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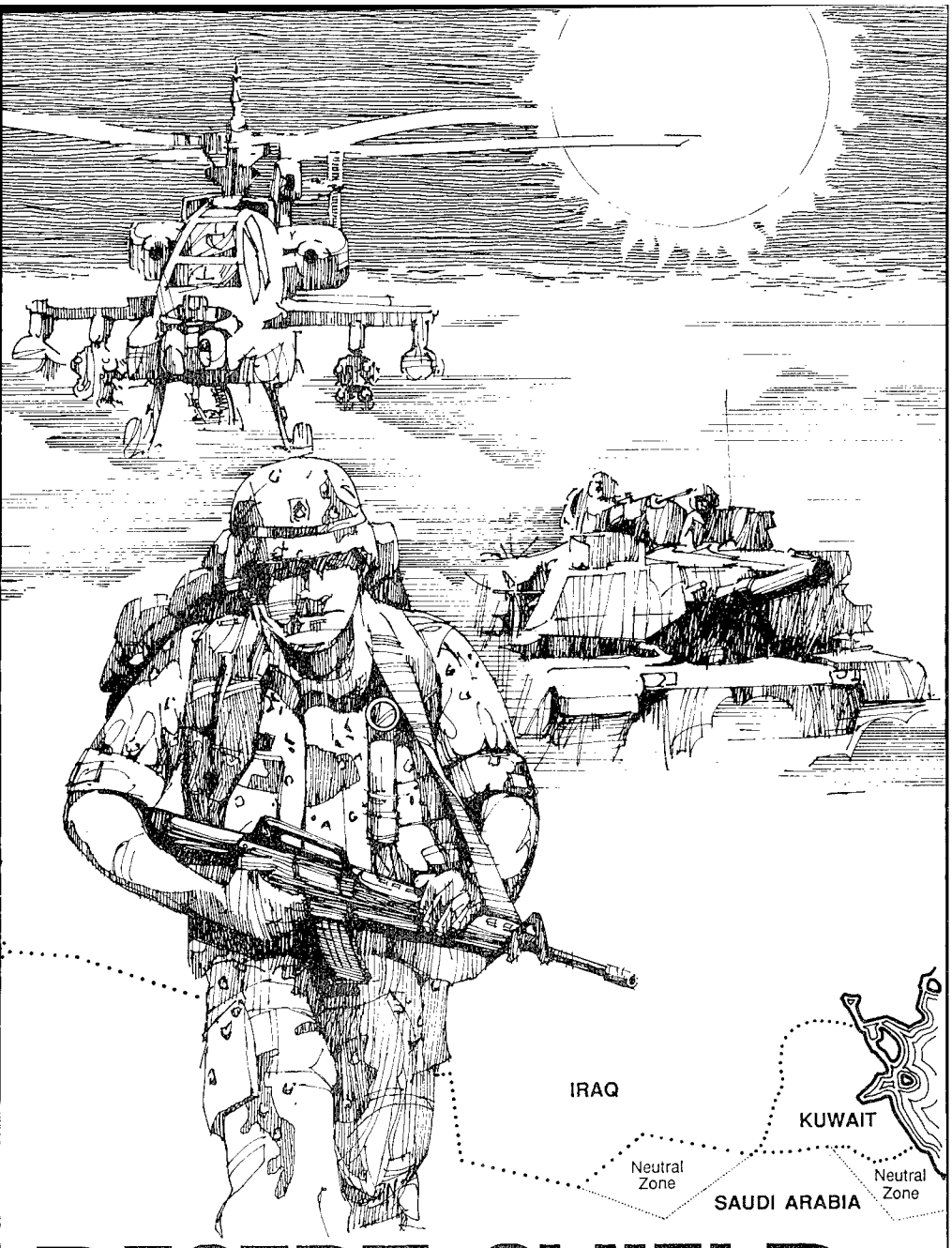

DESERT SHIELD

Leader's safety guide

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Foreword

In combat, safety is essential to force preservation. Statistics show that—

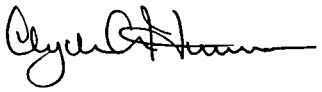
- In World War II, one out of every five American soldiers killed died as a result of an accident.
- In Korea, more than half the Army personnel who were hospitalized were injured in accidents.
- In Vietnam, accidents killed 5,700 soldiers, disabled more than 106,000 others, and produced nearly 5 million nondisabling injuries.

These are more than just numbers. They're a measurement of a serious loss of combat assets at a time when we could least afford to lose them—in the heat of battle. We must strive to keep such losses from happening on any future battlefield. We can do this by—

- Establishing and enforcing high standards of performance.
- Creating a command climate of "tough caring."
- Using risk management principles to make good decisions.
- Recognizing the effects of stress and fatigue on performance.

Let us not forget that accident prevention is an important weapon in our arsenal; using it will multiply our combat power by preserving our assets.

This pamphlet is a quick reference intended to help unit leaders prevent accidents during Operation Desert Shield, thereby saving lives and preserving their combat assets.



C. A. HENNIES
Brigadier General, USA
Director of Army Safety

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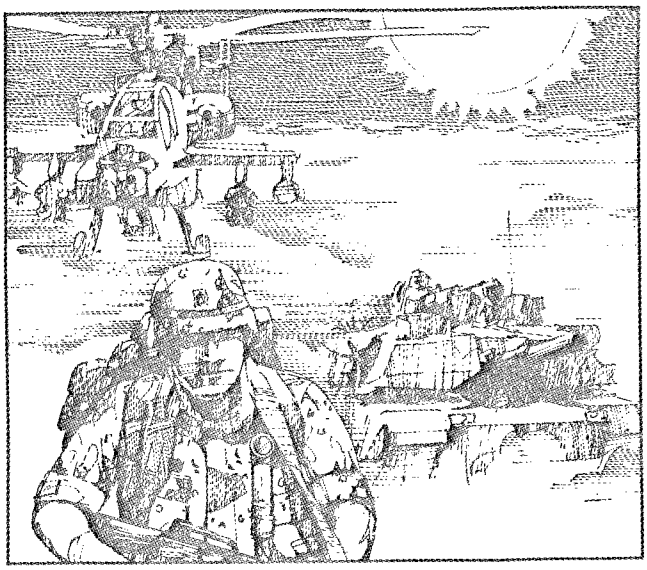


Section I

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 help 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 command 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.

Basic METT-T hazards

The following METT-T hazards are provided to provoke thought about issues to consider in your risk management actions. They are not all-inclusive.

Mission

- Middle East contingency in support of U.S. allies
- Accelerated mobilizations with short preparations
- Multinational, joint service, and combined force; language

and standard operating procedure differences
- Command relationships
- Contingency mission assignments with mission orders
- Night operation emphasis
- Combined-arms missions; more complex
  - Boundaries/sectors
  - Communications
  - Coordination

Enemy
- Possible chemical agent use
- Aggressive, determined, war-proven enemy leadership
- Seasoned/battle experienced/well equipped enemy
- Enemy home ground advantage of area hazards and hazard utilization
- Probable terrorist threats
- Increased fratricide (friendly fire) threat due to—
  - Enemy and multinational force use of like equipment
  - Long-range engagements due to favorable terrain
  - Heat shimmer/dust interference with foe identification

