an M981, and an M577.

The mission seemed simple; after all, it was the same route used to deploy to the training exercise. The route consisted of dirt roads, paved roads, and the crossing of a 1200-foot bridge.

The mission turned tragic when one of the vehicles drove off the bridge and fell into the water. Five soldiers drowned. Only the driver and track commander escaped without serious injuries.

The company commander knew exactly what the mission was and how he was going to accomplish it. He took several positive steps in preparing the unit for movement. The company had a good night's rest and also was able to rest a couple of hours prior to movement. The commander ensured that the preventive maintenance checks and services were preformed prior to departure. He conducted a safety briefing, which included convoy speed, catch-up speed, and what to do in case of a breakdown.

Vehicle commanders were provided strip maps for the route as well. The vehicles were lined up according to the order of march and checked to ensure that their service lights were operational since it was a night move through civilian areas as well as the training area.

The M998 was the lead vehicle, followed by the M2A2s, one of the M113s (medic), M981 (FISTV, accident vehicle), M106s, M577, the remaining M113s, M35s, and finally the other M998.

The convoy proceeded on the road march with a 15-mph convoy speed and a catch-up speed of 20 mph. As the commander came upon the 1200-foot bridge, he made a net radio call instructing all vehicle

commanders to cross the bridge one at a time. Vehicles were required to wait at the entrance until the vehicle ahead had cleared the bridge.

The lead vehicle, M2A2s, and an M113A3 negotiated the bridge without any difficulty, which included going around a barrier that was set up in their lane of traffic to slow civilian traffic.

The M981 was next in line to cross the bridge. It proceeded partway across, but upon encountering the barrier, the track commander told the driver to go hard left to avoid the barrier. The driver avoided the barrier, but was unable to bring the vehicle back into his lane of traffic.

Consequently, the M981 went off the bridge and plunged 64 feet to the water below, trapping five soldiers in the back who drowned. The driver and track commander extracted themselves and swam to a nearby intermediate bridge support where they were later rescued.

Lessons learned:

- The company commander's risk assessment did not identify the barriers on the bridge as a hazard. He assumed that these barriers were of no great significance to the convoy. They had, after all, gone across the same bridge en route to the training exercise with no problems and the barriers had been in place at that time.
- The commander did not realize that the driver was not the same person who had previously driven to the training area. Therefore, this soldier was not familiar with the bridge crossing or the barriers on the bridge.
- The commander did not know that the driver of the M981 had not received proper licensing or training on driving an M981 outside the training environment. ♦

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The Jury Was Out . . .

As part of an Annual External Evaluation (AEE), a two-man Multiple Launch Rocket System (MLRS) maintenance support team (MST) was attached to a firing battery for purposes of launcher loader module (LLM) maintenance support. Their duties were to troubleshoot and repair deficiencies found in the LLMs. The vehicle supported was the Loader, Rocket, Armored Vehicle Mounted or M270.

The AEE began normally with the first four days of the exercise being characterized as busy by the MST. Several launchers were deadlined and a sense of urgency was omnipresent. A few days later, the MST fell behind on several launchers and had not completed work on any of them, rotating around to each one in an attempt to diagnose and correct the faults associated with each launcher.

That evening, a Self-Propelled Launcher Loader (the MLRS accident vehicle) was diagnosed by other mechanics to have a bad track adjuster, thereby requiring maintenance. A replacement track adjuster was not available in the field. Therefore, the decision was made by the battery commander to drive the vehicle back to the cantonment area for repair. The vehicle was driven back to the cantonment area and because of limited availability, it was parked in a maintenance bay belonging to another unit. This bay was typically used for wheeled vehicles or track chassis work only. The section chief of this vehicle and the driver were to stay with their vehicle until it was repaired.

The following morning, the MST continued to work on several launchers, one of which was diagnosed as having a bad elevation transmission. They were told by the battery commander to go to the rear and take the elevation transmission off the vehicle that was taken to the cantonment area and bring it out to the field to service another vehicle. The battery commander also authorized the controlled substitution of several other parts of this vehicle in an effort to repair other launchers.

