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April 1991



Preventing Accidents in the Ordnance Corps

APRIL 1991

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A Message from the Chief of Ordnance

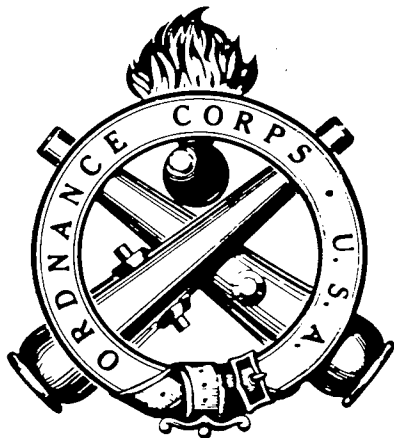
As the Chief of the Ordnance Corps, I am your safety officer. You, as the commander, are the safety officer of your unit. It is our responsibility as leaders to ensure safe operations and instill a "sixth sense" of safety in our soldiers.

Inherently, the Corps combat service support mission is the same in peacetime as in war. Safety is essential to mission accomplishment. Soldiering is a dangerous profession and risk is ever present. Training to standard and risk management are the keys to safe and effective operations.

Every year, on- and off-duty accidents result in the loss of life, limb, and equipment. Too many of these accidents are the result of inattention and failure to follow established procedures. Accidents decrease readiness and reduce our limited resources.

This pamphlet will help you evaluate and upgrade your safety program. The theme is accident prevention. The focus is on countermeasures for the prevention of common ordnance accidents. Also included in this pamphlet are safety resources that first-line leaders can use to balance risks with operational objectives.

Go Ordnance! Go safely!



A handwritten signature in black ink, appearing to read "Johnnie E. Wilson".

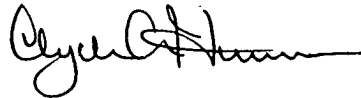
JOHNNIE E. WILSON
Brigadier General, USA
Commanding General
U.S. Army Ordnance Center
and School

Foreword

In recent years, we have made steady progress in reducing ordnance accidents. However, these accidents are still a serious drain on Army combat readiness. The record shows that improving safety in ordnance operations pays off not only in reduced fatalities, injuries, and accident costs but also in increased readiness.

This pamphlet is targeted at the most frequent causes of ordnance accidents and provides cures specific to those accidents. Any future reductions in ordnance accidents will be directly related to the prevention emphasis you place on ordnance operations in your unit.

The Army Safety Center is interested in user reaction to this pamphlet. Your comments on its usefulness and suggestions for improving its contents are welcome. Please use the pre-addressed mailer at the back of the pamphlet to let us hear from you.



C. A. HENNIES
Brigadier General
Commanding General
U.S. Army Safety Center

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Section I

Risk Management

Risk management is the process of making operations safer without compromising the mission. Accident experience shows that mission-stopper accidents occur when victims are ignorant of hazards and countermeasures or when directed countermeasures are ignored. The greatest effort should be in hazard identification and countermeasure enforcement. This section provides leaders guidance on integrating the risk management approach into unit operations.

Rules

Three rules guide the risk management process:

Accept no unnecessary risks. The leader who has the authority to accept a risk has the responsibility to protect his soldiers from unnecessary risks. An unnecessary risk is one that, if eliminated, still allows mission accomplishment.

Make risk decisions at the proper level. Make risk decisions at a level consistent with the commander's guidance. The leader responsible for the mission should make the risk decisions.

Accept risks if benefits outweigh the costs. Leaders must take necessary risks to accomplish the mission. Leaders must understand that risk-taking requires a decision-making process that balances mission benefits with costs.

Process

There are five steps to the risk management process.

Identify risks. During mission analysis, identify specific risks associated with all specified and implied tasks. Determine the hazards causing these risks. Consideration of METT-T factors helps identify risks and is crucial to the second step of assessing risks.

Assess risks. Determine the magnitude of risks. This involves an estimate of loss cost and

probability. The METT-T format provides an excellent guideline of factors to consider in this risk assessment. The *Enemy* equates to specific hazards identified. Consider the following aspects of other elements: *Mission* complexity and difficulty; *Terrain*, all aspects of the physical environment, including weather and visibility; *Troops*, supervision, experience, training, morale, endurance, and equipment; *Time* available for execution, planning, and preparation. Determine the likelihood and extent of accidental loss based on the above analysis.

Make decisions and develop controls. Make risk acceptance decisions by balancing risk benefits against risk assessments, and eliminate unnecessary risks. Reduce the magnitude of mission-essential risks through the application of controls. Controls range from hazard awareness to development of detailed operational procedures. Be sure controls do not jeopardize mission accomplishment. Involve the chain of command if necessary risks or controls prevent assigned mission requirements.

Implement controls. Integrate specific controls into plans, orders, SOPs, training performance standards, and rehearsals. Knowledge of controls down to the individual soldier is essential.

Supervise. Enforce controls and standards. This is key. Evaluate mission progress and changes to METT-T, then begin appropriate corrective actions. After mission completion, evaluate risk decisions and controls for inclusion in lessons learned.

Integration techniques

Two techniques are critical to maintaining unit battle focus:

Individual/leader risk management (focuses on individual through company-level com-

mand thought processes to recognize hazards and take action to reduce risk). Use FM 22-100: Military Leadership problem solving, decision making, and planning process. Identify the problem (hazard), gather information, develop courses of action, analyze and compare actions, make a decision, make a plan, and implement the plan. Memory aids such as METT-T and checklists help promote consistency.

Command echelons risk management. This technique uses the FM 101-5: Staff Organization and Operations Manual military decision-making process. This process integrates safety and risk assessment into operational decisions

normally associated with battalion and higher planning and operations. The commander directs the staff to identify necessary risks and risk controls as "considerations affecting the possible courses of action." Staff officers use memory aids such as METT-T to promote consistency. The final commander's estimate and concept addresses significant risk acceptance, eliminations, and controls. Implement these decisions directly into applicable areas of OPLANS (ORDERS). Commanders must ensure dissemination and enforcement of risk decisions and controls down to soldier level.



Section II

Ordnance Accident Facts

Each year, the equivalent of a battalion of soldiers are killed in accidents, and we lose the equivalent of an entire ordnance brigade for more than 6 weeks due to accidental injury. The more than \$300 million in direct cost of 1 year's accidents would put approximately 2,164 HEMTT wreckers in the field.

An analysis of accidents in ordnance battalions over a 5-year period revealed that 95 percent of the accidents fell into three categories:

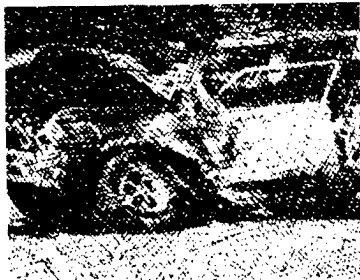
- Personnel injuries
- Privately owned vehicles
- Army motor vehicles

The application of risk management techniques and training to standard could reduce accidents and yield tremendous dividends.

The following tables list the most frequent causes of accidents and command actions to take to improve safety in each category.

Accident Category	Most Frequent Causes	Actions to Take
Personnel Injury Combat soldiering activities A soldier was on the hood of his truck putting up camouflage. He stepped to the side and fell from the vehicle. While falling, he tried to catch himself by grabbing the camouflage. The camouflage string twisted on his wedding ring, with all of his weight pulling against the ring. The skin and meat were pulled from the ring finger above the second joint.	Command failure to take precautions for the operating environment	• Use risk management techniques to enhance safety in realistic training.
	Leader's lack of knowledge of personnel	• Know your people—their qualifications, training status, physical condition, and abilities.
	Failure to follow correct procedures for handling and operating weapons and using pyrotechnics and simulators	• Improve NCO supervision of soldier activities. • Ensure NCOs make on-the-spot corrections of unsafe acts and violations of procedures. • Ensure safety briefings include pyrotechnics and simulators.
	Soldier belief that safety requirements are suspended during training exercises to achieve tactical realism	• Eliminate this dangerous misconception through preexercise briefings that spell out the requirement for strict adherence to all safety procedures during all unit operations.