Terrain
- Desert climate
  - Intense heat (+140°F.)
  - Extremely low humidity
  - Normally no rain, but thunderstorms/flash floods possible in mountains and wadis
  - Strong winds (30 mph in p.m.; 75 mph in windstorms)
  - Large fluctuations in day/night temperatures (up to 70°F.)
- Sandy deserts
  - Poor wheeled vehicle off-road mobility/stability
  - Limited water sources
  - Heat shimmer visibility degradation
  - Undefined trail boundaries
  - No natural shade
  - Snakes, lizards, scorpions
  - Sand storms
  - Congested oasis sites
- Rocky, mountain deserts
  - Poorly surfaced, boulder strewn, narrow, winding roads

with steep shoulders and washouts
- ❑ Off-road vehicle travel poor to impossible
- ❑ Limited water sources
- ❑ Mirage visibility degradation
- ❑ Snakes, lizards, scorpions
- ❑ Falling rocks

• Other areas
- ❑ Lava beds and salt marshes hazards to vehicle and parked/landing aircraft mobility/stability
- ❑ High-density urban market areas hazardous to mobility
- ❑ Congested bivouac, port, and staging areas
- ❑ Strong religion-influenced cultural taboos and lifestyle differences
- ❑ Roads heavily used by pedestrians and beasts of burden
- ❑ Little civilian compliance with established driving procedures, and no defensive driving awareness
- ❑ High temperatures/humidity and intense light in coastal areas
- ❑ Water hazards in gulf coastal areas
- ❑ Thunderstorms with flash floods and extreme mud in mountains and coastal areas
- ❑ Salt air and fog restrict visibility in coastal areas
- ❑ Petroleum facilities contain fire and poisonous fumes hazards
- ❑ Snakes, scorpions, centipedes, sea snakes, spiders, bugs
- ❑ Strong vertical turbulence caused by high temperature and heating
- ❑ Danger of hot metal burning flesh

Troops

• Assessment of training proficiency on complex tasks involving:
- ❑ NBC training
- ❑ Climate
- ❑ Desert operations
- ❑ Maintenance
- ❑ Desert survivability/operations training
- ❑ Heat-injury detection/prevention training
- ❑ Night operations training
- ❑ Physical fitness training

- Pilot/operator training on local conditions
- Leadership training

- Troop acclimatization
- Water availability
- Troop morale, stress, esprit, discipline
- Troop fatigue (quality and quantity of rest)
- Command climate and leadership quality
- Equipment status (increased maintenance requirements and long combat service support lines of communication)
- NBC equipment heat stress and visibility/mobility degradation
- Personal protective/safety equipment availability (goggles, work gloves, sunscreens, chapstick, eye ointment, canteens, helmets, flack jackets, ear protection, dust respirators, specialized equipment, and plastic bags to store individual clothing in for protection from bugs, etc.)

Time

- Little time for preparations (activations and mobilizations)
- Jet-lag effects
- Intense pace

Section II

Human Factors

The desert environment is obviously hostile toward soldiers. But there are ways you as a leader can reduce the hazards. This section discusses some of them.

Supervision

Statistics show that 80 percent of all accidents are caused by human error, and supervision is the key to preventing human error. Simply put, leaders can reduce human error by establishing sound standards and consistently enforcing them.

Failure to enforce a standard serves to establish a new, lower standard that may one day result in an accident. If, for example, you sit in the passenger seat and allow a driver to operate a vehicle too fast for conditions, you have failed to supervise, and you have failed in your leadership responsibility. You might make *that* trip; however, you've set the stage for a future accident. Consistent enforcement demonstrates "tough caring," which is looking out for the welfare of soldiers.

Buddy system
Establish a buddy system and provide guidance on the issues buddies should help each other with. Examples include enforcement of water consumption, eating, personal hygiene, watching for fatigue, sickness, sunburn, heat injury, etc. Don't forget that leaders also need a buddy, because leaders suffer the most heat injuries.

Acclimatization
As a rule of thumb, 2 weeks are required to adjust to the humidity and extreme heat. The following chart is a guideline for minimal acclimatization:

Day	Less than 80° WBGT	More than 80° WBGT
1	2 hours *	2 hours *
2	3 hours	3 hours
3	4 hours	4 hours
4	6 hours	5 hours
5	Regular duty	6 hours
6		Regular duty

*Total hours of work. Hours should be evenly divided between morning and afternoon.

If time for acclimatization can not be provided for your soldiers, supervision and the buddy system become more important!

Water consumption/salt loss
In extreme heat, the body is cooled by sweat. Since sunburn inhibits sweating, every precaution must be taken to prevent sunburn. Common sense dictates maximum use of shade, sunscreen, and/or clothing that covers as much exposed skin as possible.

When the body loses water, it also loses salt. Salt should be replaced by normal consumption of food. Do not use salt tablets.

An individual may lose more than 1 quart of water per hour

through sweating. Water loss must be replaced by frequent intake of small amounts of water. Water should be sipped, not gulped. Gulping water causes the body to sweat more, thus increasing thirst. Do not conserve water. Soldiers *must* drink when they are thirsty! However, thirst is not an adequate indicator of dehydration.

The following chart is a guideline for water requirements:

Activity	Typical Duties	Quarts per person per day for drinking WBGT*	
		less than 80°	more than 80°
Light	Desk work, guard work, radio operating	6	9
Moderate	Route march on level ground, tank operations	9	12
Heavy	Forced march, route march heavy load/MOPP, digging-in	12	15

*MOPP and/or body armor adds 10° to the measured WBGT.

Following these requirements will not necessarily prevent dehydration. Dark urine is an indicator of dehydration.

Alcohol and soft drinks are not substitutes for water. Alcohol exacerbates dehydration, and soft drinks are not absorbed as rapidly as water into body tissue.

Soldiers who are overweight, dieting, or past heat casualties are more prone to heat injuries. As such, their activities must be closely monitored. Leaders:

- Enforce hydration and monitor water use.
- Enforce work/rest cycles.
- Watch for signs of heat injury (know what they are).
- Know individual physical condition and assign appropriate work.
- Establish and ensure use of the buddy system.

Fatigue

Fatigue causes accidents. After 48 to 72 hours without

sleep, soldiers become militarily ineffective. So, the best measure against fatigue is sleep. Water consumption, diet, physical conditioning, personal hygiene, and meaningful work all impact on fatigue. Ensure the impact is positive.

Watch for the following symptoms of fatigue:

- Headaches.
- Poor personal hygiene.
- Impatience/irritability.
- Loss of appetite.
- Inability to focus on task at hand.
- Outright physical exhaustion.
- Inability to make decisions.

These symptoms manifest themselves in:

- Increased errors.
- Difficulty in following instructions.
- Lack of motivation.
- Carelessness.

All this may translate into unnecessary risk-taking or shortcuts to get the job done—an open invitation for an accident.

Facts about sleep deprivation

- You cannot train to overcome sleep loss.
- Tasks that are uninteresting and take a long time are extremely conducive to sleep.
- Performance of mental tasks requiring calculations, creativity, and ability to plan ahead declines by 25 percent for every 24-hour period of semi-continuous work without sleep.
- The abilities of leaders are degraded by sleep loss, impacting on quick and effective responses to changing battlefield conditions.
- Tasks that have been well-learned and repeatedly practiced are more resistant to sleep-loss effects (select the best trained to perform critical tasks).
- The ability to learn *new* information is compromised by sleep loss.
- Leadership ability cannot overcome sleep loss.
- Sleep loss over time (greater than 2 days) has a cumulative effect.