Each 27M (MLRS Repair MOS) section has a set of "jury struts" and each MLRS platoon has one set. These struts are used during maintenance to support the LLM when it is in the erected configuration (see photo on page 6). This particular MST left their jury struts behind for use on their vehicles in the field.

They arrived at the maintenance bay and began work on the accident vehicle without the jury struts to support the LLM. The vehicle was located in a bay without sufficient overhead clearance to allow the LLM to be raised high enough for struts to be emplaced. They erected the LLM to a point where it was as high as the bay would permit. Instead of pulling the vehicle outside where they could fully erect the LLM, they put a 7-ton jackstand between the cage and the base of the LLM (63" from pivot point of LLM) as a precautionary measure, in lieu of the jury struts. They then proceeded to remove the elevation transmission. Just as the transmission

was pulled from the right-angle drive (differential), the LLM (with pods installed) abruptly fell, trapping the Private in the turret hole of the LLM and crushing the NCO between the loaded cage and the base of the LLM.

Immediately, soldiers and NCOs nearby reacted by determining the best method for erecting the LLM and calling 911. A nearby forklift was utilized to try and lift the LLM. Due to the first forklift's limited capacity, a second forklift was needed to lift the LLM. As soon as the LLM was lifted, the NCO slid out of the launcher and the Private was able to crawl out.

The NCO was taken to the installation emergency room. After approximately 40 minutes of emergency treatment, he was pronounced dead. The Private was transported to the emergency room via POV and treated for minor injuries and released.

The most disturbing part of this accident, however, was the situation that led up to it. The battery motor sergeant was present at the time of the accident. He had come out of the field with an MLRS section chief to pick up jury struts and return them to the field. As they approached the maintenance bay where the accident vehicle was being worked on, they noticed that the MST had the launcher partially erected and was not using jury struts. The motor sergeant asked them if they wanted to use the jury struts they had in their possession. The MST stated that there was not enough clearance and tried to elevate the launcher further in order to install the jury struts. However, the overhead trusses and support beams would not allow the required height needed to emplace struts. So they left it in the bay as is.

Furthermore, an adjacent battery motor sergeant had walked past several times and was sitting at his desk which was no more than fifteen feet from the LLM. His door was open and his chair was located in the path of the doorway. The motor sergeant contended, however, that he did not see or say anything.

Subsequently, the MST NCO continued the task of removing the elevation transmission with the LLM only partially elevated. Several NCOs and soldiers were in the immediate area and not one of them stopped what they knew was an unsafe procedure. This accident was extremely unfortunate and very much preventable. In this case, the lack of a jury resulted in a death penalty. ♦

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Fire Down Below

These few words can cause concern, fear, and apprehension to any armor crewmember. Let's look at what the Army and the program managers have done to alleviate your concerns.

The Bradley Fighting Vehicles (BFVs) have two separate fire suppression systems installed in each vehicle. This does not include the portable handheld fire extinguishers. These installed systems are designed to provide the right amount of fire suppression agent to the engine or squad areas to extinguish the blazes. How the Halon 1301 disrupts the fire cycle would take more time and "Ph.D. from MIT" to understand. Just remember that it works.

First of all, the crewmembers of the BFV are responsible for ensuring that the system is properly installed. When the crew performs PMCS, they need to ensure that the systems (the bottles) are properly installed and operational, and the gauge is reading in the green zone. An area not covered by the PMCS is the wire race for the external handle. This is the sleeve for the wire that runs from the exterior handle to the valve. In older systems, the wire races can get brittle, crimped, or lose supports. It is important that the external handle wire is right for the valve to be actuated. If the complete system looks bad, have the local maintenance personnel check it out. "Better safe than sorry."

Crews need to understand that the engine compartment fire suppression system is not automatic. The crew, repeat THE CREW, has to detect the fire and stop the engine before operating the fire suppression system. Operating the engine fire suppression system before stopping the engine will only allow the Halon to be sucked out of the engine compartment and there will not be enough Halon to stop the fire.

Now, let's talk about the squad area automatic-fire suppression system. This system has two purposes. The first purpose is to provide the BFV with a countermeasure to a round that penetrates the hull. The valve is designed to activate within 250 milliseconds—that's 250 thousandth of a second. It is very important that the system is in automatic mode for this to happen.