Accident Category	Most Frequent Causes	Actions to Take
Maintenance, service, and repair activities The left front tire had been removed, and the 2½-ton truck was supported by a jackstand. The emergency brake was inoperative, so the truck was parked in gear. No chock blocks were under the rear wheels, and the battery was not disconnected. A soldier was sitting under the vehicle next to the axle when another mechanic reached inside and started the engine to check the wiper system. The truck moved forward and fell off the jackstand onto the soldier. He died of his injuries.	Failure to follow correct procedures	• Demand compliance with established work procedures even on routine tasks.
	Failure to use protective equipment	• Make sure protective equipment is worn on the job and include this requirement in SOPs.
	Misuse of tools and equipment	• Require the use of the right tool for every job. • Require personnel to keep work areas clean and tools in place.
	Inadequate inspections	• Ensure leaders at all levels regularly conduct unscheduled spotchecks to be sure personnel are using correct, safe procedures. • Ensure preventive maintenance inspections are completed properly.
Sports The soldier was playing unsupervised "scratch" football between missions. While running after the ball carrier, his knee gave out on the uneven terrain. He lost 6 workdays during a major training exercise.	Lack of supervision and insufficient command emphasis on safety	• Improve direct supervision of maintenance activities. • Ensure SOPs adequately describe procedures to be followed and cover safety aspects of all activities. • Hold personnel accountable for safe conduct on the job.
	Lack of supervision	• Ensure sports are supervised. • Train coaches and officials on sports safety. • Ensure playing facilities meet mandatory requirements.

Accident Category	Most Frequent Causes	Actions to Take
Privately owned vehicle During a 3-day holiday, a soldier went home to see his family. He waited until late afternoon to start the 500-mile return to post and planned to drive all night to make formation the next morning. Fifty miles from post, he fell asleep at the wheel and swerved into oncoming traffic. In the head-on collision, he lost both legs. The three occupants of the other vehicles lost their lives. 	Failure to use safety belts and helmets	• Enforce the requirement to use safety belts in vehicles and helmets while riding motorcycles on and off and post, on and off duty. • Develop special privately owned vehicle campaigns that encourage the use of safety belts and helmets by soldiers and family members.
	Speeding	• Instill self-confidence in soldiers. • Create safe driving habits by enforcing speed limits in all military training activities on post.
	Drinking and driving	• Make troops aware of the career and legal consequences of the Army's tough policy on drinking and driving. • Deal firmly with each DUI offender. • Develop a year-round privately owned vehicle accident prevention program targeted at drinking and driving. • Make pre-holiday safety briefings mandatory, and stress the life-threatening dangers of drinking and driving.
	Driver fatigue	• Encourage soldiers to avoid long trips during 3-day holiday weekends.
Army motor vehicle A two-vehicle border patrol had completed its designated checks and was ready to start back to base	Lack of supervision and control	• Ensure first-line leaders strictly require and supervise drivers' preoperation checks. • Restrict dispatches when road or weather conditions are hazardous.

Accident Category	Most Frequent Causes	Actions
when the section leader, who was in the lead vehicle, complained that the second vehicle was going too slow. The driver of the second vehicle was on patrol for the first time. When the lead vehicle turned onto a highway, the driver accelerated, leaving the other HMMWV behind. When the second driver reached the highway, he accelerated to about 60 in an effort to catch up. He lost control of the HMMWV on an extended curve, fish-tailed, and crashed into trees on the other side of the road. The HMMWV broke into four large pieces, throwing both the driver and his passenger from the HMMWV. The driver was dead before he reached the hospital. His passenger received only minor injuries. 	Poor maintenance	• Require strict adherence to maintenance procedures. • Use mobile maintenance teams during FTXs so damaged or improperly operating vehicles do not have to be driven. • Require special attention to brake components by personnel during periodic maintenance and by drivers during preoperation checks. • Prohibit operation of vehicles with defective brakes.
	Unsafe convoy operations	• Establish and enforce safe speed limits and following distances. • Convoy speed depends on road and traffic conditions. Generally, speed should not exceed 15 to 20 mph on long moves over rough roads; maximum catch-up speed should not exceed 25 to 30 mph.
	Undisciplined, untrained drivers	• Take corrective action at the first sign of a breakdown in driver discipline or disregard for established operating procedures. • Provide hands-on training in the environment in which drivers will operate their vehicles. • Plan driver training into the mission, not as a separate activity. • Whenever unit operations permit, pair an experienced driver with an inexperienced one to provide supervision and hands-on training. • Develop a program to ensure training includes seasonal and local driving hazards.

Accident Category	Most Frequent Causes	Actions
	Undisciplined, untrained drivers	• Hold drivers accountable for safe performance.
	Failure to follow operating procedures	• Require strict adherence to operating procedures. • Ensure all appropriate vehicle technical manuals are used.
	Speeding	• Establish and enforce safe speed limits for various road and weather conditions. • Instill self discipline in soldiers.

So, what can leaders do about preventing accidents while continuing to train realistically? If leaders could instill in their soldiers three minimum but effective characteristics, accident prevention problems would be a small shadow of what we face today.

The first characteristic is *discipline*, the capacity to understand and accept the need for a set of rules and standards of conduct aimed at minimizing accident potential.

The second characteristic is an *attitude* that accepts and respects responsibility for the safety of self, the safety of others, and the protection of property.

The third is a *sixth sense* of safety, a keen awareness that spots accidents about to happen, a consciousness of the potential tragic results of unsafe acts on and off duty, and an appreciation of the value of protective equipment.

Proven "success factors" studies were made of battalion-sized organizations with good safety records to determine what factors contributed to their low accident rates. Five factors were common to all organizations studied:

- Standards were precisely defined.

- All personnel were acutely aware of the standards.

- Training was conducted to a high standard.
- Immediate and effective action was taken to deal with any deviation from the standards.
- Operations were conducted by the book, and unit morale was high. In fact, in every safety study we've seen, where the units were safe, troop morale was high.

The last factor is extremely important. Unit members were proud of the fact that their organization conducted operations by the book.

Maintenance accidents account for the largest portion of personnel injuries. Most maintenance accidents are caused by—

- Failure to follow procedures.
- Poor supervision.
- Lack of written procedures.
- Insufficient or no training for the jobs assigned.

Failure to follow procedures

Shortcutting or disregarding established work procedures is the most frequent cause of accidents during installation, removal, and modifi-

cation jobs. Mechanics may knowingly fail to use correct procedures because they are in a hurry to get the job done, because they do not understand the reasons for the work rules and the potential for injury, or because of a lack of supervision.

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.

It's not enough to just write manuals and SOPs. They must be enforced. A "just get the job done fast" attitude leads to taking shortcuts and accidents, injuries, and damaged equipment. It also produces a job that is neither "done" nor "fast." Many accidents happen when mechanics perform routine jobs that seem too simple to bother with safety precautions.

Actions to take:

- Require strict compliance with safe work procedures no matter how routine the task.
- Make sure all maintenance is done by the book.
- Allow no shortcuts and watch for unsafe acts and violations of procedures.
- Take prompt disciplinary action to correct violators.

Poor supervision

Frequently, supervisors do not fulfill their responsibilities. They permit the use of unsafe or incorrect procedures, allow shortcuts, or fail to closely monitor personnel. Poor supervision is the result of command failure to take positive action when supervision breaks down.

All the written procedures in TMs and unit SOPs won't prevent a single accident unless the procedures are practiced. And they won't be practiced unless supervisors insist on it and never forget that supervisors must

also be supervised.

