

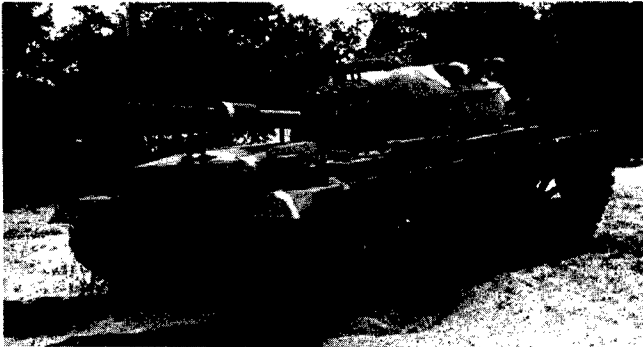
# LOSS CONTROL

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# ARMOR

## Stopping Accidents in Armor Battalions – A Support Packet

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The Army's peacetime tracked vehicle accident experience suggests the existence of operational weaknesses that would produce even greater losses in combat. This support packet focuses on the kinds of operational accidents that have the potential to rapidly deplete armor unit capabilities under combat conditions. Based on problems that have caused armor unit accidents in the past, this packet is intended to help you gain the perspective to prevent these kinds of accidents in the future. Let's look briefly at past problems.

Six years ago the Army Safety Center studied tracked vehicle accidents that occurred in 1977. The study revealed that 180 of the 200 driver error accidents were caused by six factors. They were:

- Deficient inspection and testing.
- Following too closely.
- Improper passing.
- Driving too fast for conditions.
- Narrow or congested roads.
- Nighttime conditions/excessive duty hours.

Recently, M113 APC and M60 tank accidents occurring in fiscal year 82 were studied. The same six factors accounted for 166 (63 percent) of the 262 accidents. The study identified three other factors—

- Poor coordination or communication
- Rough terrain
- Incorrect ground guiding—

which accounted for an additional 60 (23 percent) accidents. Altogether, nine factors accounted for 226 (86 percent) of the 262 accidents that occurred in fiscal year 82. Here's a closer look.

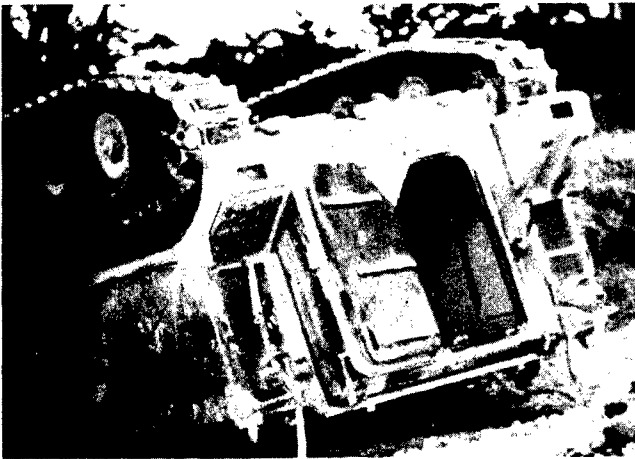
• **Deficient inspection and testing.** The average cost of these accidents was more than twice the average cost of all other accidents. This is due to the severe nature of injuries resulting from hatch failures or malfunctions. Nearly half of these accidents involved hatches where the positive locking safety pin either was not installed on the vehicle or was available but not used.

• **Following too closely.** All of the accidents in this category involved M60 tanks. Drivers often underestimated the stopping distances required for these heavy vehicles.

• **Improper passing.** The majority of these accidents also involved the M60 tank. Because of its large size, the M60 is difficult to maneuver precisely when passing, meeting, or going around other vehicles and obstacles. Therefore, drivers frequently misjudge clearance. In more than half of these accidents, drivers had been on duty for more than 8 hours. This suggests that fatigue is also a factor. All of the accidents caused by incorrect passing occurred during tactical operations. This may explain, but not excuse, the excessive duty hours. Proper work-rest cycles are especially important during tactical operations.

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Commander's Guide to Accident Prevention Series **1** Armor



- **Excessive speed.** Three out of four of the accidents in this category involved driving too fast on slippery surfaces (rain, ice, snow, or mud). The other accidents involved speeds that were excessive regardless of the road or surface condition.

- **Narrow or congested roads.** All the accidents in this category occurred off post, again pointing out the difficulty of maneuvering the large M60 tank through narrow, congested, and frequently unfamiliar areas.

- **Nighttime conditions/excessive duty hours.** Nine out of ten of these accidents occurred between 1800 and 0559 hours and involved drivers who had been on duty for more than 8 hours. This again stresses the critical need for proper work-rest cycles during tactical operations.

- **Poor coordination or communication.** Crew coordination and communication tend to suffer during long hours of tactical operations. There are two main problems. The first involves operating the M60 turret without making sure that crewmembers are informed and in their correct positions inside the tank. The second problem involves crewmembers not being in their correct positions while the tank is underway.

- **Rough terrain.** The principal problem here is crewmembers not being correctly positioned with three points of contact when traveling over rough terrain (ditches, holes, bumps). Crewmembers are injured from being thrown around inside the vehicle.

- **Incorrect ground guiding.** The errors most frequently made by ground guides were placing themselves in the wrong position, using the wrong signals, and lack of attention. That three out of four of these accidents occurred in tracked vehicle facilities is not surprising since that is where most ground guiding is done.

The results of these studies clearly show that the same kinds of accidents occur over and over again. Vehicle operations are still the single largest source of operational accidents in armor units. This packet concentrates on these and other M60 and M113 operational problems because accidents involving these vehicles greatly reduce the Army's combat readiness.