Guidelines for sleep plans

- 6-8 hours sleep each night will maintain mental task performance indefinitely.
- 3-4 hours sleep each night will maintain mental task performance for 5-6 days.
- Less than 4 hours sleep each night (over a 3- to 6-day period) will impair military effectiveness.
- Best sleep periods, given limited choice, are 0300-0600 and 1600-1900.
- Provide for a *minimum* of 4-5 hours quality sleep (uninterrupted); however, after 6-7 days, accumulated sleep loss will equate to performance of 48 hours without sleep.
- After 24-36 hours without sleep, decisions, calculations, etc., should be cross-checked by a second person. Use a mix of rested/unrested soldiers as check and balance.
- Allow for naps as often as possible. Four 1-hour naps in a 24-hour period are as beneficial as 4 hours sleep; however, accumulative sleep loss is more severe with fragmented sleep.
- Sleep plans should include provisions to recover from sleep loss.
  - ❑ 12 hours of sleep/rest (at least 8-10 hours sleep) are required after 36-48 hours acute sleep loss.
  - ❑ 24 hours of sleep/rest (at least 15 hours sleep) are required after 36-48 hours sleep loss under conditions of high workload (12-16 hours per day). This is particularly important for commanders/staff with high mental task workloads.
  - ❑ 2-3 days sleep/rest are required after 72-96 hours sleep loss. The sleep/rest period means 8-10 hours sleep per day and light duty.

Personal injuries

Soldiers can minimize injuries by taking a few precautions. Arid conditions cause mucous membranes to dry out, leaving the eyes and nose more susceptible to infection. Some type of eye protection should be worn to shield the eyes from the sun and blowing sand. Chapstick used on the nostrils will prevent mucous membrane dryness.

Snake and insect bites

Bottom line—tell your soldiers to leave snakes alone. There

are poisonous snakes in the region (e.g., Cobra and Desert Horned Viper), but bites from nonpoisonous snakes can be just as harmful because of infection. Snakes will burrow under the sand and seek shade during the day and heat at night. Anyone bitten should seek medical help immediately. Do not treat snakebites with the cut/suck method.

Scorpions, centipedes, assassin bugs, black widow spiders, flies, mosquitoes, and sand fleas can cause illness and infectious wounds. Tell your soldiers to shake out their clothing before dressing and to check boots, etc., before putting them on. Where possible, boots should be placed off the ground or inside a waterproof bag or other container.

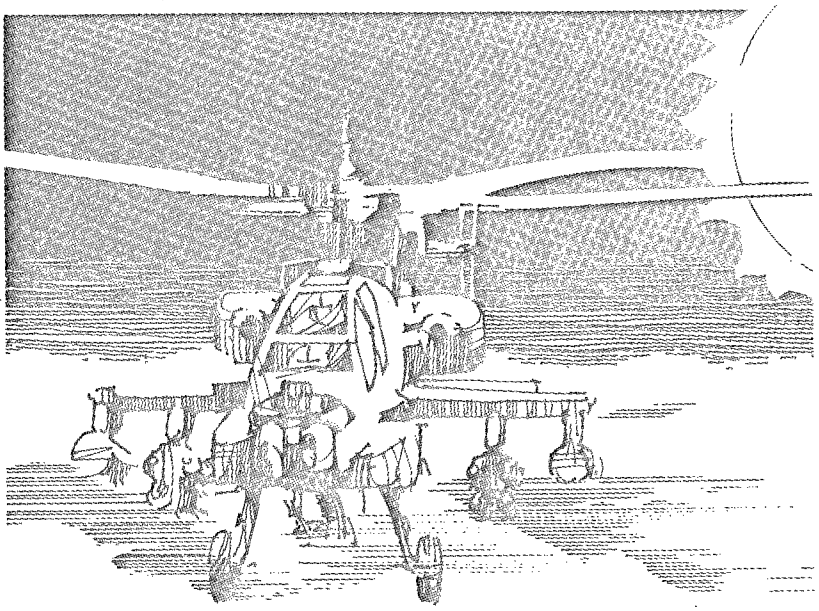
Use insect repellent religiously. Deet repellent lotion is recommended (NSN 6840-01-284-3982). Also available is Permetrin clothing repellent (NSN 6840-01-278-1336).

Hydrogen sulfide

Hydrogen sulfide is a gas emitted from petroleum-based products. It has the characteristic "rotten egg odor. It is a systemic poison that can be fatal.

- Expect to encounter the gas around oil well heads, drilling platforms, oil storage tanks, and pumping stations. Locally produced diesel fuel contains hydrogen sulfide.
- The gas is heavier than air; therefore, it will concentrate in low areas (depressions) and confined areas such as cargo areas of ships.
- Handle diesel fuels in well-ventilated areas.
- If you smell the "rotten egg" odor, notify your chain of command. Medical personnel should check the toxic level to determine if it is lethal.

Caution: The odor may go away. However, that does not mean the gas is not still present. Hydrogen sulfide gas may cause olfactory fatigue (i.e., your brain ceases to recognize the smell).



Section III

Aviation Operations

This section addresses areas of concern in aviation operations. Listed under each area are actions to take to reduce the hazards.

All aircraft

Maintenance

- Use caution when touching aircraft surfaces or metal tools that have been exposed to the sun. Wear gloves and use mats or pads when practical to prevent burns and blisters.
- Inspect seals, tires, and such frequently for blisters and other signs of deterioration.
- Inspect vibration isolators frequently and replace where cracking or permanent set is excessive.
- Inspect and clean flaps, control hinges, pulleys, bearings, worm gears, cowl slides, and leading gear regularly to arrest corrosive action.
- Inspect dead air spaces in fuselage at regular intervals for

accumulation of sand. Remove accumulated sand to prevent change in aircraft weight and balance.

- Clean instrument filters thoroughly at regular intervals. Replace wornout filters promptly.
- Leave canopy partly open, except during dust or rain storms, to permit circulation of air within the flight compartment.
- Install protective covers and dust excluder plugs on all engine openings, vents, air intakes, exhaust outlets, breathers, propeller hubs and feathering domes, cowls, and other vital openings to prevent entry of sand and dust. Keep aircraft pointed into wind when not being serviced or prepared for flight.
- Make all possible ground checks before starting engine. Inspect controls for freedom of movement to ensure no binding is caused by sand.
- Never use sand-encrusted tools on aircraft.
- Run up engines on a hard surface such as a landing mat or a sand- and dust-free area to prevent sandblasting.

Depth perception at night

- Drop chem light stick on ground before landing to overcome illusion that aircraft is higher above ground than it actually is.
- Remind pilots that radar altimeters provide the only effective reference to properly gauge altitude over expanses of flat "mirror" desert during the day.
- Monitor shadows cast by near objects such as landing gear or skid shadows during hover.
- Keep windscreen and door windows clean of sand and dust.

Overflying NVGs

- Slow airspeed to give more reaction time in areas of low contrast. In addition, terrain becomes more clearly defined and contrast is greater when the aircraft is flown closer to the ground.

Wire strikes

- PIC—Conduct thorough hazard and obstacle briefing before each mission.

- Aircrews—
  - ❑ Mark all known wires on hazard maps.
  - ❑ Ensure maximum crew coordination in searching out and calling out wires.
  - ❑ Go slow when you go low.
- Aviation safety officers—Promote wire strike prevention awareness in safety briefings.

Flying in MOPP gear

- Aircrews—
  - ❑ In aircraft not equipped with environmental control units, keep doors, windows, and vents open to increase ventilation.
  - ❑ If tactical situation permits, fly at higher altitudes, which yield cooler air.
  - ❑ Because the M24 and M43 protective masks reduce visibility, constantly scan in all directions.
  - ❑ Wearing the M24 mask for extended periods causes breathing resistance. Concentrate on breathing slowly.
- Commanders—Provide contamination-free areas where aircrews can rest.

Defensive measures during NBC operations

- Once chemical agents are employed or their employment is imminent, use M-9 paper or M-9 tape on windscreens, forward edges of stubby wings, etc., to detect chemical agents while in flight (FM 1-112, App E).