The second purpose for this system is to provide fire protection for the crew from the grease, fuel, or electrical fires that will occasionally occur.

If a fire does occur in either the engine or squad areas, the vehicle must be stopped and the engine shut down. The crew exiting the vehicle should move upwind of the vehicle and assemble. Moving upwind will prevent the crew from being exposed to toxic gases which are always generated when fire breaks out. For those crews that do not notice the fire in the squad area until after the automated fire suppression goes off, do not be too worried about inhaling the Halon gas. Halon is not harmful in the amount of time required to safely exit the vehicle.

The most important element in the BFV fire suppression system is YOU, the crewmember. Be calm and don't let fear overtake rational thought and emergency training. Ensure the equipment is up to the Dash 20 standards and understand what each system is capable of doing and when to use it. ♦

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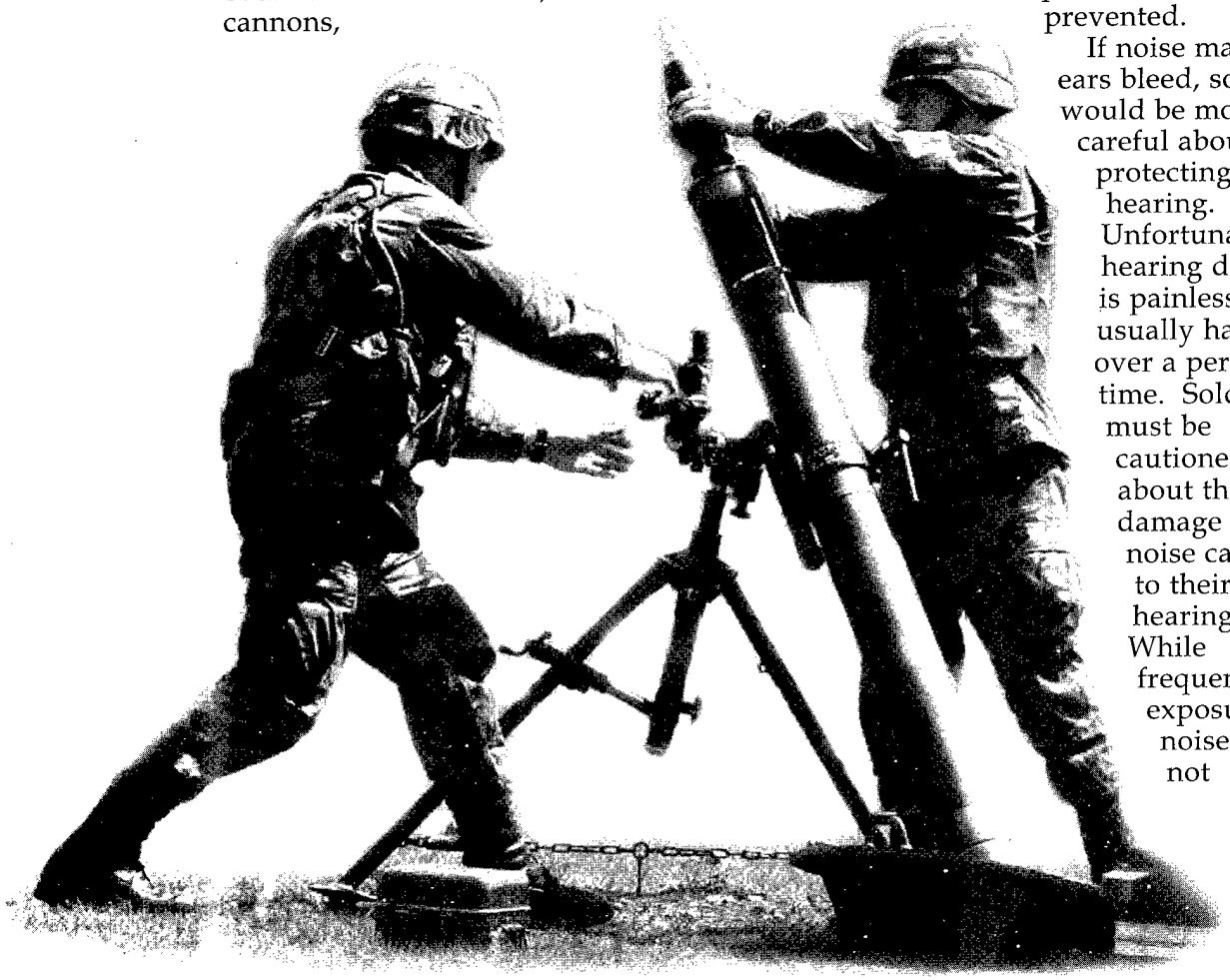
Are You Too "HOOAH" For Earplugs?