Accidents and injuries involving tracked vehicle maintenance are another problem area in armor units. These accidents usually get little attention and often little in the way of prevention because, looked at individually, they often seem to be only isolated, "bad luck" events. But looked at collectively, they represent a serious loss of combat readiness.

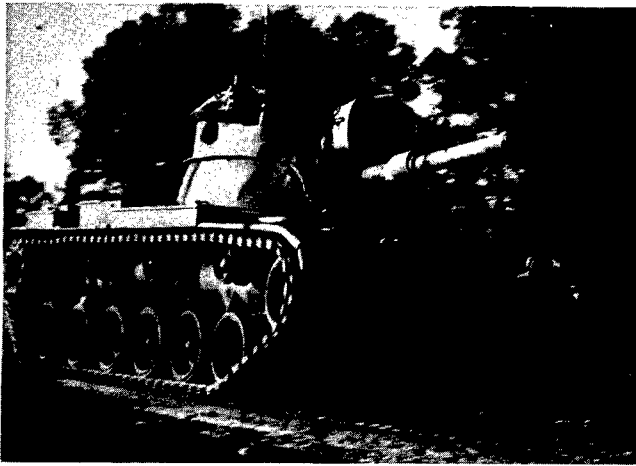
Weapons and explosives handling is another common source of accidents in armor units. In almost every instance where the cause is determined, the accident is found to be the result of improper, rough, or careless handling or a failure to follow established procedures. Weapons, ammunition, and explosives are required Army tools, and their misuse is another drain on combat readiness.

The responsibility to protect combat readiness and reduce future combat losses rests on your shoulders. What can you as an armor unit commander do? Let's look at some specific problems and actions you can take to solve them in your unit.

## **Accident Prevention is a Combat Multiplier: A Real-Life Example**

Accidents in armor battalions pose a significant threat to combat success. The best evidence of this is the accident experience of armor and mechanized infantry battalions when they engage in intensive field training. A case in point . . .

Two battalions, one armor and one mechanized infantry, were deployed to Fort Irwin, CA, to conduct high realism, live fire training. During the 8-day exercise, the accident experience of these two battalions was closely monitored and recorded. The



following data deals exclusively with accidents associated with the M60 tank and the M113 armored personnel carrier.

<b>Recordable combat vehicle accidents</b>	<b>7</b>
<b>Combat vehicles damaged</b>	<b>4</b>
<b>Crewmembers disabled (more than 1 day)</b>	<b>8</b>
<b>Crewmembers killed</b>	<b>1</b>

Some simple extrapolation of this data produces the following combat vehicle data for just the maneuver elements of one- and six-division forces in the field for 90 days.

	<b>One Division</b>	<b>Six Divisions</b>
<b>Recordable combat vehicle accidents</b>	<b>462</b>	<b>2,772</b>
<b>Combat vehicles damaged</b>	<b>264</b>	<b>1,584</b>
<b>Crewmembers disabled (more than 1 day)</b>	<b>528</b>	<b>3,168</b>
<b>Crewmembers killed</b>	<b>66</b>	<b>396</b>

The validity of this extrapolation to large-size units has been confirmed by analysis of Vietnam data which indicates that the information is realistic. The available data from Vietnam indicated even higher rates of loss during the first several weeks following deployment of units. Looked at another way, these accidents would mean the death of about 1 percent and the temporary disability of 7 percent of the fighting force and significant damage to 25 percent of a division's combat vehicles in 90 days of combat-vehicle-related operations alone. Preventing these accidents would increase combat effectiveness by the same percentages. Looked at this way, this data confirms that accident prevention is, indeed, a combat multiplier.



## Vehicle operations

### Excessive speed for conditions



*The M113 APC was driving on a tank trail at night. The vehicle was traveling about 20 mph without lights. The track commander (TC) spotted another APC and tried to warn the driver, but the two APCs collided head on. Damage to the two APCs cost \$172,523.*

Safe speed must always be determined by existing conditions (road surface, visibility, weather, etc.), no matter what the posted speed may be. Stress to your track commanders that they are responsible for ensuring that their vehicles are operated at speeds that are safe for existing conditions. Speeds that seem slow during normal conditions can be dangerously fast when visibility is limited or the road is slippery. Establish safe speeds for various road and weather conditions, and enforce them in your unit.

### Vehicle-to-vehicle accidents

*During a night tactical blackout road march, the convoy halted. The M60 tank driver misinterpreted the position of the brake pedal and pressed the accelerator instead. He was unable to stop in time to avoid hitting the APC ahead of him.*

An M113 or M60 colliding with another vehicle is a common type of accident. Accident data shows that one or more of the following three factors are frequently present.



- **Poor visibility.** Collision accidents often take place at night or during foggy conditions when visibility is reduced. In many cases, drivers try to compensate for the lack of visibility by closing the gap between their vehicle and the one ahead. However, they often fail to reduce their speed when they reduce their following distance. The result is often a collision.

- **Ice and snow.** Tracked vehicles are not easy to handle even on dry roads and good surfaces. Add ice and snow and the potential for an accident skyrockets.

- **Inexperienced drivers.** All too often an M113 or M60 driver is "created" after a couple of supervised trips around the motor pool. These drivers may perform adequately when conditions are good and nothing goes wrong. However, reduce their visibility or throw in a little ice and snow and they become accidents waiting to happen.