Survival equipment

- Check for presence and condition of desert survival kit (Hot Climate Individual Survival Kit, NSN 1680-00-973-1861) before each mission. Kit should contain the following:
  - ❑ Water, canned or in canteens.
  - ❑ Shelter, parachute or canvas.
  - ❑ Rations for 3 days.
  - ❑ Waterproof matches.
  - ❑ Compass.
  - ❑ First-aid kit.
  - ❑ Pocketknife.
  - ❑ Emergency radio.
  - ❑ Water purification tablets.

- ❑ Sunburn ointment.
- ❑ Day/night signal flares.
- ❑ Snakebite kit.
- ❑ Frying pan.
- ❑ Whistle.
- ❑ Headnet, insect.
- ❑ Signal mirror.

High intensity radio transmission area (HIRTA)

- Mission planning should include consideration of potential effects of an electromagnetic environment.
- Report suspected instances of electromagnetic interference.
- Review classified HIRTA guidance information (CDRAVSCOM message, AMSAV-E, 091845Z Jan 89).

Helicopters

Brownout; blowing dust/sand

- Ensure crews are familiar with procedures in aircraft operator's manual; chapter 2, FM 1-202: Environmental Flight; and TC 1-13, Hot Weather Flying Sense.
- As a minimum:
  - ❑ *Taxiing.* Get helicopter airborne as quickly as possible to minimize sand and dust intake by engines and danger of brownout.
  - ❑ *Takeoff.* Running takeoff is preferred for wheel-type helicopter. Otherwise, maximum performance takeoff is recommended.
  - ❑ *Flight and descent.* Avoid flying through sand or dust storms. Excessive dust and grit will cause damage to internal engine parts, excessive bearing wear, and erosion of rotor blades.
  - ❑ *Landing.* Running landing when terrain permits with minimum touchdown roll. Approach to touchdown should be made using approach angle greater than angle used for normal approaches. Approach angle should be compatible with available power.
  - ❑ *Doors and windows.* Keep closed during takeoff and landing to help prevent sand from entering cockpit and cargo area.

Maintenance

- Keep aircraft clean, thus reducing wear and tear caused by a buildup of sand and dirt.
- Use protective covers between flights to protect aircraft from excess heat and to stop sand and dirt from getting into moving parts.
- Wipe oil and grease off engine decks and cowling-covered parts.
- Make sure all filters and air cleaners are inspected and cleaned daily.
- Cover radios and receivers with dust covers when possible. Clean ventilating ports and channels to stop overheating.
- Blow sand and dirt out of instrument panels, switches, flight controls, and cables.
- Tape all openings or seams around windows, chin bubbles, and access panels. Do not stop airflow that's needed to cool parts.
- Lubricate main and tail rotors after every flight or at least daily as per appropriate TM.
- Replace damaged sealant around windows, doors, and chin bubbles,
- Remove oil cooler compartment access panel daily, and clean caked dirt and sand off fan's inner lip.
- Keep windows clean and covered when aircraft are parked.
- Don't let covers touch windshield. Protect windows with styrofoam, newspaper, cardboard, or other nonabrasive material—then attach cover.
- Add oil and hydraulic fluid directly from original unopened containers to help stop sand and dirt from getting into helicopter's lubrication and hydraulic systems. Dispose of partially used containers.
- Wipe off excess grease every time lubricant is applied. Grease attracts sand and dirt, forming a paste that grinds and wears lubricated parts.
- Inspect blades after every flight. High winds combined with sand or dirt landing pads can sandblast paint off blades.
- Slow erosion by covering leading edge of main rotor blades with paint (TB 1-1500-200-20-28 Rotor Blade Erosion Protection for All Army Aircraft).

Pressure/density altitude; weight and balance; wind

- Compute density altitude (DA) before weight and balance.
- Always assume DA to be a little higher than calculated.
- Study DA tables in operator's manual.
- Remember that helicopter performance can be affected as soon as 1 hour after sunrise because of desert temperature extremes affecting DA.
- Consider the effect wind direction has on aircraft control during takeoff and landing.

Forward arming and refueling points (FARP)

- Ensure fuel and ammunition handlers are familiar with FM 10-68 and FM 1-104 procedures.
- Use extreme care when handling engine fuel at temperatures above 120°F to prevent possible sparks and explosion. Open gasoline drums with bronze or other nonsparking tools.
- Look for and correct improper grounding points, deteriorated or leaking hoses, leaking nozzles, incorrect sampling procedures, improper storing and/or dumping of waste POL products, lack of personal equipment for refueling personnel, no water at refueling site, unserviceable fire extinguishers, and no controlled access into and out of refuel points.
- Keep gasoline drums covered and, where possible, maintain storage temperature below 120°F.
- Remember that fuel expands in very hot temperatures.
- Ensure fuel does not become contaminated by dirty nozzles and other unclean equipment.
- Consider positive control of air traffic and ground traffic around refueling sites to reduce potential of midair/ground collisions.
- Keep camouflage materials (netting/foliage) as far from rotor blade systems as possible to prevent FOD.

Warning: High-frequency radios will not be operated within 100 feet of aircraft being armed and/or refueled.

Caution! At 111°F., white phosphorous (WP) tends to liquefy, affecting ballistics of WP rounds.

• Enforce requirement for at least two qualified personnel to arm an aircraft.
• Ensure weapons are on safe before arming.
• Ensure guns are oriented away from unit assets during rearming.
• Require frequent cleaning and lubrication of turret weapon systems to prevent jamming due to sand.
• Require daily inspection of grounding/bonding systems.

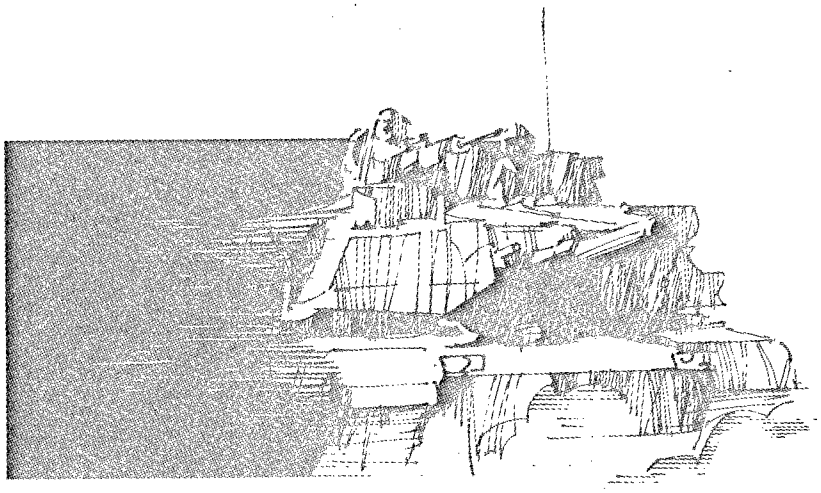
• **Static electricity:** Saudi Arabia is known as a static electricity hazard area. Be aware of fire hazard possibility from static electricity and that connecting the nozzle bonding wire before opening the fuel cap will prevent a static arc from occurring in the presence of fuel vapor and significantly reduce the fire hazard.

Lasers
• When in doubt, require wearing of laser safety eyewear.
• Treat handheld laser devices as if they were a loaded weapon.
• Do not aim laser rangefinders or target designators at nontarget personnel, vehicles, or passing aircraft.
• Do not place hands in front of any laser device.
• When using binoculars or image magnification devices in area of lasers, ensure proper filter is being used.
• Do not perform maintenance work on laser systems until power is off and residual charge in any power supply capacitors has been bled off.
• When maintenance *must* be performed on "on line" laser systems, output must be blocked or enclosed.

APU starting procedures
• Under normal operating conditions, start APU only when performing preflight cockpit equipment checks or during parking and shutdown sequence, as specified in the operator's manual.
• As APU is not flight certified, do not start in flight or during ground taxi, except in emergency.