Actions to take:

- Hold supervisors accountable for their own unsafe actions as well as those of their subordinates.
- Ensure personnel are properly trained, then demand they do the job right.
- Require supervisors to—
 - Set a good example of professionalism, competence, and safety discipline.
 - Insist on compliance with established work procedures no matter how routine the job.
 - Require the use of the right tool for every job.
 - Make sure protective equipment is available and worn.
 - Use only qualified personnel for maintenance jobs.
 - Set realistic time goals. Place more emphasis on safe, correct performance than on meeting work deadlines.

Lack of written procedures

Insufficient written procedures show up in poorly written standing operating procedures and in vehicle technical manuals. This lack consists mainly of absent or incomplete procedures for certain maintenance tasks. SOPs are not periodically reviewed to keep them current. Failure to submit DA Form 2028: Recommended Changes to Publications and Blank Forms permits deficiencies in technical manuals to go uncorrected.

Voids in written procedures in manuals can be remedied using DA Form 2028 to submit changes to publications. This is necessary if procedural steps are omitted.

Actions to take:

- Ensure all personnel know how to complete DA Form 2028.
- Supplement TM guidance with unit SOPs.

- Use safety information in DA Pam 750-35 as sample for unit maintenance SOP.

- Include requirements for personal protective equipment in SOPs.

- Review SOPs regularly to ensure they contain specific guidance about the unit's maintenance tasks and ensure SOPs are updated periodically.

- Pay special attention to use of tools and equipment, communication, lifting, security and inspection of components, hazardous actions, depressurizing, and housekeeping.

- Spend time training and helping mechanics who may not have the experience or expertise to perform jobs safely without guidance.

- Use the safety checklist available from the local safety office or the maintenance safety checklist in DA Pam 385-1.

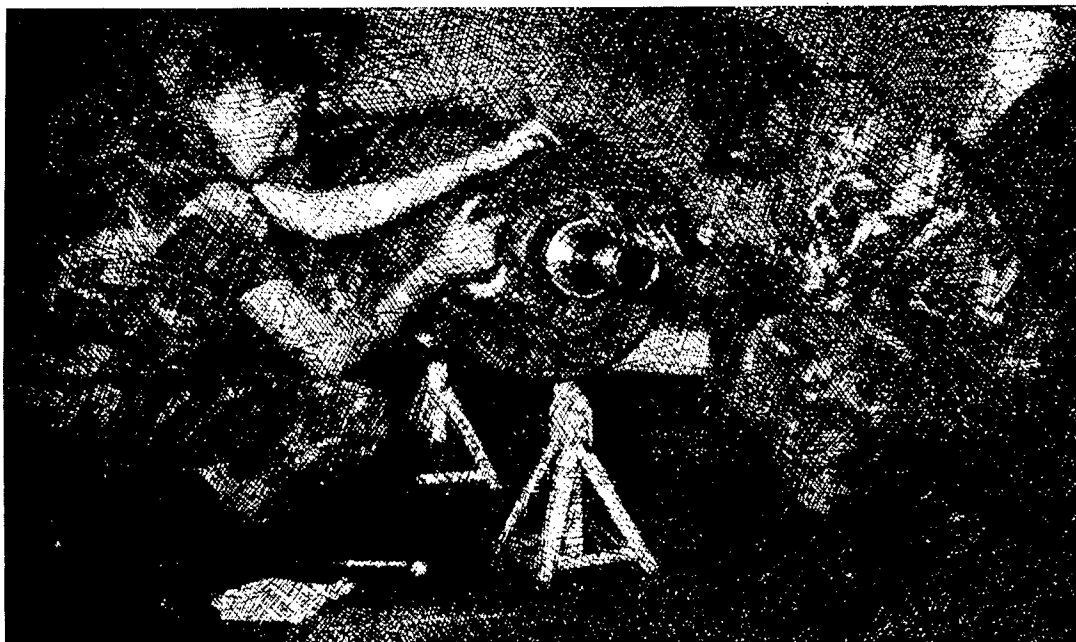
Insufficient or no unit training

Mechanics are often assigned jobs for which they either are not trained or have received in-

sufficient training. This occurs when supervisors do not correctly assess training needs and develop and conduct training programs. Insufficient command emphasis on training increases this problem.

Actions to take:

- Assess unit training needs.
- Develop appropriate training programs.
- Conduct these programs.
- Hold refresher classes to update and strengthen training on maintenance tasks.
- Conduct training on unit SOP requirements.
- Have manuals and needed equipment and tools available.
- Keep training performance oriented.
- Make sure all leaders 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.



Section III

Accident Prevention Planning

Leaders must take the initiative in making safety just as much a part of being a mechanic as troubleshooting vehicles. How can you do this in your unit?

Identify the problems. Find out what causes the most injuries in your unit. Do this by answering the following questions:

- What kinds of accidents happen in your unit?
- Where do they happen?
- To whom do they happen?
- How often do they happen?
- When do they happen?

Analyze the problems. Find the "why" behind the accident. For example, if a soldier is injured while using a lifting device, it's not enough just to blame the accident on his failure to inspect the device before use. You have to find out why he didn't inspect it. Ask yourself the following:

- Was the injured soldier trained in all unit SOPs?
- Were SOPs routinely enforced?
- Had the soldier received unit training in the task he was performing when he was injured?
- Were all MWOs checked for compliance?
- Was the appropriate device used?
- Was the device maintained in accordance with the appropriate TB or TM?
- Were leaders monitoring the task and procedures?

Prevent the problems. Determine what you can do to prevent the problems. Here's a short list of ideas to get you started.

- Develop a procedure to ensure all personnel receive training on the contents of SOPs.
- Require supervisors to always enforce SOPs.
- Give additional unit training on nonroutine tasks.
- Cross-train mechanics according to Soldier's Manuals and Job Books—not by the "buddy system."
- Train mechanics to take care with tasks that

have a higher hazard.

Follow up. Safe operations don't just happen. They result from careful planning. Develop your plan and put it to work. Then constantly analyze it. See how your mechanics respond to it. See if it reduces or gets rid of your safety problems. If it does, keep refining it to make it even more effective. If it doesn't, try a new plan. But in any case, remember—your safety plan should not be just temporary. Write it down and distribute copies to your NCO leadership. Keep it working.

Sample prevention plan

Problem. A maintenance company was losing a lot of work-hours to hand/finger injuries and back and abdominal strains. The mechanics were receiving these injuries during tactical exercises while changing large vehicle tires.

Analysis. Unit leaders found these accidents were caused by a combination of factors, not just one. Their analysis revealed that—

- The mechanics had a heavy workload.
 - Eleven mechanics had been in the unit less than 6 months.
 - An unnecessary rush was placed on all maintenance practices while in a field environment.
- Prevention plan.** Unit leaders developed the following plan to solve the problem. The plan was to be given a trial during the next field exercise to see if it reduced mechanic injuries. If it did, it would be refined to improve results; if it didn't, a new plan would be developed.

- Increase training for mechanics on installation and removal of large vehicle tires.
- Train additional personnel (clerks and administrative personnel) to assist in the installation/removal of large vehicle tires.
- Prioritize field maintenance requirements to provide assistance to mechanics performing heavy lifting duties.

- Conduct training on proper lifting techniques and require two or more personnel to lift large tires.

- Provide safety equipment (gloves) to unit personnel and require their use during all lifting.

- Adopt a new approach to tactical training

that stresses overall mission completion, not just the length of time it takes.

- Present awards to the maintenance platoon with the greatest contribution to the mission. Selection will consider injury rates as well as tactical skill.



Section IV

Safety Checklists

Safety and maintenance personnel should work together to incorporate some of the following managerial techniques in an effort to prevent ordnance maintenance accidents and injuries.

This section covers some of the high risk areas involved in maintenance operations and gives some checklists that are beneficial to leaders in checking their unit safety standing.