Use FM 21-17 and FM 21-306 to develop your unit driver training program. Make sure your program exposes your drivers to all the conditions under which they will be expected to operate. Include hands-on training in correct procedures and techniques for controlling tracked vehicles in all types of weather and visibility and over all types of roads and terrain. Stress that speed must be reduced when visibility is restricted and when driving over slippery or rough terrain.

## Following too closely



*The driver of an M113 APC in a motor column stopped his vehicle at the bottom of a slight hill because the vehicles ahead of him were having steering problems on the slippery road. As the vehicles behind him came over the hill, each slid into the vehicle to its front. Ten vehicles were damaged in this one accident.*

Failure to keep safe distances between vehicles is a frequent driver error causing vehicle collisions. Make sure your unit SOP, in accordance with appropriate TMs and FMs, clearly covers convoy control and vehicle spacing. Before each convoy operation, brief your drivers on the safe-to-follow distance. Before establishing this distance, consider the type of vehicle and load, visibility and surface conditions, terrain, and weather. Remember, more hazardous conditions require greater distances between vehicles.

## Fatigue

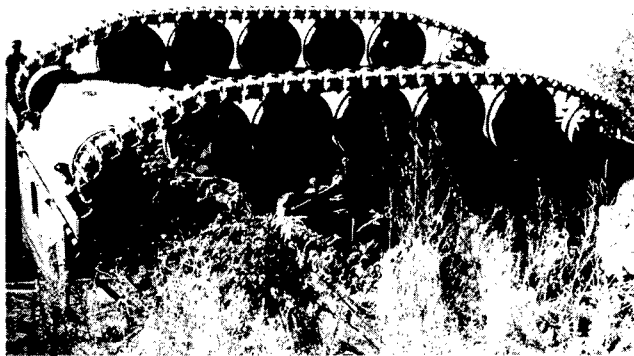


*During a major FTX, the soldier had been on duty for 14 hours. Sitting in the gunner's seat of the M60 tank, he fell asleep with his head resting on the main gun. He was not wearing a helmet. As the TC moved the gun and turret to face the enemy, the soldier's head was caught between the gun and the telescopic sight. He suffered a severe head injury.*

Track crews suffering from sleep loss will go through various stages of fatigue, including decreased coordination, narrowed attention span, and reduced standard of performance. You must train yourself and your soldiers to know the causes, signs, and results of fatigue and to be aware of its effects on your unit's ability to accomplish the mission safely. Recognize the fact that, as an exercise goes on, fatigue becomes more and more a factor. Step up supervision to make sure safety precautions are not ignored. Try to anticipate errors caused by fatigue, and take action to prevent them before they cause an accident. See AR 385-55 for guidelines on establishing a crew rest policy for your unit.

## Inadequate driver training

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*Three M113 APCs were on a night road march, traveling at about 10 to 15 mph along a dusty tank trail. A ¼-ton truck drove by the convoy and created a dust cloud that limited the visibility to 2 to 5 feet. The trail M113 initiated a right turn to follow the tank trail but, due to the limited visibility, did not see the tank trail straighten out to the left. He brushed the right side of an embankment, overcorrected to the left, and allowed his left track to fall down the 30-degree embankment on the left side of the tank trail. When he tried to correct by steering to the right, the M113 APC exceeded its slope capability, overturned, and rolled down the embankment. The driver was killed when the M113 rolled over on him. Investigation revealed that this driver had received no training and was not licensed to operate the M113 or any other Army vehicle.*

Many times, soldiers are killed or injured simply because they lack the training to safely operate the vehicles they are required to drive. It is a command responsibility to make sure drivers are properly trained and supervised.

The M113 operators manual stresses that oversteering can cause loss of control. Drivers must be taught special steering techniques that will enable them to regain control if they lose it. This type of training will lessen the chances that a driver will panic and overreact in an emergency. Well-trained drivers become confident drivers who can handle trouble routinely, without panic.

Driver training requirements are outlined in AR 385-55, TM 21-306, and FM 21-17. The FM can be especially helpful in designing a training program that is tailored to your unit operations. It outlines a concise, well-thought-out sequence of training for combat vehicle drivers and offers excellent examples of training programs that can be conducted at battalion level.

When developing your driver training program, identify specific tasks, conditions, and standards that suit your mission and equipment. Cover every facet—driver maintenance responsibilities, driving in all types of weather and over all types of terrain, and emergency procedures peculiar to each type of vehicle. Establish specific standards a driver must accomplish before he is awarded a driver's license.

As part of your on-going driver training program, whenever unit operations permit, pair an experienced driver with an inexperienced one to provide supervision and hands-on training. Match the driver to the mission, and assign only your most experienced drivers to transport troops.

Allow only properly trained and licensed drivers to operate tracked vehicles in your unit. Remember that driver error becomes supervisory error when you fail to provide the training and supervision your drivers need to operate their vehicles safely.