Visual scan

• Do not stop scanning to channelize attention inside or outside aircraft. Scan stop of more than 3 seconds is risky. If pilot on controls must stop scanning, transfer controls; if pilot not on controls decides to stop scanning, announce decision.



Section IV

Ground Operations

This section addresses areas of concern in ground operations. Listed under each area are actions leaders should take to reduce the hazards.

All vehicles

PMCS

- Stress that PMCS is especially critical in hot, dusty conditions.
- Ensure that operators know that, due to severe environmental conditions, they must perform daily PMCS even if equipment is not used.
- Stress that drivers must perform special requirements covered in the "Operating Under Unusual Conditions" section of their respective operators manual.

Sand conditions

- Provide instruction about tire pressure and hands-on

training in gear selection, crossing dunes, stopping in sand, and other sand-driving skills (FM 21-305 and FM 21-306).

- Ensure drivers refer to appropriate vehicle operators manual for "Operating Under Unusual Conditions."
- Provide instruction in vehicle control in strong wind and blowing sand conditions.
- Ensure that wheeled vehicle drivers receive hands-on training in driving in sand, to include the following:
  - ❑ Reduce tire pressure for soft sand and dunes, and drive at low speed. Inflate tires to normal pressure as soon as situation permits. (Prolonged driving on partially deflated tires will overheat tires and break down sidewalls.)
  - ❑ Select a gear or range that will start vehicle with a minimum of clutch slippage and wheel spinning.
  - ❑ Maintain a steady, even rate of movement.
  - ❑ Avoid unnecessary gear shifting. Keep automatic transmissions in low range.
  - ❑ Approach dunes from the windward (most gradual) slope at a 90-degree angle after selecting gear or range to avoid shifting on slope. Maintain momentum during ascent.
  - ❑ Make wide turns.
  - ❑ Brake gradually or allow vehicle to roll to halt. Stop on downhill slope when possible. (Abrupt stops may cause vehicle to sink into loose sand and become stuck.)
  - ❑ FM 21-305 provides additional guidance.
- Ensure that tracked vehicle drivers receive hands-on training in driving in sand, to include the following:
  - ❑ Do not make pivot turns.
  - ❑ Do not straddle sand mounds or drive on sides of two sand mounds. (Loose sand will not support tracked vehicles on steep slopes.)
  - ❑ Keep speed steady after reaching desired speed.
  - ❑ Turn slowly on loose sand.
  - ❑ Steer straight up and down hills if possible.
  - ❑ Be wary of a lack of steering response, which indicates sand is building up between rear sprockets and treads. If allowed to continue, sand buildup will force the track off. "Shaking" the vehicle with the steering or backing up will throw off the sand.
  - ❑ FM 21-306 provides additional guidance.

Built-up areas/local driving

- Provide instruction in local driving customs and practices. (Accident experience shows local drivers to be very unpredictable, often showing complete disregard of traffic signs and signals, turning left from the right lane or right from the left lane, and making U-turns in intersections.)
- Avoid areas of high civilian vehicle concentration.
- Stress need for constant alertness and to expect civilian vehicles to always do the unexpected.

Speed

- Establish and enforce safe speed limits for various road and environmental conditions.

Safety belts

- Enforce the use of safety belts.

Driver selection

- Pair an experienced driver with an inexperienced one to provide supervision and hands-on training.

Rollovers

- Practice rollover crew drills.
- Instruct drivers on conditions that can lead to rollovers: steep slopes, ditches, loose sand, etc.
- Enforce use of safety belts by crew and passengers.
- Ensure equipment is secure to prevent injury from falling equipment or cargo.
- Enforce posted and briefed speed limits.
- Remind drivers to slow down in limited visibility, on rough terrain, and during inclement weather.
- Caution drivers to avoid steep slopes and narrow trails. (Leaders must also keep this in mind when planning vehicle moves.)
- Remind drivers to give special care to tire, track, and suspension checks.
- Caution drivers to drive at moderate speed and make wide turns at slow speed to maintain vehicle control (especially critical in sand).

Backing

- Ensure drivers properly use ground guides (see section on ground guiding).

Rear-end collisions

- Stress safe following distance.
- Remind drivers that when in blackout conditions, they should watch the rear blackout marker lights of the vehicle ahead. Ensure they know the distances different marker readings indicate. (When a driver sees one point of red light at each rear lamp of the vehicle ahead, he is more than 180 feet behind it; if he sees two points of light, he is following 60 to 180 feet behind it; if he sees four lights or two pairs of "cat's eyes," he is less than 60 feet behind it.)
- Establish speeds for blackout driving under different conditions, including blowing sand.
- Establish procedures for vehicle stops and breakdowns to warn approaching vehicles in blackout, sandstorm, and other restricted visibility conditions.

Passengers/cargo transport

- Supervise cargo loading to ensure load is secured and weight is correctly distributed (especially when traveling over sandy terrain).
- Enforce wear of safety belts and helmets.
- Use fixed seating in truck cargo beds.
- In cargo beds without fixed seating, ensure passengers remain seated within truck body.

Crew coordination

- Stress importance of maintaining crew communication.
- Remind drivers/track commanders to warn crew/passengers when they are about to cross a ditch, climb an obstacle, or take any action likely to catch crew/passengers off balance.

Tracked vehicles

Hatches and latches

- Make sure safety pins are present, operational, and used.
- Require daily PMCS checks to ensure hatches and doors

are functioning correctly.

- Notify crew of hatches and doors that are unserviceable.
- Ensure helmets are worn.
- Ensure bad latches and pins are replaced immediately.
- Require crews to check hatch, latch, and pin function throughout the mission.

Turrets

- Remind crews to maintain proper communications between crewmembers at all times.
- Brief and train crewmembers and passengers about turret hazards.
- Advise crew and passengers on the tactical situation so they can anticipate turret movements.
- Stress importance of announcing "power" before traversing turret.
- Remind crews to turn turret power off before leaving turret station.

Fires

- Practice crew drills for emergency fire escape.
- Require complete electrical inspection (no loose connections, no frayed/worn wires, and no wires that run over hot or sharp objects) in accordance with appropriate operators manual.
- Ensure that fuel systems are inspected for leaks and ensure lines do not run over sharp objects or rub, causing breaks or tears.
- Train/supervise crew activities involving ammunition.
- Require inspection of fire extinguisher bottles to ensure they have been tested/weighed and properly connected to discharge lines and external pull handles.
- Ensure that fire detectors are cleaned every 4 hours in extremely dusty conditions.

General

- Ensure soldiers get help to mount/load heavy objects.
- Require that head protection be worn in and around vehicles.
- Stress hazards of slippery footgear and slippery vehicle surfaces.

• Emphasize use of gloves (protection from extremely hot surfaces) and maintaining three points of contact while moving about the vehicle/equipment.

• Do not allow soldiers to jump from vehicles.

Convoys

Speed

• Establish and enforce safe convoy and catch-up speeds for expected road and environmental conditions. Include in pre-march briefing.

• Set speeds based on personnel, training, terrain, environment, and equipment (see section on night vision devices).

Rear-end collisions

• Provide adequate driver rest before starting.

• Establish speed and following distance guidelines. Increase following distance in bad weather and darkness. Include in pre-march briefing.

• In blackout conditions, ensure drivers watch the rear blackout marker lights of the vehicle ahead. Ensure they know the distances different markers indicate. (When a driver sees one point of red light at each rear lamp of the vehicle ahead, he is more than 180 feet behind it; if he sees two points of light, he is following 60 to 180 feet behind it; if he sees four lights or two pairs of "cat's eyes," he is less than 60 feet behind it.)