Standing operating procedure (SOP)

- Review maintenance SOPs periodically to ensure procedures—
 - Are explicit and complete.
 - Include the primary and alternate tools to be used for each task.
 - Include any personal protective clothing and equipment necessary, such as goggles, gloves, etc.
- Update SOPs as required when new missions are undertaken or when new equipment is brought on board at the installation.

Assignment of personnel

- Before assigning personnel to maintenance tasks, leaders should—
 - Evaluate the task and determine the number of personnel and other resources required to perform the task safely.
 - Ensure personnel are trained and qualified to perform the task.
 - Assure all required personal protective clothing and equipment is available and fit for use and that assigned personnel can use all clothing and equipment necessary.

Education and reinforcement

- Evaluate training needs and conduct training as needed.
- Incorporate TM 9-243: Use and Care of Hand Tools and Measuring Tools; AR 385-32: Protec-

tive Clothing and Equipment; and DA Pam 385-3: Protective Clothing and Equipment into training of maintenance personnel.

- Provide training on safe lifting techniques and procedures at least annually for all maintenance personnel. Use instructional videos such as "A New Way to Lift." Your local Training Aids Service Center will have the videos you need or can order them for you.

- Hold weekly "hip pocket" sessions (samples can be found in "Stopping Accidents in Maintenance Operations," an Army Safety Center publication) to inform personnel about common maintenance problem areas, upcoming maintenance activities, and safe operating procedures.

- Hold periodic refresher classes to update and strengthen training on maintenance tasks. Emphasis should be placed on areas of potential danger at the installation, seasonal problems, and recent accidents.

Accountability

- Leaders and workers in maintenance operations must be held accountable for their performance.
- Ensure leaders at all levels regularly conduct unscheduled spot checks to see that personnel are using correct procedures and required protective clothing and equipment.
- Take administrative action against personnel who repeatedly perform tasks unsafely and incorrectly and leaders who knowingly allow personnel to use unsafe and incorrect procedures.
- Incorporate standards on safe performance of duties into performance appraisals for all personnel.

General warnings for maintenance personnel

Body position. Know the safe position to

place your body, hands, and feet before starting to work.

Component/equipment security. Be sure components and tools are secured before moving equipment or operating vehicles. Check secured positions and connections no matter how much experience you've had or how quickly you must get the job done.

Pulling/gripping/holding. Clean items to be pulled, grasped, or held to eliminate slipping. Firmly grasp and hold items to be moved. Get help with heavy or awkward items.

Inspection. Inspect tools and equipment for safe operating condition before starting work. Ensure all tools and personal protective clothing and equipment are repaired or replaced as needed.

Communication. Be alert to conditions that might endanger you or your co-workers. Keep co-workers informed about what you are doing, how you are doing it, and when you are doing it.

Improvising. Use tools/equipment on tasks for which they were designed. Do not substitute hands, feet, pieces of wood, or other makeshift tools.

The following checklists are to be used only as a reminder and a basic format for conducting inspections. Keep in mind that each unit's needs vary depending on mission, location, and structure.

Guide to Safety Management

1. Does the commander have a formal, written accident prevention plan that is compatible with the mission and the function of the organization? (AR 385-10, AR 385-40, AR 385-55, DA Pam 385-1, FM 29-2)

2. Does the unit have a current, complete, and clearly defined safety SOP, and are safety meet-

ings conducted on a regular basis? (AR 385-10, DA Pam 385-1)

3. Is there a written commander's safety policy? Are personnel aware of and actively implementing it? (AR 385-10)

4. Are unit commanders personally involved in the unit accident prevention program, and are they personally reviewing the program efforts? (AR 385-10, DA Pam 385-1)

5. Is there a designated safety officer? Are duties specified and are they accomplished? (AR 385-10, DA Pam 385-1)

6. Is there a designated fire marshal? Are the duties specified and are they accomplished? (AR 420-90, DA Pam 385-1, DA Pam 750-1)

7. Does the unit have a workable fire plan posted where necessary? (AR 420-90)

8. Are fire points maintained where required? Are personnel designated to man them aware of their responsibility? (AR 420-90)

9. Are fire extinguishers of the correct type? Are they inspected monthly for serviceability? (AR 420-90)

10. Is safety equipment, such as safety shoes, impact goggles, etc., on hand and in use? Is the use of protective clothing and equipment prescribed by applicable SOP? (AR 385-10, AR 385-32, DA Pam 385-1)

11. Are hazardous areas marked with appropriate signs? (AR 385-30)

12. Are hearing and sight protective devices

available? Are they being used? (FM 29-2)

13. Are noncombustible containers with tight-fitting lids provided for clean and dirty rags? (AR 420-90)

14. Are smoking areas provided and used? (AR 420-90)

15. Are vehicle pits designated (covered or roped off)? (AR 385-30)

16. Has an ongoing training program been established to train and refresh petroleum, oils, and lubricants (POL) personnel with various aspects of POL operations?

a. Are records maintained for those personnel who have completed a course of instruction on fuel vehicle driving? (FM 20-22, FM 21-305, FM 21-306, FM 55-30)

b. Does the training program include:

(1) Danger of fire?

(2) Fuel spills?

(3) Firefighting techniques?

17. Are POL storage areas properly maintained and regularly inspected?

18. Are POL, gas cylinders, solvents, and paints stored separately? Are oxygen and acetylene cylinder storage areas well ventilated and protected from direct sun rays and separated by at least 50 feet? (AR 420-90)

19. Are acetylene cylinders always maintained

in a vertical position? Are correct valves and fittings used for oxygen/acetylene operations? (FM 29-23)

20. Are explosion-proof lights used inside areas where POL products are stored?

21. Are adequate correct-type fire extinguishers available in POL areas?

22. Are "No Smoking" signs prominently displayed? (AR 420-90)

23. Are POL service areas located the proper distance from buildings, parked or operating aircraft, vehicles, etc.? (AR 420-90)

24. Are monthly safety classes being conducted as applicable for ground/maintenance personnel on safety aspects of materiel handling, shop safety, refueling, fuel storage, hazards of maintenance-induced materiel failures, accidents resulting from maintenance errors, use of fire extinguishers, accident prevention plans? What was the date of last class? (AR 385-40)

25. Is a unit safety council established? When was the last meeting held? (DA Pam 385-1)

a. Does the commander participate in safety council meetings?

b. Is the membership appropriate for the unit?

c. Does the commander review and approve the minutes?

d. Are council recommendations implemented?

e. Does the unit have an enlisted safety council?

26. Are paint and welding rooms fire-proofed and vented or are these functions performed outside with proper shielding and safety measures taken? (AR 420-90)

27. Are packaged POL products properly stored? Are POL packaged products being issued/used on a first-in, first-out basis?

28. Are refueling vehicles properly marked? (AR 385-30, AR 420-90)

29. Are vehicle chocks carried on the vehicles and used during refueling operations?

30. Are proper bonding and grounding procedures accomplished when loading, unloading, or transferring fuel?

31. Do refueling personnel know the procedures to clean fuel spills off clothing and ground?

32. Are filter elements in the filter separators on refueling vehicles changed as required or scheduled? (Appropriate TM) How often are they changed?

33. Are required fire extinguishers (type and capacity) mounted on refueling vehicles? (AR 420-90)

34. Are tank and pump units properly mounted in vehicle or trailers with straps, braces, and holddowns?

35. Is a tire inflation cage used? Is a lock-on valve stem used so personnel do not place an arm inside the tire cage during pressurizing?