## Sleeping in the field

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*During the training exercise, the soldier went to sleep on the ground using a poncho liner for cover. An M113 APC, operating under blackout conditions, ran over him as he slept. He was killed.*

The designation of where to sleep is a commander's prerogative. You must select an area or place on a vehicle, in a vehicle, around a vehicle, or away from a vehicle that presents the least hazard to the soldier commensurate with the mission. Of course, the least hazardous arrangement is to designate a sleeping area away from activity areas and instruct your people

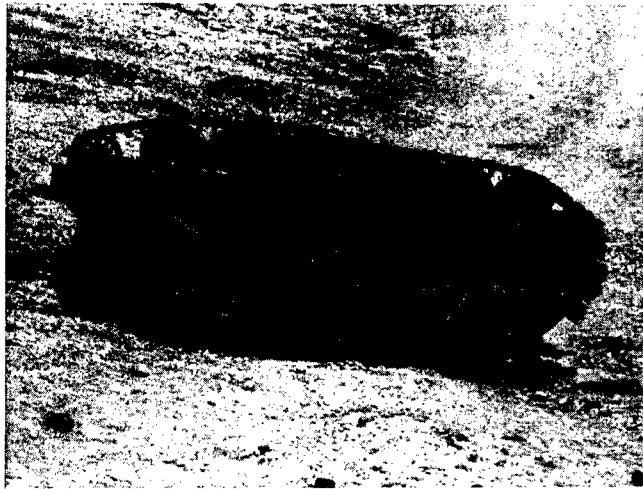


to sleep only in this area. But this is not always possible. When your operations require that your soldiers sleep in other than a designated sleeping area, you must specify where they are to sleep. Once you have decided where your soldiers will sleep, hold your first line supervisors responsible for insuring that your guidance is followed.

There are certain things that a first line supervisor should consider before allowing troops to sleep in the field.

- Perimeters should be established and guards trained to challenge vehicles and tell them it is a dismount area.
- Walking guards should be posted.
- Ground guides should be used when a vehicle moves through any area where troops may be present.
- Soldiers should never be allowed to sleep adjacent to a roadway.
- Soldiers should never be allowed to sleep in front of, behind, or under vehicles.

## Rollovers



*While driving an M113 in a convoy on a night road march, the driver allowed the APC to veer off the left side of the tank trail. When he applied right lateral in an attempt to return to the trail, the APC rolled over and slid down an embankment. The driver was crushed underneath the vehicle.*

The causes of rollover accidents vary, but the crew's emergency actions should, in most cases, be the same. Make sure your tracked vehicle crews know that in a rollover it is safer to remain inside the vehicle. Crewmembers who try to jump clear of a rolling vehicle are often crushed by the vehicle. Emergency actions for rollover should not only be included in crew SOPs but also practiced by all crewmembers during drills. Make sure your soldiers know the emergency actions to take in case of loss of control and vehicle overturn. Stress that crewmembers must immediately get down into the track if it becomes evident that the vehicle is going to roll over. Let them know that it's better to risk a few bruises or breaks than to risk being crushed by an overturning vehicle.

## Ground guides



*The ground guide was walking backwards 5 to 10 feet in front of the APC he was guiding. The damp, muddy ground caused him to suddenly slip and fall. Being so close to the APC, the ground guide did not have time to get out of the way. He was killed when the APC ran over him.*

The **proper** use of ground guides greatly reduces the chances of an accident when operating in tight spots. However, **improper** use of ground guides greatly increases the chances of an accident.

Stress to your people that when they are acting as ground guides they must stay clear of the vehicle and remain visible to the driver at all times. They must keep themselves at a safe distance from the vehicle—far enough to give themselves time to react and get out of the way if something goes wrong. They must maintain enough clearance to avoid the chance of being hit by the vehicle. FM 21-306 specifies 10 yards' distance between the vehicle and the ground guide. Point out that walking backwards when guiding a vehicle should be avoided at all times because

doing so increases the ground guide's chances of stumbling and falling into the path of the vehicle.

Drivers must share the responsibility for insuring the ground guide's safety. Stress to your drivers that they must stop the vehicle **immediately** if they lose sight of their guide or are unsure of his signals.

## Inadequate inspections



*Both the TC and the driver noticed that the M113 APC tended to pull to the right as they left the motor park. But they took the APC anyway. As they drove down the tank trail at about 20 mph, the driver tried to correct for the pulling to the right by pulling on the left lateral control. The APC veered to the left and ran off the trail. It slid sideways down an embankment and rolled over. The TC was seriously injured, and the APC was heavily damaged.*

Strictly enforce the requirement for by-the-book vehicle inspections and preventive maintenance checks and services before, during, and after all operations. Make it SOP that crews perform preoperation checks in the same order each time so that the checks get to be a habit. If preoperation checks uncover something that requires major repairs, have crews immediately report it to organizational maintenance and write it up on DA Form 2404. Prohibit vehicle operation until repairs are made.

Stress in unit SOP that crews should always take advantage of halts and rest breaks during operations to give their tracks a quick check. They should look for broken, missing, or loose center guides. Caution crews to watch out for shiny metal at the nut. A sagging shoe should be replaced before it causes a thrown track. Any unusual noises, vibrations, or other faults should be reported to unit maintenance personnel who should make the necessary repairs or provide vehicle recovery.

At the end of the day, require crews to give their track a postoperation inspection IAW appropriate TMs to insure that the track is in safe condition and ready for the next day's mission.

Preventive maintenance checks and services are essential for the safe operation of tracked vehicles. The responsibility for insuring that inspections are made rests with you and the immediate supervisor, the vehicle commander.

## Poor coordination or communication



*The soldier was acting as loader on an M60 tank during an FTX. The TC announced "power" right before moving the turret. The loader did not hear the command because he was not wearing his CVC helmet. When the turret was traversed, it crushed his foot between the loader's seat bracket and the inner hull.*

Failures of crews to coordinate and communicate with each other continue to cause accidents, kill and injure soldiers, and damage vehicles. To prevent these losses, you must insure that crewmembers have the means to communicate with each other and with others outside the vehicle. In addition to providing the means, you must see to it that your people properly use the means you provide. You must insist that they wear their helmets and use proper commands and procedures.