• Establish speeds for blackout driving under different conditions, including blowing sand.

• Establish procedures for vehicle stops and breakdowns to warn approaching vehicles in blackout, sandstorm, and other restricted-visibility conditions.

Loss of control/rollovers

• Use experienced drivers in difficult terrain.

• For off-road movements, when possible conduct a physical reconnaissance of the route to avoid the worst terrain hazards. Mark unavoidable hazards on strip map and include them in the pre-march briefing.

• Check loads to ensure cargo is correctly secured. Stress even load distribution, especially when traveling over sandy terrain.

Clearance

• Recon the route for bridges or underpasses that may be too low for large vehicles.

• Recon routes for mountain passes or any sharp turn that might require special control measures.

Materiel failure

• Have all drivers perform PMCS before departure, during halts, and after completion.

• During halts, in addition to normal during-operation PMCS, emphasize tire/track pad condition and security of loads.

• During operation, have drivers pay particular attention to air cleaner indicator and water and transmission gauges.

• Ensure operators know proper cool-down procedures for their vehicles. Procedures are spelled out in appropriate operators manuals.

• Ensure vehicle basic issue items, pioneer tools, highway warning devices, and fire extinguisher are present on every vehicle.

• Ensure that disabled vehicles are moved completely off the roadway.

Local driving practices

• Provide instruction in local driving customs and practices. Avoid areas of high civilian vehicle concentration. Stress staying alert and to expect civilian vehicles to do the unexpected. Include in pre-march briefing.

Passengers

• Enforce requirement to wear available safety belts and helmets.

• Use fixed seating in truck cargo beds.

General

• Do not place vehicles transporting troops, ammunition, or

POL last in a serial or march unit.

- Ensure all prime movers and trailer brake systems are properly connected and fully operational.
- Reinforce braking and downhill driving procedures with all operators.

Combat soldiering

Parachuting

- Brief all jumpers on drop zone (DZ) conditions.
- Rehearse actions on DZ.
- Review parachute landing fall techniques and emergency procedures.
- Conduct aircraft crash drills.
- Use door bundles for extra equipment and ammunition.
- Stress exit interval, door position, and correct exit procedures.
- Review crossloading plan.

Rappelling/fast rope

- Use trained rappellmaster.
- Conduct briefing with aircrew.
- Inspect all equipment.
- Keep rucksacks under 50 pounds.
- Require use of helmets and gloves.
- Prohibit cutting of ropes except in an emergency—and only after visual confirmation that rope is clear.

Landing zone selection

- When selecting helicopter landing sites, pick areas that minimize the amount of sand and dust that might be disturbed and that are clear of powerlines, trees, brush, or other obstacles. Mark unmovable obstacles.

Weapons handling

Fratricide

- Do not tolerate horseplay.
- Ensure weapons are kept on safe.
- Remind soldiers to consider weapons loaded at all times

and to check chamber often.

- Instruct soldiers to load only on command or SOP.
- Remind soldiers to know their target and their allies. Train in target identification under "mirage" conditions.
- Control ammo.
- Highlight danger of "cookoffs."
- Rehearse immediate-action drills for misfire/weapons malfunction.

Maintenance

- Establish weapons lubrication policy.
- Require that weapons, ammo, and magazines be kept clean.
- Require that muzzles be covered to prevent clogging.
- Conduct headspace and timing in accordance with TM. Caution soldiers not to rely on memory, to always verify.

Lasers

- Use only trained personnel to operate/handle lasers.
- Caution personnel to fire lasers only at designated targets and to never fire at specular surfaces such as glass, mirrors, and windows.
- Ensure laser safety filters are installed on binoculars and other optical devices when observing laser operations.
- Ensure eye protection is available and worn.
- Ensure laser safety procedures are established and implemented for each device being used.
- Conduct safety briefings on all Class II and higher lasers, specifying the needed eye protection and viewing limitations.

NBC operations

MOPP

- Increase WBGT by 10°F for operations in MOPP. Increase water consumption correspondingly (see human factors section).
- Practice drinking while wearing mask.
- Remind soldiers that command drinking policy is even more important when in MOPP.
- Plan additional time to conduct operations (up to 6 times longer). Rotate personnel more often.

• Allow personnel to loosen protective clothing as situation permits.

• Employ buddy system to check for heat injuries. Ensure leaders are included.

• Delegate tasks to subordinates to reduce stress and fatigue. (Experience shows that leaders are most likely to suffer adverse effects of operating in MOPP.)

M43 protective mask

• Do not expose blower or battery pack to temperatures above 160°F.

• Do not allow battery pack or blower to remain in contact with hot metal surfaces.

Fires

• Store DS2 and STB separately.

• Do not spray DS2 on hot metal surfaces.

Chemical burns

• Store containers of DS2, STB, and the M13 decon apparatus out of direct sun to avoid overpressurization of containers and leaking.

• Remind users to wear rubber gloves when handling containers of decontaminants.

Night vision devices

Preparation for use

• Ensure soldiers get adequate rest and eat well-balanced meals.

• Advise soldiers to avoid use of tobacco, alcohol, and self-medication. (They impair night vision.)

• Remind users to avoid bright light, including sunlight and to wear sunglasses when outside.

Driving

• Warn drivers against overconfidence and to avoid normal tendency to overdrive capabilities of goggles.

• Remind users to continuously use scanning technique.

• Remind users that effectiveness is greatly reduced in dust,

haze, fog, smoke, and rain and during mirage effect. Slow down.

- Remind users to keep light sources outside the field of view of goggles.

Personnel

- Ensure eye guards are in place to prevent recoil injury.
- Caution soldiers that haste will cause accidents.

Equipment damage

- Ensure personnel are properly trained in maintenance and use.
- Remind users to avoid pointing goggles into the wind if possible.
- Ensure that users remove all dust and sand from goggles after use.
- Remind users to keep carrying case closed unless removing or replacing items.
- Remind users to protect optics from light sources, intense heat, direct sunlight, dust, and sand.

Ammunition and explosives

General precautions

- Expose only the minimum number of people and amount of equipment necessary to ammunition and explosives.
- Handle ammunition carefully. Containers must not be tumbled, dropped, thrown, rolled, or dragged (unless designed for dragging).
- Make provisions to evaluate and, if necessary, segregate damaged ammunition.
- Coordinate with QM laundry to wash clothing with an antistatic additive to reduce static electricity.
- Don't use sparking metallic tools on explosives; take precautions to reduce static electricity discharge.
- Determine if your area of operations is susceptible to electrical storms and establish lightning protection procedures.
- Do not allow soldiers to collect dud rounds for souvenirs.

Fire precautions

- Keep all flammable materials and all flame- or spark-producing devices away from ammunition and explosives. This includes matches, lighted cigarettes, petroleum products, and vehicles with leaking fluids.
- Ensure fire extinguishers are present wherever ammunition is handled, stored, or transported.
- In case of fire, evacuate the area to a distance of at least 400 meters and take cover.
- Clearly post "Add no water" signs to ammunition containing materials (such as thermite or triethyl aluminum (TEA/TPA) that react violently with water. These fires may be smothered with sand or earth.

Loading precautions

- Ensure vehicle brakes are set, engine is turned off, and at least one wheel is chocked during loading and unloading.
- Ensure ammunition weight is evenly distributed and the load is secured to prevent movement.
- Ensure vehicles and trailers loaded with ammunition are parked at least 50 feet from vehicles and trailers loaded with flammable liquids.