Some noises are desirable—when they are controlled. We welcome the noise of a fire alarm when it informs us of the hazard in time to escape, and we use the noise of an alarm clock to awaken us every morning. Similarly, we welcome the sound of a barking dog when it warns us of a prowler. But if we had to listen to these all day, we would soon become prime candidates for the psychiatrist's couch.

Consider noise emissions from tanks firing, weapons firing, roar of aircraft engines, clamor of combat vehicles, or even loud music. M16s, cannons, howitzers, and recoilless rifles all exceed the decibel level that's known to damage hearing. The turret of a Bradley Fighting Vehicle is one of the noisiest places in the Army. All of these present a safety hazard and are just a few examples of equipment and weapons that decrease your hearing ability.

The Army has long recognized that repeated exposure to high-intensity noise can cause permanent loss of hearing. And permanent loss of hearing can affect combat efficiency. Noise-induced hearing loss cannot be repaired, but it can be prevented.

If noise made ears bleed, soldiers would be more careful about protecting their hearing. Unfortunately, hearing damage is painless and usually happens over a period of time. Soldiers must be cautioned about the damage that noise can do to their hearing. While frequent exposure to noise does not



Always wear hearing protection. Once damage is done, it is permanent. Noise-induced hearing loss cannot be repaired, however it can be prevented. Save it today for tomorrow!

immediately cause irreparable damage—but after repeated exposure, it will. It is important for soldiers to know that once this damage is done, it is permanent. It cannot be repaired, ever.

Noise levels that are damaging may not seem very loud to some soldiers. They may say that the noise doesn't bother them, that they're used to it. But they must be made to realize that whether noise "bothers" them or not, it can and will damage their hearing.

According to an interview in *Soldiers* Magazine, SGM Kevin Skelly stated that he wasn't exactly sure when the ringing in his ear began. He said that it might have been early in his career when he went to the rifle range without earplugs. He was young and figured it would be okay just this one time. And besides, his leaders weren't checking anyway. Or maybe it was all the times he was around artillery fire, and he figured he could get his fingers in his ears quick enough.

Later in his career, SGM Skelly left the field artillery, went airborne, and joined the Special Forces. Many times, he would climb aboard a helicopter or airplane thinking the ride was too short to bother with earplugs. He stated, "I was too "Hooah" for earplugs. We all were."

During the time of the interview, SGM Skelly was only 38 years old and the owner of a pair of Army-issued hearing aids. The ringing in his ear is permanent and something he must live with every minute of every day, because he didn't wear hearing protection when he should have.

Personnel who work in noisy areas must be told the effects of noise on hearing and how to avoid overexposure. Hearing protection must be worn when steady noise levels are 85 dB or greater and when impulse noise levels exceed 140 dB, especially during combat. Exposure to impulse noise in excess of 165 dB requires the use of earplugs and either earmuffs or a noise-attenuating helmet. All small arms used by the Army produce impulse noise levels above 140 dB.

Preventing noise-induced hearing loss requires the coordinated application of developing control measures, such as: noise level surveys, posting of warning signs in noise hazardous areas and on associated equipment, the mandatory use of hearing protective devices, and annual audiometric monitoring, supplemented by health education, supervision, and discipline of personnel.

For a hearing conservation program to work, the dedicated efforts of the individual soldier, commander, first-line supervisor, and medical personnel are required. The first and foremost line of defense is the individual act of the soldier to wear appropriate hearing protection that the Army has made available. Hearing protection is available for all soldiers, and all soldiers must recognize the need to protect their own hearing.