Tank intercoms and radios must be checked daily. Checks should include a complete intercom and external phone examination. Make it SOP that track commanders insure that the following are checked before every operation.

- With power on, place each crew position intercom control box through all phases of operation, survey the connecting cables for damage or exposed wires, look for corrosion, and insure O-rings are present on cable connectors.
- Check each CVC helmet for condition, making sure that there is no water or oil in the padding and that microphones mount properly in front of the mouth.
- Check radios and radio mounts for proper installation, and see that internally-mounted cooling fans rotate freely when activated.
- Make a radio check with a radio located at least 10 miles away. If any deficiencies are detected, notify organizational field radio repair.

## Unsecured equipment



*The M60 tank was moving back into position after a firing mission. All weapons were cleared and elevated, and the turret was stabilized. A spent canister which had not been placed in the storage rack fell between the turret and hull, severed a power cable, and lodged in place. The power cable arced against the canister, starting a fire.*

Poor housekeeping inside the M60 tank can result in accidents and injuries. Ammunition which is not properly secured is a major threat to the safety of crews and tanks when it gets loose. Equipment which is not properly secured in mountings or in storage racks often vibrates loose, especially when the tank is moving over rough terrain. The equipment either acts as projectiles or distracts tankers from their duties.

Stress to your crews that they are responsible for good housekeeping in their tanks. Make it SOP that crews police the hull for loose items before each operation. Require them to check equipment and ammunition to insure it is properly secured or stowed before vehicle movement.

## Rough terrain

*While participating in a night movement, the M113 APC struck a pothole. A passenger bounced into the air and landed on his tailbone, causing his head to snap back violently. About 5 minutes later, the APC hit another pothole. The same passenger bounced into the air again, and his head snapped back violently a second time. Not wearing a seatbelt caused this soldier a lot of pain and cost the Army \$1,340.*

The use of seatbelts in tracked vehicles is specifically required by paragraph 2-16, AR 385-55. However, requiring seatbelt use is avoided by many commanders in the name of "realism." They want their troops out the door the instant it opens. But the split-second it takes to release the buckle as the door opens will have a lot less effect on the time it takes troops to hit the ground running than the injuries they suffer from bouncing around inside the APC.

Improved driver training will also help prevent accidents caused by rough terrain. Your driver training program must include hands-on training in correct procedures and techniques for controlling the APC on all types of terrain. Require track commanders to routinely practice alerting crew and passengers of upcoming rough terrain. And, also, make it SOP in your unit that crewmembers and passengers wear protective headgear at all times.

## Carrier swimming

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*During a field training exercise, two M113 APCs sank and four soldiers drowned while crossing a river. In one accident, the driver and TC failed to insure that drain plugs were secured. In the other, the driver and TC knew that the drain plugs were missing before the swimming operation. In both cases, the results were the same—fatalities and damaged vehicles.*

TM 9-2300-257-10 clearly spells out that, before swimming the carrier, drain plugs must be inspected to insure they are in place—straight and tight. You must require your carrier crews to follow established preoperation procedures. Stress that carriers with missing or unsecured drain plugs are not acceptable for operation. Exercise absolute control over all swimming operations, and make sure all your crews understand that you will not tolerate unsafe practices.

Water operations should be conducted in accordance with the TM for the vehicle involved. While not all-inclusive, the following guidelines should be in your SOP for vehicle swimming operations.

- Before any amphibious operation, conduct abandonment drills to insure vehicle personnel know what actions to take in emergency situations.

- Require a preoperation check of vehicles, giving special attention to door gaskets, drain plugs, water screens, engine grille covers, and special attachments.

- Require a preoperation briefing which includes the requirement for and use of serviceable personal flotation devices and the proper placement of safety boats in the water with appropriate life-saving devices and trained recovery crew on board. (See AR 385-15.)

- Outline procedures for rescue and emergency medical attention.

- Before operation, check for leaks by predipping the vehicle, using recovery cables and qualified ground personnel.

- Close all cargo hatches except the driver and TC hatches during predip and crossing unless otherwise indicated by the commander.

- Following swimming operations, inspect each vehicle to insure that it is operating properly and has not been damaged during the swim.

## M60 tank fires

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*During an FTX, the crew noticed smoke coming from the engine compartment of the M60 tank. The crew pulled and used both fixed fire extinguishers but could not put out the fire. Then other tank crews began to help. They used every portable fire extinguisher in the company and shoveled dirt into the engine compartment. This also failed to do any good. Finally, the fire was put out by firefighters. Later, it was found that the fuel line was frayed and leaking.*

Caution your vehicle commanders and crews that they must be constantly on guard against fires, especially when tanks are uploaded. Remind your tankers that the most common causes of tank fires are electrical shorts and fuel or oil contact with a hot engine component. Require that they check out all fuel and oil connections and inspect the wiring **before** operating tanks, especially just after quarterly service, to make sure electrical wires do not cross over hot spots or sharp edges. Require your tankers to look for and remove any foreign objects in engine compartments.



In addition, the following guidelines should be helpful in preventing tank fires in your unit. Include them in your unit SOP.

- While starting the powerpack after quarterly service, closely observe the engine compartment for excessive smoke or sparks which would indicate a fuel or oil leak or an electrical short.
- Inspect extinguisher bottles to make sure they have been recently tested and weighed. Be sure they are properly connected to discharge lines and external pull handles.
- Inspect discharge lines during quarterly service to make sure they are not plugged, dirty, or pinched.

Make sure your tankers know exactly what to do if a fire breaks out in their tank. Hold routine fire drills so that crewmembers can practice firefighting and safe escape procedures. And review the following firefighting procedures during refresher sessions before every field training exercise.