Storage precautions

- Protect ammunition, particularly unpackaged ammunition, from direct sun. However, tarpaulins or other covers placed directly on ammunition could cause deterioration, so a ventilation space must be provided.
- Disperse ammunition to minimize loss in the event of fire, accidental explosion, or enemy action.
- Conform to quantity-distance standards for storage of ammunition and explosives.
- Ensure that ammunition of unknown origin and captured ammunition is examined, evaluated, and classified by qualified personnel and stored in a designated collection point.
- When storing ammunition, use sand dunes, barriers, buildings, and so forth to prevent propagation and to protect personnel and materiel from the effects of an explosion.
- Store ammunition containing white phosphorous (WP) in

an upright position (WP liquifies at high temperatures and ballistics will be affected by horizontal storage).

Pyrotechnics

- Ensure your soldiers know that simulator flash powder ignites instantly and explosively and that simulators should not be exposed to intense heat and direct sunlight. Remind them never to cut open or hand-ignite these devices and to mark duds and seek EOD guidance for handling and disposal.
- Remind soldiers, while training, not to throw/detonate simulators, flares, or smoke devices near troops, tents, vehicles, or other flammable/combustible materials.
- Remind soldiers to roll down sleeves and wear gloves and helmets when using simulators.
- Warn soldiers not to drop or mishandle ATWESS or Hoffman device cartridges and to roll down sleeves and use gloves and helmets when loading them.
- Ensure all crew are in vehicle when using Hoffman and be sure to clear to the rear when using ATWESS.
- Remind soldiers to beware of missile hazards when simulators are used on rocky terrain.

Maintenance

Track checks

- Ensure proper PMCS is conducted.
- Ensure that vehicle suspension is checked for excessive wear and loose, broken, or missing bolts before, during, and after operation.
- Ensure that tracks are lubed often to flush out sand-grease mixture.

Tire checks

- Ensure that tires are checked often for cuts and wear.
- Remind drivers to check for rocks between duals and to check tire pressure often.
- Be aware that the combination of sand, heat, and rough ground shortens the life of tires.

Tire repair

- Insist that mechanics always use a tire cage.
- Remind mechanics to use proper tools, to keep hands out of cage while inflating, and to use an extension.
- Remind mechanics to use the buddy system when lifting, removing, and installing large tires.

Batteries

- Remind personnel to keep air vents on caps clean to allow gas release and avoid pressure buildup.
- Ensure that personnel check levels often. Battery electrolyte water evaporates faster in extremely hot weather.
- Ensure personnel adjust battery electrolyte levels during the day. (When batteries cool, levels will lower slightly and overflow will be avoided.)
- Require the use of slave cables. Only as a last resort should jumper cables be used. Remind personnel to beware of sparks as jumper cables are attached around the battery's gaseous vapors.
- Ensure mechanics adjust voltage regulators to lowest setting possible to avoid overcharging.
- Require use of face shields, goggles, and aprons when servicing batteries.

Recovery operations

- Remind recovery personnel to use a braking vehicle when required by TM and to always use correct hookup procedures.
- Enforce safe towing speeds.
- Match driver to mission.
- Fabricate ground support devices for outrigger support in soft soil.

Eye protection

- Require goggles for work under vehicles.
- Require that the right tool be used for every job.

POL

- Remind personnel to use extreme care when changing hot lubricants (they can burn).
- Take care to prevent sand/dust contamination of POL.

Brakes

• Remind mechanics to use low air pressure to remove sand/dust from brake drum areas.

Radiators/coolant

• Remind personnel to use caution when removing radiator caps from hot vehicles and to check radiator fluids often to avoid overheating. (Use hand to remove cap only if cool to touch. Turn cap slowly to release pressure.)

• Remind personnel to keep radiators and airflow areas clean and free of debris to avoid rupture of radiators.

• Require that radiator caps be tested often. (Caps control radiator pressure.)

Grounding

• Ensure that portable electric power tools and power generation equipment are properly grounded (see section on grounding).

Communications

Antennas

• Remind personnel that, when erecting RC-292/OE254 antennas, they must stay *twice* the distance from powerlines as the length of the antenna.

• Stress that soldiers have been killed by falling antenna head sections.

• Require that personnel wear eye protection, head protection, and gloves when erecting antennas.

• Allow no substitutes for antenna mast sections (camouflage poles have been a fatal alternative).

• If, for any reason, an assembled antenna head must be left on the ground, ensure it is guarded to prevent others from walking into it. Tip protectors are a must.

Power lines

• Identify power lines in operational areas to *all* soldiers.

• Tie down antennas when in areas of power lines (antenna tip should be no lower than 7 feet to preclude eye injuries). Use tip protectors at all times.

• Warn soldiers never to throw WD1 over power lines.

Electrical storms

• If possible, do not operate radios, telephones, switchboards.

• Disconnect electrical equipment from power sources and antennas if the situation permits.

• If equipment *must* be used, converse as little as possible. Return call after storm.

Grounding

• Ensure that *all* electrical equipment is grounded (see section below).

Grounding

General

• Remind personnel that extra care must be given to preventing static electricity in hot, dry climates.

• Ensure that personnel know that desert soil requires special grounding procedures. (In accordance with FM 20-31, a mixture of 5 pounds of salt with 5 gallons of water buried with the grounding rod improves grounding conditions.)

• Instruct personnel to dig/drive ground rods to a depth of 6 feet.

• Remind personnel to keep soil moist around grounding rods to increase conductivity and to keep ground rods, straps, and connections free of paint or oils.

Fuel handling

Grounding and bonding

• Ensure proper grounding and bonding procedures are always used (see grounding section above).

• Remind personnel that hot, dry, dusty conditions contribute to the generation of static electricity.

• Remind personnel to ground themselves by touching a large metal object before handling fuel hoses and nozzles.

• Ensure that grounding and bonding equipment is inspected regularly.

Tank and pump units

- Remind personnel to—
  - ❑ Lubricate equipment more often.
  - ❑ Use light oil instead of grease.
  - ❑ Keep caps and covers on systems.
  - ❑ Keep pump engines clean.
  - ❑ Purge tanks, lines, and filter separators at the beginning and end of the day.
  - ❑ Recirculate all fuels to remove water.
  - ❑ Keep pressure relief valves clean (compressed air).
  - ❑ Watch for corrosion.

Fuel system supply point

- Remind personnel to—
  - ❑ Not fill collapsible bags to full capacity (allow for expansion).
  - ❑ Leave hose line valves slightly open to allow for fuel expansion into tankage.
  - ❑ Keep pump engines clean.
  - ❑ Lubricate pumps more often.
  - ❑ Use dust caps and plugs.

Refueling operation

- Ensure proper bonding and grounding procedures are used.
- Remind personnel to—
  - ❑ Not fill vehicles to full capacity (allow for expansion).
  - ❑ Keep tank truck hatches open during refueling to allow vapors to escape.
  - ❑ Stay on the windward side to prevent being overcome by fuel vapors.
  - ❑ Close hatches immediately after refueling.
  - ❑ Use bottom load procedures when possible. (If top loading is used, use extreme caution and start the refueling procedure at a slow rate until the level of fuel has covered the hose. Thereafter, increase the flow rate slowly.)

Protective clothing and equipment

- Remind personnel not to wear nylon clothing. (Nylon will build up electrostatic charges.)

• Remind personnel to wear fuel-resistant or rubber gloves and protective clothing to keep fuel off the skin. (Skin is highly susceptible to drying, cracking, and peeling if it comes in contact with fuel in desert conditions.)

• Coordinate with QM laundry to wash clothing with an antistatic additive to reduce static electricity.

Bivouac

Sleeping locations

• Establish a designated sleeping area. If situation permits, mark perimeter with engineer tape or chem lights.

• Post unit perimeter security personnel equipped with lights for signaling. Ensure they have been thoroughly briefed on their duties and responsibilities.