36. Are lifting devices and stands tested and

properly marked? (TB 43-0142)

37. Are ground guides used when appropriate (particularly when backing up)? (DA Pam 385-1)

38. Is protective supplemental clothing (safety) being issued and used where authorized by a common table of allowances (CTA)? (AR 385-32, DA Pam 385-3)

39. Are required color codes used for safety markings? (AR 385-30)

40. Are floors clean and reasonably free of oil, grease, sawdust, etc.? (DA Pam 385-1)

41. Are vehicles "chock" blocked while being worked on? (DA Pam 385-1)

42. Are vehicles supported by trestle stands when raised off floor/ground?

43. Is safety equipment available when spot-painting with chemical agent resistant coating (CARC)?

Guide to Maintenance Management

1. Does the unit have an adequate Modification Table of Organization and Equipment/Tables of Distribution and Allowances (MTOE/TDA) for its mission?

2. Are all authorized positions filled with qualified personnel?

3. Are there adequate standing operating procedures (SOP) covering all aspects of the unit's functions/missions?

4. Are all personnel aware of and complying with unit SOP?
5. Are there frequent technical assistance/maintenance assistance instruction team visits from support units? From higher units?
6. Are current copies of DA Pam 738-750 and Supply and Maintenance Assessment and Review Team (SMART) messages available?
7. Is The Army Maintenance Management System (TAMMS) implemented in accordance with DA Pam 738-750? Are entries correct, consistent, and timely?
8. Does the unit have a pinpoint publication account? (AR 310-1)
9. Are the DA Form 12 series complete? Is there a request for publications on each type of equipment on hand? (AR 310-1)
10. Does the unit use DA Form 4569 and DA Form 17 to request publication resupply? (AR 310-2)
11. Has there been a semi-annual review of DA Form 12 series by commodity oriented personnel? (AR 310-2)
12. Is there a microfiche viewer available in good condition and accessible to mechanics and operators? Is it used? (DA Pam 750-1)
13. Are all current publications on hand or requisitioned and accessible to mechanics and operators? Are they used? (DA Pam 310-1)
14. Are publication changes posted? Rescinded and superceded publications removed? (AR 310-1)
15. Are personnel familiar with DA Form 2028 to make recommendations or changes in technical publications? (AR 310-1)
16. Are PS Magazines available? Are they being used? (DA Pam 750-1)
17. Is one copy of each appropriate technical manual, lubrication order, technical bulletin, field manual, and supply catalog present for each item of equipment in unit? Are they used? If not present, are publications on order? (AR 310-1)
18. Are maintenance and supply personnel familiar with the Equipment Improvement Recommendation/Quality Deficiency Report (EIR/QDR) program? Is it used? (DA Pam 738-750)
19. Do unit maintenance activities have supply catalogs for the sets, kits, and outfits they are authorized? (AR 310-1)
20. Does the unit have a publication SOP and a current DA Pam 310-1?

Guide to Maintenance Operations

1. Are current copies of AR 11-14, AR 220-1, AR 750-1, AR 750-43, and DA Pam 738-750 available?
2. Has a unit logistics readiness officer been appointed? (AR 11-14)

3. Is maintenance capability considered in unit readiness assessment? (AR 220-1)

4. Is the daily equipment status report prepared accurately? (AR 220-1, DA Pam 738-750)

5. Is the data on the DA Form 2406 accurate? Is temporary duty equipment reported? (AR 220-1, DA Pam 738-750)

6. Is management emphasis placed on deadlined equipment to preclude unauthorized cannibalization? (AR 11-14)

7. Is the most current edition of the support maintenance external standing operating procedure available in the unit? Are key personnel familiar with the contents? (FM 29-2, DA Pam 750-1)

8. Is the unit's relationship with the supporting maintenance activity clear and sufficient? (FM 29-2)

9. Do the unit commander and unit maintenance supervisors visit the supporting maintenance activity? (FM 29-2)

10. Are the mechanics working within maintenance allocation chart? Are operators/crew assisting where applicable IAW appropriate TM?

11. Does the unit have an effective preventive maintenance program? (DA Pam 750-1)

12. Are preventive maintenance periods on the training schedule? (FM 29-2)

13. Do all unit leaders attend and actively supervise preventive maintenance periods? (FM 29-2)

14. Are unit leaders knowledgeable in preventive maintenance checks and services procedures? (DA Pam 750-1)

15. Do maintenance supervisors know and carry out their responsibilities? (FM 29-2, FM 43-1)

16. Is the maintenance SOP current, complete, and understandable? (FM 29-2, FM 43-1)

17. Are SOP copies available and used? (FM 29-2, FM 43-1)

18. Does the unit have a current maintenance SOP covering warranties? (AR 702-13)

19. Are all authorized tools on hand or on requisition? Are they properly marked? Are they serviceable? Are they periodically inventoried? Are they secured properly? (DA Pam 710-2, TM 9-243)

20. Is test, measurement and diagnostic equipment (TMDE) used? Are mechanics qualified to use it? (AR 750-25, AR 750-25-1, AR 750-43, TB 750-25-1)

21. Is TMDE calibrated in the specified time intervals and properly stored? (AR 750-25, AR 750-25-1, TB 750-25-1)

22. Are calibration records maintained by the unit and support activity? (AR 750-25, AR 750-25-1, TB 750-25-1)

23. Has the Army Oil Analysis Program (AOAP) been effectively implemented? (AR 750-22)

a. Are the samples taken IAW TB 43-0210? Is DD Form 2026 prepared and submitted with the

samples? Are the samples sent to the lab by the most expeditious means?

b. Are required records (DA Form 2408-20, DD Form 2026, and DA Form 3254-R) being maintained? Are all appropriate AOAP publications on hand and accessible to personnel? (DA Pam 738-750, AR 750-22)

24. Are the necessary AOAP kits and supplies on hand for a 90-day supply and requisitioned on a timely basis? (AR 750-22, TM 43-0211)

a. Is unit notifying the laboratory of transfer-in and transfer-out of equipment to include components change? (AR 750-22, TM 43-0211)

b. Does the unit maintenance SOP include AOAP? (AR 750-22, TM 43-0210, TM 43-0211)

c. Has the unit conducted AOAP training, and are personnel familiar with AOAP? (AR 750-22, TM 43-0210, TM 43-0211)

Guide to Maintenance Work Area

1. Does the shop foreman emphasize accident prevention measures in all maintenance operations? (AR 385-10)

a. Are walkways properly marked? (AR 385-10, AR 385-30)

b. Are safety and warning posters used throughout the maintenance areas? (AR 385-10, AR 385-30)

c. Are smoking and no smoking areas designated, and are no smoking signs posted? (AR 420-90)

2. Are maintenance facilities adequate? (FM 29-2)

a. For field? (FM 29-2)

b. For garrison? (FM 29-2)

c. If not, has action been taken to improve them? (FM 29-2)

3. Is there an adequate vehicle wash facility? Proper drainage? Oil separator? Are they adequately serviced? (FM 29-2)

4. Are the shop bays and administrative areas neat and functional? (FM 29-2)

a. Are shop sections organized to make maximum use of facilities? (FM 29-2)

b. Are parking areas well organized and effectively used? (FM 29-2)

c. Are adequate security measures taken to ensure against unlawful entry into the shop sections? (FM 29-2)

5. Do sufficient electric power sources exist? (FM 29-2)

6. Are lighting systems adequate? (FM 29-2)

7. Is safety equipment (fire extinguishers, eye-wash baths, goggles, protective aprons, gloves, shields, etc.) on hand and operable? (AR 385-32)

8. Is equipment stored in an efficient manner? (AR 385-32)

9. Is equipment stored to prevent damage? (AR 385-32)

10. Is stored equipment clean and neat? (AR 385-32)

11. Is installed materiel-handling equipment (hoists, cranes, etc.) in working condition, and is it maintained properly? (Appropriate TM, TB 43-0142)

12. Have jacks, cranes, hoists, lifting cable/slides, and/or forklift trucks been load tested as required? (TB 43-0142)

13. Are jacks, cranes, hoists, lifting cable/slides, and/or forklift trucks marked with capacity and next inspection due date as required? (TB 43-0142)