Commanders and first-line supervisors can do the following to prevent hearing loss in their units:

- Ensure hazardous noise areas are marked with caution signs in accordance with AR 385-30.
- Ensure all personnel are aware of the damage that noise can do to their hearing.
- Ensure personal hearing protection is available for all personnel.
- Enforce the requirement of AR 40-5 that states hearing protection will be worn during exposure to hazardous noise levels.
- Ensure that all soldiers and civilians who are exposed to noise receive periodic hearing evaluations.
- Set a good example.

Part of being battle-ready is being able to communicate. The ability not only to speak, but also to hear and understand is basic to soldier survival and mission accomplishment.

Editor's note: *Noise hazards are not only limited to on duty. Off-duty noise hazards include rock concerts, car and personal stereos, firearms, power tools, and recreational vehicles. Wear hearing protection. It is* ***your*** *responsibility.* ♦

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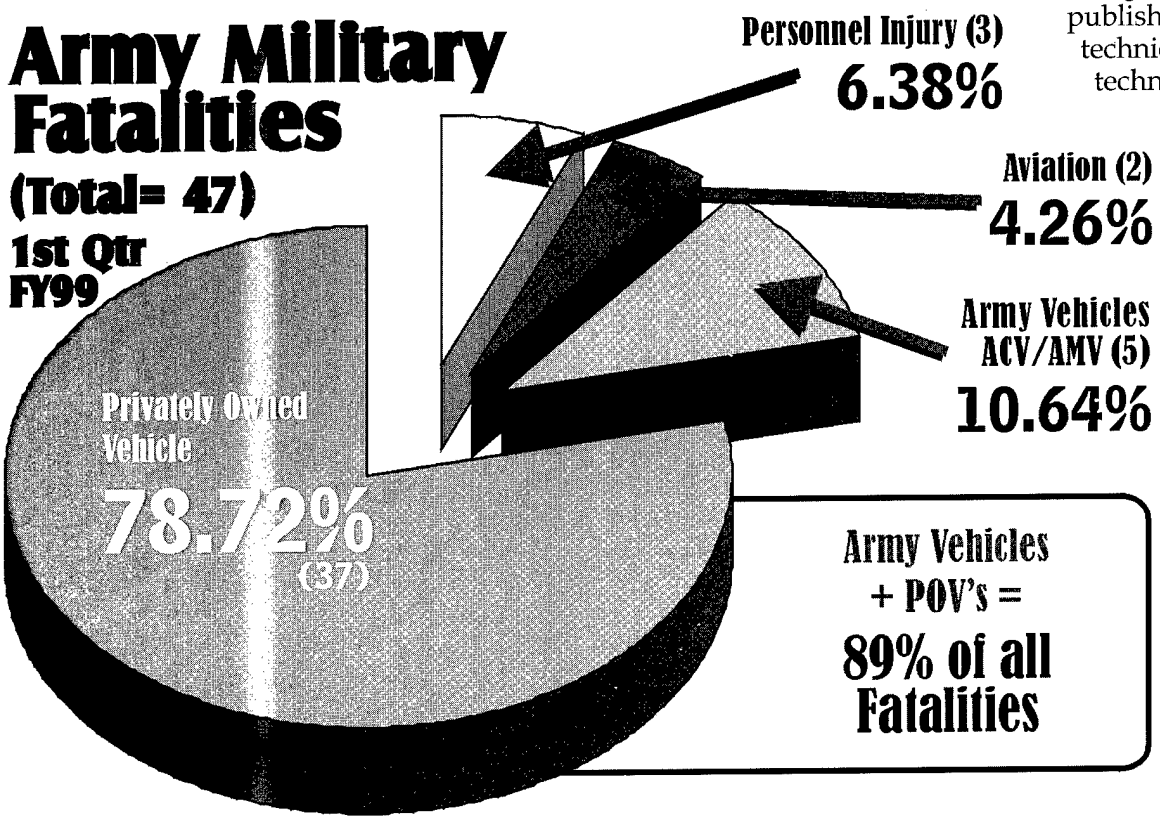
How Many Times

There is no doubt that military operations are becoming more complex, more difficult, and more dangerous. We are challenged daily to make our limited resources stretch to support increased mission taskings. Training dollars are shrinking, equipment is getting older, and experience levels seem to be tapering off. Yet, it seems our mission load continues to increase. We hit the ground running and don't let up. Unfortunately, we frequently make mistakes.