- Stop the tank.
- To fire first shot, pull handle hard then push in. A switch in the fire extinguisher system will shut off fuel to the engine.
- If fire is not extinguished after 20 seconds, fire the second shot.
- To fire the second shot, pull handle hard then push in.
- Vacate the tank.
- If the tank is uploaded, stay at least 50 meters away from it. Alert firefighters that ammunition is involved.
- After the fire is out, have the local EOD unit check the tank before removing ammunition.

## Hatch covers



*The M113 APC was traveling uphill on rugged terrain when the open driver's hatch slammed against the driver's head, resulting in head injuries. A hatch safety pin was not installed to properly secure the hatch.*

Soldiers continue to be injured when tracked vehicle hatch covers vibrate loose and slam closed on their hands, heads, arms, and backs.

The problem of open hatch covers vibrating loose was first identified in 1975. An MWO fix was published in TB 43-001-39, 15 April 1975. It included procedures and necessary hardware for installation of safety latches. By now, all tracked vehicles should have the safety pin modification installed. If this is the case, then the problem would seem to be that crews are not using the safety pins.

Make sure the safety latch modification has been installed on all your tracked vehicles. Then require your crews to insert the safety pin every time the vehicle is driven with the hatch cover open.

## Lateral or track failure

*During a convoy, the M113 APC driver lost lateral control. The vehicle started to move to the right, and the driver pulled the left lateral to correct it. When the APC veered to the left, he pulled the right lateral to try to straighten it out. But the vehicle turned to the right and headed for the side of the road. The APC turned over, pinning the track commander. He died of his injuries.*

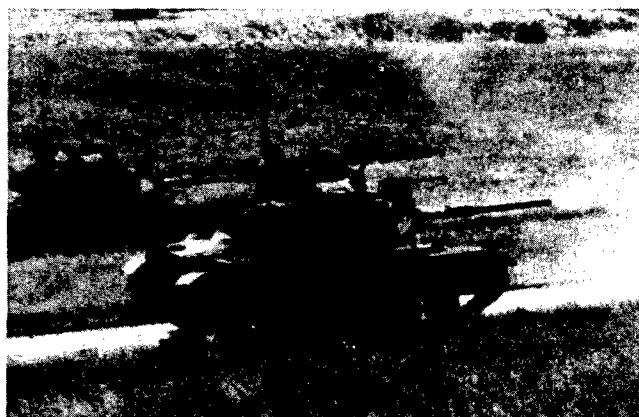
One of the greatest single hazards with the M113 and M60 is lateral or track failure. When tracks or laterals fail, the driver

loses directional control. In many cases, the vehicle overturns. Exact reasons for track or lateral failures usually are not covered in accident reports. However, in most cases, you can safely assume that a lack of preventive maintenance checks and services played a part.

Point out to your maintenance crews that lateral or track failure almost always causes a serious accident. Improve direct supervision of tracked vehicle maintenance, and give laterals and tracks special attention. Require that all maintenance be done strictly by the book.

While the correction of unsafe mechanical defects is the responsibility of maintenance personnel, drivers are responsible for making daily inspections of their vehicles in accordance with TM 9-2300-257-10. Hold your vehicle commanders responsible for insuring that these daily inspections are made by the book and that maintenance is performed when needed.

## Main gun recoil



*The soldier loaded the M60's main gun and announced "up." When the TC said "fire," the loader switched to "fire," and the gunner fired without responding "on the way." During the recoil, the safety lever hit the loader's hand, breaking one finger in seven places, severing his middle finger, and severely cutting his hand.*

Each year, M60 crewmembers are injured in accidents involving recoil of the 105mm main gun. Based on accident reports, loaders are more often injured than other crewmembers. The most common cause of these accidents is failure to clear the path of recoil because of improper attention, improper position, and failure to use required call-out procedures.

Stress the danger of not clearing the path of recoil during firing operations. Emphasize to track commanders that they are responsible for their crews and for insuring safe operation of the main gun and proper call-out procedures.

## Stabilization system

### WARNING

**When stabilization is first turned on, turret or gun may move. Make sure crewmembers are at their assigned stations. Sudden turret or gun movement may cause injury. Movement of either gunners or commanders control handles will cause turret or gun to move.**

*The tank turret repairman was to troubleshoot the M60's turret, repair a malfunction in the main gun stabilization system, and then service check the system. He had completed two operational checks of the turret stabilization system from the gunner's station inside the tank before he moved to a position near the tank's main gun breech. While leaning over the breech, he engaged the gun stabilization system. Normally, engagement of the stabilization system causes the muzzle of the main gun turret to depress slightly and the gun breech to raise about 2 inches. However, this time the gun depressed to the full muzzle-down position. It crushed the repairman between the breech and the upper tank hull, critically injuring him.*

It takes just a moment to make a fatal mistake when checking out the stabilization system on an M60-series tank. The gun or turret might move when the stabilization system is first engaged. Make sure your maintenance personnel are aware of this, and step up supervision of this operation. Point out and emphasize the warning on page 2-363 of TM 9-2350-257-10-2 (30 Jul 80, c1).



# Vehicle maintenance

## Inadequate supervision

While fitting a new set of track to the M60A1 tank, the supervisor was using a 10-pound sledge hammer to seat the end connectors. The soldier was assisting by tightening the wedge bolts. When the supervisor swung the sledge hammer, it ricocheted off the end connector and hit the soldier's chin. According to the procedures in TM 9-2350-215-10-3, a 2-pound hammer should have been used to seat the end connectors. Because the supervisor didn't follow proper procedures, two workdays were lost and a soldier suffered a painful injury.