14. Are shops/hangars/floors being cleaned with low volatile and nonflammable liquids? (FM 29-2)

a. Are drip pans used under vehicles in shops? (FM 29-2)

b. Are approved cleaning materials handy in case of spills? (FM 29-2)

15. Are oily rags stored in self-closing metal containers? (AR 420-90)

16. Are unsealed containers of hydraulic fluid classified as contaminated and disposed of? (TB 43-0210)

17. Do personnel using power tools; e.g., drills, grinders, lathes, torches, etc., wear safety goggles and noise attenuating devices as required? (AR 385-32)

18. Do mechanics remove jewelry when performing maintenance? (AR 385-10)

19. Are tops of booths, shelves, and other surfaces in the paint shop cleaned to prevent the accumulation of lint? (AR 385-10, AR 420-90, FM 29-2)

a. Are dope and paint deposits removed from the floor? (AR 385-10, AR 420-90, FM 29-2)

b. Is paint and dope in the paint shop limited to quantities used during one work shift? (AR 385-10, AR 420-90, FM 29-2)

c. Are fire extinguishers provided throughout the paint shop area? (AR 385-10, AR 420-90, FM 29-2)

d. Is electrical equipment in the paint shop explosion-proof? (AR 385-10, AR 420-90, FM 29-2)

e. Are smoking restrictions posted and enforced? (AR 385-10, AR 420-90)

f. Are covered waste containers used as required? (AR 385-10, AR 420-90)

g. Are flammable-liquid containers properly marked? (AR 385-30, AR 420-90)

20. Are current lubrication orders available, and are they being used (for each specific model end item)?

a. Is the lubrication area used? Are sufficient lubrication materials available?

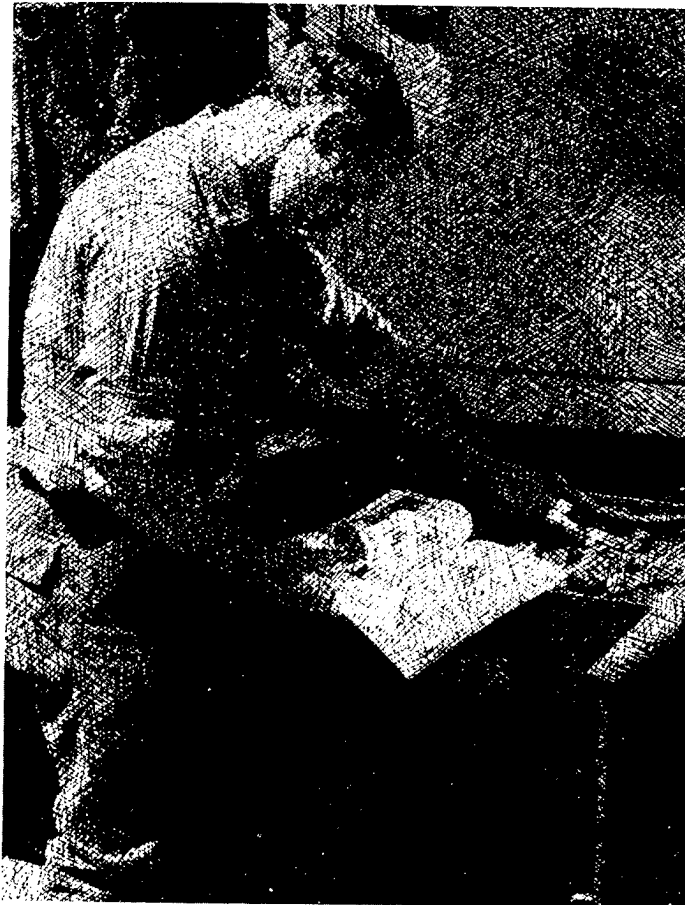
b. Are lubricants protected to prevent contamination? (FM 29-2)

c. Are both clean and dirty rag barrels clearly identified? Are they used? (AR 420-90, FM 29-2)

21. Do maintenance personnel have sufficient tools to perform their level of maintenance? (Table of Organization and Equipment, Table of Distribution and Allowances) (DA Pam 710-2-1)

22. Is ground handling equipment properly reflectorized? (AR 385-30)

23. Are ground support equipment operators (APU, generator, etc.) properly licensed? (AR 600-55)



Section V

Missile/Munitions Accident Prevention

Responsibility for safety enforcement. An effective safety program is essential to ensure safe handling and maintenance of munitions and missile system equipment. Such a program depends on alert personnel who are aware of the importance of maintaining constant vigilance to detect potential hazards. Senior personnel, in particular, must be sure that all personnel are thoroughly familiar with their respective duties, safety rules, regulations, first-aid, and self-aid. Carelessness can cause fires or explosions that result in equipment damage, injuries, or even loss of life. The commander is responsible for the safety of his unit. It is his responsibility to ensure all activities are conducted according to instructions in applicable technical manuals, safety regulations, and unit standing operating procedures.

Although many common safety practices and procedures apply, regardless of the type of materiel/equipment involved, there are also some special safety concerns that apply to personnel working with missile/munitions materiel.

Materiel-handling operations. Incorrect use and control of materiel handling equipment (MHE) is a common cause of accidents among missile and munitions personnel. Practices and procedures that can prevent these accidents include the following:

- Leaders responsible for MHE must ensure inspections are current and load ratings are not exceeded during operation. Leaders must pay particular attention when operations involve movement of heavy items.
- Leaders should not allow MHE to work or move without a designated ground guide.
- Leaders must ensure personnel are trained in the correct way to ground guide MHE. Personnel must not be allowed to ground guide from positions near the front, sides, or rear of

the equipment.

- Aisles must be wide enough and there must be enough room available in work areas to allow for easy operation of MHE.

- MHE must not be used as a transport vehicle. Forklifts and other MHE should only be used for moving material over short distances. Movements over longer distances make it more difficult to properly supervise the work and increase the chances of the MHE running into something or rolling over.

- Soft sand/soil should be avoided when operating MHE. Soft spots in or near areas where MHE is operated should be marked and/or cordoned off.

- Before trying to lift or move material using MHE, the operator and supervisor must ensure the material to be picked up or moved is stable and secure.

- When materiel-handling operations must be conducted at night, leaders must—

- Supervise operations more closely.

- Allow more time to accomplish the mission.

Operations must be done more slowly at night.

- Increase the number of ground guides. In addition, ground guides will need flashlights or chemlights, unless the area is well lit.

- Obtain night vision devices for operators of MHE if operations must be conducted in black-out or minimal lighting conditions. MHE operators will also require some training/familiarization with night vision devices before working with them.

Munitions handling. Missile and munitions personnel routinely work with a variety of explosive devices. Munitions items are inherently dangerous and a number of safety rules must be observed when working with these items. Following are some of these rules:

- Do not smoke around munitions items. Smok-

ing is allowed only in authorized areas, located at least 50 feet from all munitions items.

- Keep flame-producing items, such as cigarette lighters and heaters, out of areas where munitions items are kept.

- Use only nonsparking flashlights and tools when working within 50 feet of munitions items.

- Handle detonators and initiators one at a time and handle them very carefully.

- Lightning can cause activation or explosion of electrically initiated munitions items. See TM 9-1300-206 for information about conducting operations during lightning/electrical storms.

- When handling electroexplosive devices (EEDs), such as squibs and igniters, personnel must—

- Keep EEDs away from open flames and all sorts of electrical power, including RF energy.

- Not carry EEDs in toolboxes or clothing.

- Use only approved test kits for conducting continuity and resistance checks. Tester current must not exceed 5 ma.

- Not install an EED until the electrical system is completely deactivated.

- Short all initiating device leads before testing the device or installing it in the main assembly.

High voltage hazards. The high voltage systems used to power the missile system and the missiles themselves present additional hazards that are peculiar to missile maintenance operations. Although the technical manual for the equipment contains specific warnings and cautions concerning electrical hazards, some gen-

eral precautions must be observed anytime personnel are performing maintenance on missile system equipment. These precautions include:

- Do not work on electrical equipment when you are alone. Have someone near you who knows about the operation and hazards of the equipment. This person should also know how to give first aid.