How often have we seen that live-fire range with the misplaced round that finds its way to the wrong place and creates absolute havoc? How many soldiers have been hurt in military vehicle accidents in the field? How many soldiers have we lost to privately owned vehicle accidents? How many times have we seen accidents that involved supervisory errors, lack of experience, complacency, overconfidence, and failure of self-discipline to simply follow established procedures?

It seems there are no new accidents, only repeats of previous unfortunate events. We are seeing very similar accidents in totally different locations, by both active duty and reserve units. Although some do have new variations, we seem to invariably follow in the footsteps of those before us, making the same costly mistakes, tragically resulting in injuries, lost lives, lost equipment, and ultimately mission failure. We make mistakes as maintainers, as operators, as supervisors, and as commanders, either actively or through omission. We frequently overlook the obvious or fail to maintain or enforce standards. Through ignorance, arrogance, or conscious decision, we might even take shortcuts, or bypass established procedures—procedures established for good reason. Even in the case of materiel failure, there is usually an oversight.



Regulations, SOPs, published orders, technical manuals, technical bulletins, and field manuals all lay the foundation of rules governing our operating environment. We apply these rules to our given circumstances to accomplish our mission. These rules come through intelligent, expert thought, and evolve through lessons learned from past mistakes. To

circumvent these rules, for whatever reason, courts disaster.

All accidents, with the "Act of God" exceptions, are preventable. It is a matter of breaking the usually long and complex chain of events at some point in the sequence. That chain is inevitably exacerbated by the numerous contributing factors which now days seem to continually invade our domain, drive our motivation, and affect our inherently dangerous operating environment. The OPTEMPO, level of soldier training, weather, weapon condition, ammunition, lack of time, sense of urgency, individual personal problems, and other pressures further complicate our ability to manage this risk.

The margin for error is indeed becoming slim. Our environment is becoming increasingly more technical and correspondingly more lethal. Mistakes are more costly. Each and every soldier has the ultimate and immediate responsibility to be actively involved and break the accident chain at the earliest point possible. Awareness is the key. Risk management is the mechanism that facilitates awareness and provides us methods to combat these factors.

Risk management is a process. It is not complicated, though the details may become complex. It should not be something to which we merely pay lip service. It is a tool for the command to help identify and deal with safety concerns in a logical and sensible manner. It is not a mystery. Field Manual 100-14 provides all the details and instructions to apply and implement risk management techniques to your particular operating environment. Additional information is available on the web at http://safety.army.mil

The first step of risk management is to identify hazards through all aspects of our situation, environment, and mission, considering previously identified and historical problem areas. Then we assess those hazards to determine probability, severity, and potential costs. Next, we consider possible steps or control measures that could reduce or eliminate those risks. It seems only logical that we should make the most informed risk decisions based on a residual risk level. Ask yourself, "Do the benefits outweigh potential costs?"

Once the decision is made to accept a given risk level, we must ensure control measures are effectively implemented. These measures are deliberate and absolutely essential to keep risk at a manageable level. Finally, we must supervise and evaluate the situation, including enforcement of standards and procedures.

These simple steps seem like common sense, and indeed they are exactly that. But haste, overconfidence, complacency, and a lack of situational awareness, exacerbated by a high OPTEMPO may invite shortcuts, poor decisions, or reduced planning.

The risk-management process is designed to facilitate time-constrained planning, much in a sense that we use checklists and battle drills. It recognizes historical hazards and jogs the thinking process to include as many potential problems as possible, develop control measures, and heighten awareness.

The process further considers unit, crew, and individual training levels, standardization, weather conditions, known hazards, and pertinent factors about the mission profile. Implementing control measures, the commander then balances risk against the mission, using his best judgment. He must match the right soldier to the right job, in the right environment, with the right support.