All the written procedures in TMs and unit SOPs won't prevent a single accident unless they are practiced. And they won't be practiced unless supervisors insist on it. It is up to unit leaders to instill a healthy respect for safe procedures by setting a good example.

Never forget that supervisors must also be supervised. And that is up to you. You must hold them accountable for their own unsafe actions as well as those of their subordinates. If leaders don't follow the rules, their subordinates are not likely to follow the rules either.

Insure that all your personnel are properly trained, then demand that they do the job right. Let your supervisory personnel know in no uncertain terms that you expect them to—

- Set a good example of professionalism, sound workmanship, and safety discipline.
- Insist on compliance with established work procedures no matter how routine the task.
- Require the use of the right tool for every job.
- Make sure protective equipment is available and worn on the job.
- Use only qualified personnel for maintenance tasks.

All too often, young soldiers are ready and willing to take a chance and abandon safe practices so they can get their jobs done quicker or easier. And oftentimes young soldiers will try to do more than they are capable of doing safely. It is a supervisory responsibility to temper this "can do" attitude with experience and mature judgment and by setting a good example of doing the job right—every time.

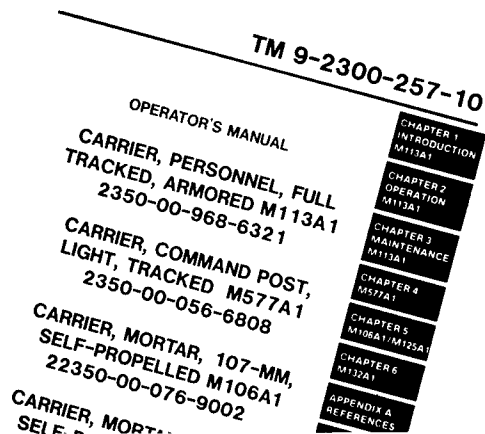


## Failure to follow proper procedures

The mechanic was jumping up and down on the pipe extension of a wrench. The pipe slipped off the wrench and hit the mechanic in the face, knocking him unconscious. He lost 21 days from work as a result of his injuries.

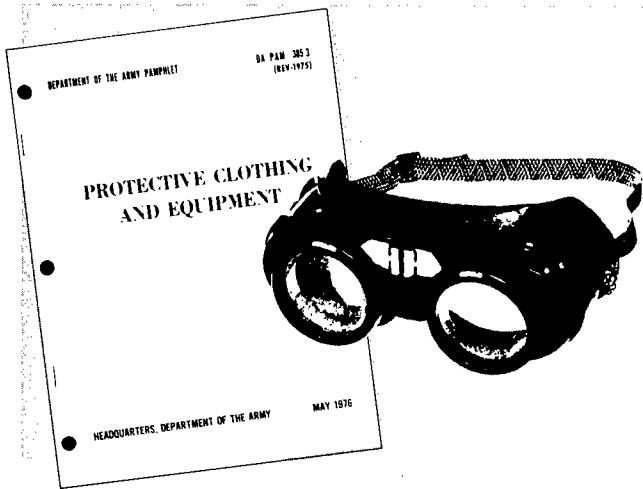
It's not enough to just write manuals and SOPs. Use of correct procedures must be enforced. A "just get the job done fast" attitude leads to accidents, injuries, and damaged equipment and produces a job that is neither "done" nor "fast."

Insist on strict compliance with safe work procedures no matter how routine the task. Many accidents happen when people perform routine jobs that seem too simple to bother with safety precautions. Using the wrong tools—lengths of pipe as extensions to increase leverage, screwdrivers as chisels, or hammers that are too heavy—is a common cause of maintenance accidents. To prevent these, make sure that all maintenance is done by the book. Allow no shortcuts, and be particularly watchful for unsafe acts and violations of procedures. Take prompt disciplinary action to correct violators.



Insist on **absolute** compliance with safety rules and work procedures. And make it a point to explain to your people the reasons for the rules, because people are more likely to obey rules they understand.

## Lack of personal protective equipment



*The servicemember was drilling out the drain plug for the left final drive of the M113 APC. A metal shaving flew into his eye. Safety goggles were not available.*

It's a command responsibility to provide personal protective equipment needed in your unit. (See AR 385-32, DA Pam 385-3, and CTA 50-900.) But your responsibility doesn't end with simply making it available. You must also insist that it be used.

Personal safety awareness doesn't just happen. It must be instilled and encouraged by commanders and supervisors. You must treat personal equipment as tools of the trade, a part of the job, not as something separate.

One of the keys to eliminating on-the-job injuries is correct and consistent use of personal protective equipment. Some commanders consider minor on-the-job accidents as routine, everyday occurrences that are to be expected. But in units where the use of personal protective equipment is considered routine, accidents are not.

## Slave starting



*Two soldiers were acting as vehicle guards at a field site. One of their duties was to start each tank every day to prevent battery and starter damage from the severe cold. Using one M60A1 tank to slave-start another, they parked the tanks nose to nose. After both tanks were cranked, one guard dismounted to retrieve the slave cables. Unaware that his partner was on the ground, the other guard shifted the starter tank into reverse. This caused the tank to roll forward, and the guard retrieving the cables was crushed between the tanks.*

Prohibit nose-to-nose slave-starting of tanks in your unit. Also caution your people about the danger of standing in front of or behind idling vehicles at any time.