- If you have a helper, make sure your helper knows which items are dangerous.

- Whenever you can, shut off power to the equipment before you start to work on it. Turn off power before making continuity checks and replacing electrical components. Before making continuity checks on cables, connectors, etc., check for potential voltage and/or current with voltmeter/current meter.

- Do not connect or disconnect power, ground, or antenna cables when power is on. If you do, it could damage the equipment. **It could also kill you!**

- Do not be fooled by the term "low voltage." **You can be killed by as little as 50 volts.**

- Do not touch any voltage connections when you install or operate this equipment.

- If you have to work on equipment or check something with the power on, be careful. When you can, keep one hand away from the equipment to reduce the chances of current flowing through vital organs of your body.

- Be careful not to contact high-current connections when installing or operating equipment.

- Read FM 21-11 so you will know about cardiopulmonary resuscitation.

Section VI

Reference Publications

AR 11-14	Logistic Readiness
AR 220-1	Unit Status Reporting
AR 310-1	Publications, Blank Forms, and Printing Management
AR 310-2	Identification and Distribution of DA Publications and Issue of Agency and Command Administrative Publications
AR 310-3	Preparation, Coordination, and Approval of Department of the Army Publications
AR 350-1	Army Training
AR 385-10	Army Safety Program
AR 385-30	Safety Color Code Markings and Signs
AR 385-32	Protective Clothing and Equipment
AR 385-40	Accident Reporting and Records
AR 385-55	Prevention of Motor Vehicle Accidents
AR 420-90	Fire Protection
AR 600-55	Motor Vehicle Driver - Selection, Testing, and Licensing
AR 600-200	Enlisted Personnel Management System
AR 672-20	Incentive Awards
AR 700-4	Logistic Assistance Program
AR 702-13	Army Warranty Program
AR 710-2	Supply Policy Below the Wholesale Level
AR 725-50	Requisitioning, Receipt, and Issue System
AR 750-1	Army Materiel Maintenance Concepts and Policies
AR 750-22	Army Oil Analysis Program
AR 750-25	Army Test, Measurement and Diagnostic Equipment (TMDE) Calibration and Repair Support Program
AR 750-43	Test, Measurement and Diagnostic Equipment (TMDE)
AR 750-51	Maintenance Assistance and Instruction Team (MAIT) Program
DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms
DA Pam 385-1	Unit Safety Management
DA Pam 710-2-1	Using Unit Supply System Manual Procedures
DA Pam 738-750	The Army Maintenance Management System
DA Pam 750-1	Organizational Maintenance Guide for Leaders
FOR Reg 700-5	Transfer of Equipment
FM 20-22	Vehicle Recovery Operations
FM 21-305	Manual for the Wheeled Vehicle Driver
FM 21-306	Manual for the Track Combat Vehicle Driver
FM 25-2	Unit Training Management
FM 29-2	Organizational Maintenance Operations

FM 43-1	Organizational Maintenance Manager's Guide
FM 43-1-1	Organizational Maintenance Manager's Guide - Indicator Lists
FM 55-30	Army Motor Transport Units and Operations
TB 43-0142	Safety Inspection and Testing of Lifting Devices
TB 43-0210	Nonaeronautical Equipment Army Oil Analysis Program
TB 43-0211	Army Oil Analysis Program Users Guide for Nonaeronautical Equipment
TB 750-25	Maintenance of Supplies and Equipment: Army Test, Measurement and Diagnostic Equipment Calibration and Repair Support Program

Section VII

Safety Promotional Material

Pamphlets

Safety Checklists: A ready safety reference encompassing most functions and tasks common to operations within a command.

Stopping Accidents in Maintenance Operations: Focuses on leading causes of accidents in maintenance operations and provides countermeasures.

Maintenance Safety Reader: A collection of articles from *Countermeasure* dealing with maintenance operations.

Hot Tips on Welding Safety: General hazards of all types of welding processes. Short safety briefings for welders.

Chemical Agent Resistant Coating (CARC Paint): General hazards and precautions concerning CARC paint, handling, storage, and application.

Primary and Secondary Battery Operations: Short safety briefings for equipment operators and personnel servicing batteries.

Spray Paint and Paint Booth Operations: General hazards concerning storage, handling, and application of paint products.

Radiator Repair: Accident prevention measures during radiator repair.

Conducting Brake Repair Operations: Accident prevention measures during brake repair.

For copies of the above pamphlets, write Commander, U.S. Army Safety Center, ATTN: CSSC-M, Fort Rucker, AL 36362-5363, or call AV 558-2062.

Safety videos

TVT 20-633, Maintenance Safety: Discusses safety in maintenance activities.

SF 20-689 and 20-690, Grinding Wheel Safety: Stresses safety responsibilities when working with grinding wheels, such as safe wheel speeds, proper guards, static balancing, and checks and inspections.

TVT 20-440, Shop Safety or Putting the Odds in Your Favor: Five segments on the different aspects of shop operations and safety.

TVT 20-629, Eye Safety: Civilian-generated film concerning the same problems in civilian shops as

those occurring in military shops.

TVT 20-628, Sound Advice: Civilian-generated video on hearing conservation.

TVT 20-660, Hearing Safety: Civilian-generated video relating to day-to-day duties.

TVT 20-632, Hear, Hear! Hearing Conservation for the Good Life: Civilian-generated video on hearing conservation.

TVT 20-781, The Back (Prevention of Back Injuries): Civilian-generated video relating to back injuries.

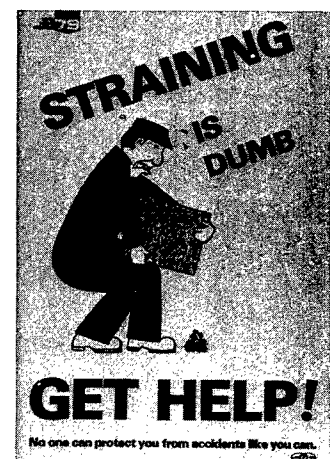
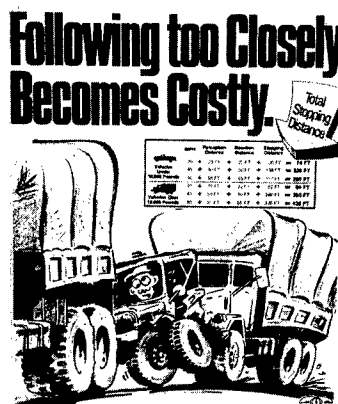
TVT 20-843, Go Ordnance . . . Go Safety: BG Ball gives talk on maintenance-related tasks and problems.