In today's complicated world, this is becoming a significant challenge. Our plates are full. We have fewer and fewer personnel available to accomplish an increasing myriad of missions, in less and less time. The present OPTEMO should spark increased hazard awareness, not shortcuts. It mandates that leaders at all levels manage risk appropriately. Identify the hazards, know the hazards, reduce the hazards, and maintain a vigil against complacency, shortcuts, and improper procedures. We cannot afford to continue to make the same mistakes. ♦

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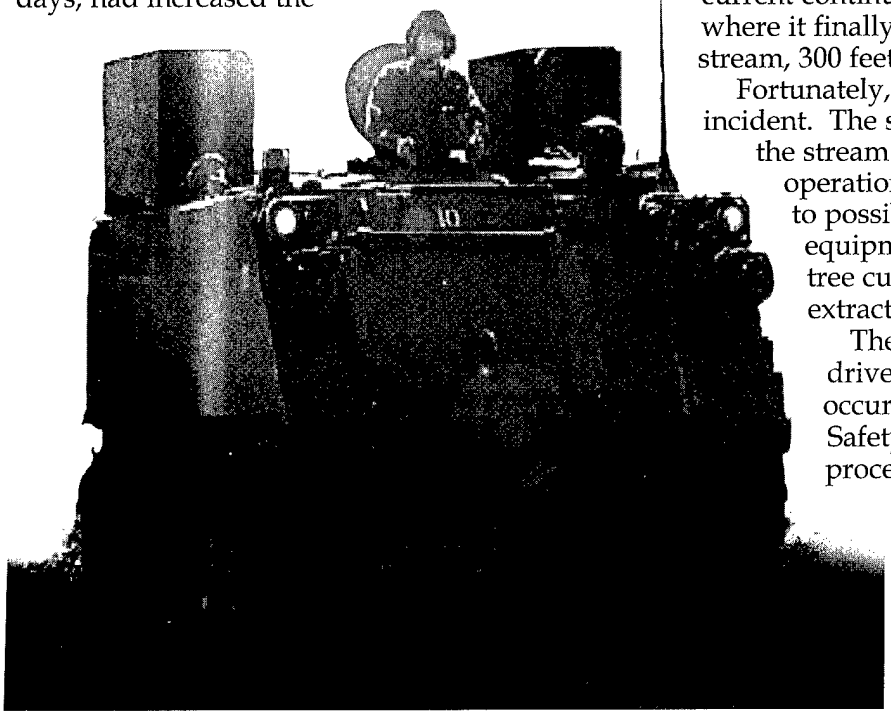
From The Troops

Fording—Anything But A Normal Operation

A chemical unit was preparing to train an officer advanced course on smoke generator systems. An instructor decided to pre-position an M1059A2, Armored Personnel Carrier (APC), with mounted smoke generators and drive it on ahead to a local range for the next day's training. The instructor was driving the APC alone without a track commander.

The weather condition was overcast with rain. A ford site used by tracked vehicles had a stream with a normal water depth of two feet with a slight current. The constant rain however, from the previous days, had increased the stream's water depth and changed the current to a rapid flow. The maximum ford depth referenced in the technical manual for the APC was 40 inches.



Approaching the ford site, the instructor stated later that he misjudged the swift current and rising water level. He drove the APC into the stream and attempted to cross over to the opposite bank. In mid-stream, the track's engine stalled. The instructor successfully restarted the engine, but the APC was being moved downstream by the current.

The instructor exited the APC and safely made it out of the water to the opposite bank. The current continued to move the APC downstream where it finally sank in a deeper portion of the stream, 300 feet from the initial entry point.

Fortunately, no one was injured in this incident. The sunken APC was extracted from the stream after an extensive recovery operation. This exposed more personnel to possible injuries due to heavy equipment and metal cabling use and tree cutting to clear a path for the extraction.

The instructor was an experienced driver and knew better. Accidents occur when safety rules are ignored. Safety guidance and risk management procedures do protect soldiers and equipment . . . **Our task is to follow them.** ♦

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Correction

Reference February 1999 Countermeasure article, "Driving with NVGs," we failed to mention the co-authors supporting the article. The by-line should have read: This article was authored by Scot Best, Dennis Collins, and Dino Piccione, Human Factors Engineers, DCS Corporation, Alexandria, VA (703-683-8430). Please accept our apologies. We will work harder to ensure we don't make the same mistake in the future. ♦