## Weapons and explosives

### Improper procedures

*The soldier and his supervisor were turning a 12-volt battery 180 degrees in the battery box of the tank. They had not removed the ammo from the tank nor the ground cables from the battery. As the soldier turned the battery, a live positive cable touched the base of a 105mm cartridge case. Electricity arced from the mouth of the cartridge case to an ammo retainer clamp around the cartridge case, melting holes in the case. The propellant ignited and ejected the HEAT projectile out through the ammo loader's hatch and into the turret. The flash fire caused third-degree burns over 65 percent of the soldier's body and minor burns to the supervisor's face and upper body.*

This supervisor failed to insure that ammo was downloaded before working on the battery. He and the soldier he was supervising also failed to disconnect the ground cables despite the warning decal on the battery box.

Take positive command action to assure that established, by-the-book procedures are strictly followed in performing any type of work, especially on uploaded tanks. Make it SOP that all tanks must be downloaded before performing any maintenance that involves heat or electricity.

Allow no shortcuts where explosives are concerned, and be particularly watchful for unsafe acts and violations of procedures.

## Improper storage

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*During the FTX, the soldier was leading an attack against some infantry armored personnel carriers. He had all his pyrotechnics—ground burst, hand grenade, and booby trap simulators; smoke grenades; star clusters; and white smoke pots—loose in a box. Intending to pick up a hand grenade simulator, which takes about 20 seconds to explode, he accidentally grabbed a booby trap simulator instead. It exploded immediately, injuring both his hands.*

Make sure your unit training program includes detailed instruction in the proper storage, transporting, and handling of explosives. Make it SOP that different types of explosives must be kept separate.

Train your people in the specific functions and dangers of each type of explosive. Make your soldiers aware of the fact that simulators contain more sensitive explosives than other ammo and will ignite or explode more quickly. This requires more caution in handling simulators and more knowledge of their use.

Include hands-on training in the use of simulators, and demonstrate their destructive force and sensitivity. Establish controls and procedures for the safe storage and use of simulators, using TM 9-1300-200 and TM 9-1370-200 as references.

## Improper transport

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*The M113 was in a night screening position with the TC on radio watch. A can containing blank ammunition was stowed under the right front troop seat. The APC heater ignited the blanks. As the TC tried to throw the ammo can out of the APC, blanks scattered on the floor near the heater duct. These blanks exploded, causing other equipment to catch fire. The APC was extensively damaged.*

Incorrect stowage of ammo near heater ducts is a frequent cause of fires in M113 APCs. Make sure your unit SOP covers the transport of hazardous materials in combat vehicles. Include and strictly enforce safe procedures for handling unpackaged ammunition in the field. Require your tracked vehicle commanders to closely supervise the loading and placement of all hazardous materials in their vehicles. Include live fire demonstrations in unit training programs to impress on your people the dangers involved in handling explosives.

## Improper disposal

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*The sergeant told three members of his platoon to cut about 100 known misfired XM70 blast simulators for destruction. When they were finished, he collected the photoflash powder—about three-quarters of a pound—in a 3-gallon bucket and carried it 20 feet down range. He set the bucket down and lit a cigarette. The powder exploded, killing the sergeant.*

The sergeant was not authorized to dispose of the pyrotechnics and was negligent in ordering the three soldiers to help him. Further, he disregarded instructions pertaining to disposal of explosives.

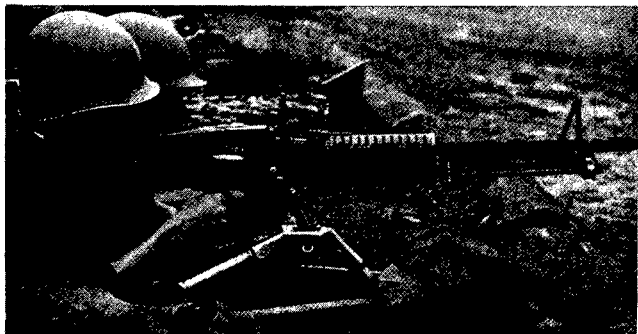
Establish and enforce unit SOP requirements for the disposal of all explosives and ammunition. Clearly establish that only trained, experienced personnel will dispose of ammo and explosives and that the procedures outlined in TM 9-1300-206 will be strictly followed. Make sure all your troops know that the destruction of any explosive is extremely dangerous and is never to be attempted.

Include in your unit and range SOPs the requirement for range sweeps to be made to locate duds and live ammo. Clearly establish and strictly enforce safe disposal procedures. Closely supervise range cleanup operations and make sure all your people are aware of the dangers of improper disposal of explosives. When trash police of the range is made, be sure that all troops know that any explosives found must not be touched but must be reported immediately for pickup and proper disposal by trained ordnance personnel.

Have EOD personnel instruct your unit on proper handling of explosives. Live demonstrations of the destructive force of explosive devices is a good way to visibly impress on your soldiers the great danger—and need for constant caution—when handling any type of explosive.

## Inadequate training

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*While supervising live machinegun firing, the sergeant spotted a weapon malfunction. When a cease-fire was signaled, he went to help the trainee. When the sergeant raised the chamber cover of the M60 machinegun, a live round exploded, injuring his eyes. The round exploded because the weapon was still hot.*

Make sure all supervisors and trainers take seriously their responsibility for teaching soldiers correct procedures and safe practices by setting the right example and consistently demonstrating professional standards of conduct. Use this accident brief to illustrate to your trainers the dangers of overconfidence in weapons handling. Brief your OIC, NCOIC, and safety representative on their specific safety duties and responsibilities when conducting weapons training.



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