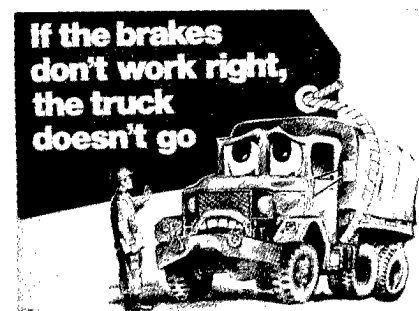
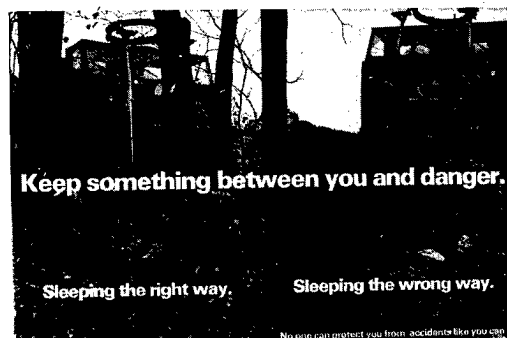
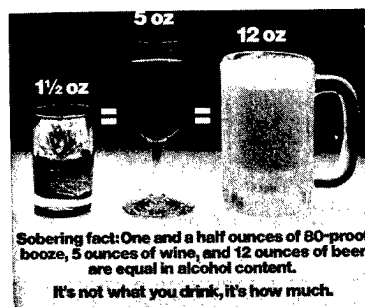
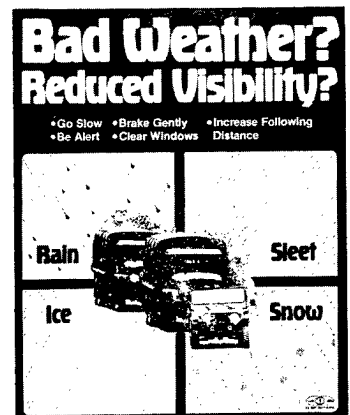
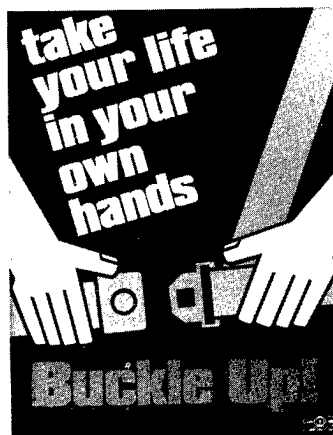
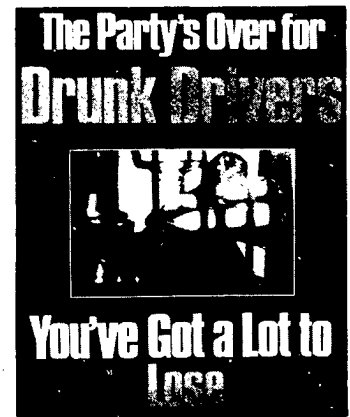
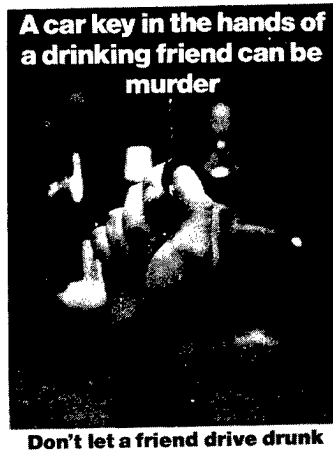
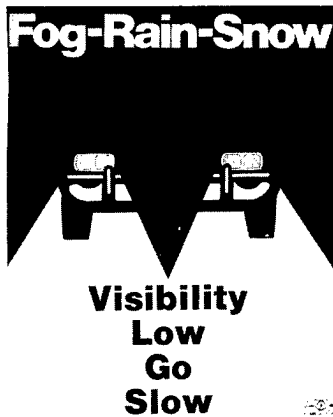
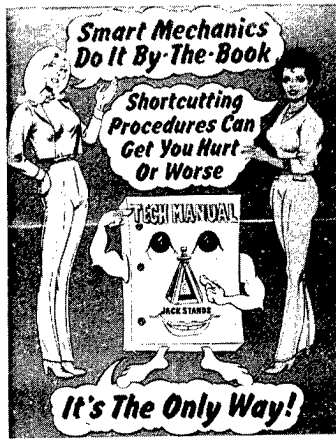
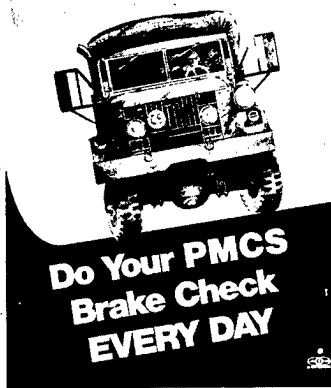
TVT 20-778, Supervising Safety: You Make the Difference: Civilian-generated video covering leader responsibilities and production results.

DA Pamphlet 25-90 contains a good selection of videos available through Department of the Army. Your local Training Aids Service Center (TASC) will have these videos or can order them for you. The Army Safety Center does not have videos to loan.

Posters

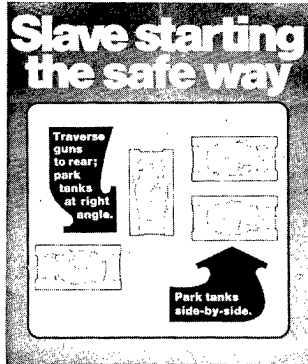
For copies of these posters, write Commander, U.S. Army Safety Center, ATTN: CSSC-M, Fort Rucker, AL 36362-5363, or call AV 558-2062.







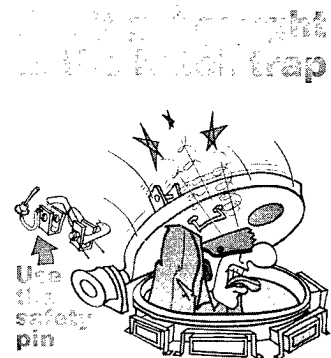
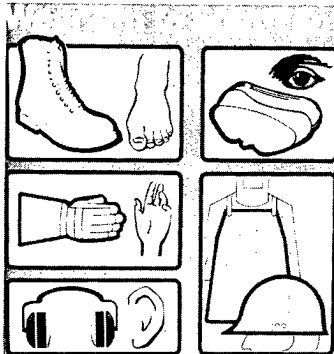
Track Fact: Crewmen who try to jump clear of a rolling vehicle are often crushed.



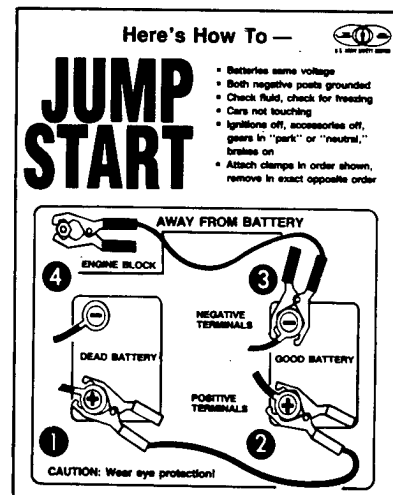
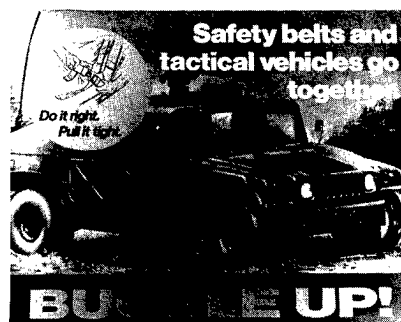
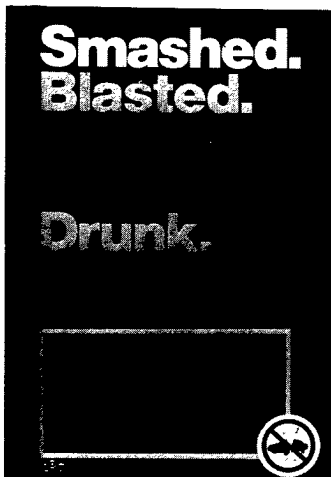
Never nose-to-nose



Track Fact: Greater speeds require greater following distances.



Track Fact: Open hatch covers, even if latched, can vibrate loose and seriously injure crewmen.



**More Soldiers Are Killed
In POV Accidents
Each Year Than In All Other
Types Of Accidents Combined.**



Be Smart, Be Sober, Be Alive.

Section VIII

Feedback

We are interested in your opinion of this ordnance pamphlet. Please answer the following and return promptly. A self-addressed mailer appears on the back of this sheet for your convenience.

1. How useful is this pamphlet to you? (circle one) Very Somewhat Not at all

2. Which section is most useful to you? _____

3. Which section is least useful to you? _____

4. What is your job title? _____

5. What is your pay grade? _____

6. Comments/recommendations: _____