• Ensure vehicles are *not* parked where they can roll toward sleeping personnel or on an incline without chocks.

• Brief all soldiers on correct driving/sleeping procedures during hours of darkness.

Dismount points

• Establish dismount points beyond which vehicles may not move without ground guides.

Ground guiding

• Require all vehicles to use ground guides, especially during periods of darkness and reduced visibility.

• Require tracked vehicles to use two ground guides when moving within or through an assembly area at any time.

Tent fires

• Ensure all personnel fueling/operating tent stoves are properly trained.

• Ensure operable fire extinguishers are accessible and that operators are assigned and knowledgeable.

• Require that electrical circuits be routinely inspected for possible overload condition.

• Ensure that personnel prevent stove fuel from leaking and require immediate cleanup of any spills.

• Establish and enforce smoking areas.

Wind

- Ensure sufficient anchorage is provided for tents in sandy and high-wind conditions.

Mess operations

Sanitation

- Ensure all food waste is properly disposed of. If buried, do so daily and at least 30 meters from food preparation areas.
- Ensure food preparation area is at least 100 meters from latrines and 50 meters from incinerators.
- Ensure food is protected from contamination.
- Monitor food handlers and other soldiers to ensure sanitation standards are maintained.

Fire/explosion

- Ensure kitchen fuel storage area is at least 15 meters from working area and is marked as a hazard area.
- Ensure operable fire extinguishers are accessible (with designated operators) in mess-tent area and at stove-lighting and fuel-storage areas.
- Ensure all personnel fueling/operating stoves, immersion heaters, and burners are properly trained.
- Make operators aware that increased heat will add pressure to fuel tanks and fuel cans and that particular attention should be given M2 burners.
- Keep mess-tent exits clear of obstructions.

Cuts/burns

- Remind personnel to—
  - ❑ Keep knives sharp, and use the right knife for the job.
  - ❑ Not use knives or other sharp implements to open tray packs (use modified can opener and P38).
  - ❑ Tilt heated tray packs and cans to right or left when opening to prevent burns from squirting hot juices.

Materiel handling

Lift/carry procedures

- Enforce use of correct techniques—

❑ Never carry a load heavier than can be managed with ease.

❑ When in doubt, get assistance.

❑ Bend from hips and knees, not just the waist.

❑ Carry heavy objects close to body.

❑ Avoid sudden movements; move slowly and deliberately.

❑ Do not carry unbalanced loads.

Slips, trips, and falls

- Supervise operations.
- Ensure that areas are clear of obstructions and hazards, and remind personnel to use care when vision is obstructed by objects being carried.
- Caution personnel not to jump or step from cargo vehicles while carrying loads; tell them to use a ramp or get help.
- Remind personnel to use extreme care when carrying loads in loose sand or over rough surfaces.

Ground guiding

General

- Train drivers in the correct use of ground guides and *all* personnel in how to perform as ground guides.
- Stress importance of ground guides when traveling cross country during periods of limited visibility.
- Remind drivers to always use one or more ground guides while backing.
- Equip ground guides with suitable lights during periods of limited visibility/darkness.

Combat construction

Equipment operation

- Remind operators that construction equipment may be very unstable off road in sandy and rocky terrain.
- Ensure operators and supervisors check outriggers for stability. This is especially critical in sand or soil where a surface crust exists.
- Ensure safety belts are worn at all times when operating equipment.

• Ensure rollover protection systems are installed, and erect sun umbrellas on slow-speed equipment such as rollers and compactors.

• Establish operator/crew equipment rollover drills.

• Ensure ground guides are used at construction sites and in congested areas and bivouac locations.

• Ensure all prime movers and trailer brake systems are fully operational on equipment haulers and other M915 series vehicles.

• Rehearse braking and downhill driving procedures with all operators.

Construction sites

• Appoint a site safety supervisor for large earthwork or building construction sites.

• Ensure helmets or hardhats are worn on construction sites.

• Control vehicle, pedestrian, and troop access to sites.

• When excavating, ensure excavation walls are reinforced to prevent cave-ins.

• Ensure all personnel on the site know what to do in case of flash floods.

• Ensure *all* electrical equipment is grounded, and ground and bond when transfering fuel (see section on grounding).

• Ensure safety equipment (goggles, gloves, welding masks, aprons, dust respirators, etc.) is available and used.

• Ensure personnel do not shortcut safety procedures due to heat discomfort.

• Ensure personnel know precautions to take during a windstorm to prevent injury and equipment damage.

• Determine if site has windstorms and ensure this hazard is taken into account during both design and construction.

• Establish policies and procedures for recovery of equipment in sand.

• Protect electric wiring, hydraulics, and optics from abrasive effects of blowing sand.

• Protect hydraulics, fuel, and optics from sand/dust contamination.

Heat effects on tools and materials

• Ensure gloves are worn when working with metal tools and

materials exposed to heat from the sun.

- Remind personnel to—
  - ❑ Take into account expansion and contraction of metal tools and materials. (Metal will contract during cool nights and expand during hot days.)
  - ❑ Check wire rope rigging and bolt torque specifications to minimize varying heat stress/strain effects.
  - ❑ Keep sawdust cleaned up in carpentry areas. Sawdust fires occur frequently in hot, dry climates.
  - ❑ Frequently inspect wooden items such as shovels, axes, and hammers for shrinkage from extreme heat and low humidity. Check and tighten as needed.
  - ❑ Protect flammables (flash point less than 100°F) and combustibles (flash point 100°F or greater) from extreme heat exposure.
- Emphasize need for spill control. Remind personnel to remove contaminated soil from operational areas at once because of extreme fire and vapor hazards in hot, dry conditions.

Combat engineer

Demolitions

- Prohibit towing MICLIC with M1 tank due to extreme heat from M1 exhaust.
- Ensure proper procedures and tools are used when working with demolitions (i.e., crimper, flak jacket, helmet, and nonsparking tools).
- Ensure that static electric charges are checked for and grounded and that anti-static laundry additives, anti-static sprays, and individual grounding are used on large metal surfaces/vehicles.
- Ensure demolitions are stored properly. Provide shade and ventilation, separate and sandbag-sensitive initiation components, and protect emplaced demolitions (especially blasting caps) from direct heat.
- When blowing explosives, make sure survivable safe distance or cover is used.
- Ensure that explosives are kept away from food and eyes and that personnel clean hands after handling explosives.

• Conduct a test burn to determine local condition effects on time fuse.

• Remind personnel to crimp blasting caps before placing on explosives and not to connect blasting caps to det cord leads until nonessential personnel are evacuated.

• Don't conduct live demolition training during electrical storms, and don't use electric caps within 155 meters of energized powerlines.

Landmines

• Ensure that only the AN/PSS-11/12 metallic mine detector is used. (The AN/PRS-7 metallic/nonmetallic mine detector should not be used, and those still on hand should be turned in immediately.)

• Remind all personnel that—

- Sand can cause malfunctioning.
- Moving sand and windstorms can cause mines to drift.
- Pressure and tension release anti-handling devices must have firm bases/anchors.

• Ensure that static electric charges are checked for and grounded.

• Protect stored mines and fuses from direct heat (shade and ventilate).

• When detonating landmines, make sure the proper survivable distance or cover is used.

Armor vehicle launch bridge (AVLB) Class 60-68

• Ensure all bridges used to support MLC 60-68 are inspected on regular basis. (Catastrophic failure of AVLB is possible if safety restrictions are not enforced.)

Wire obstacles

• Ensure proper equipment is used and proper clothing is worn (barbed-wire gloves, sleeves rolled down) when constructing wire obstacles.

Rail operations

Ground guides

• Ensure training is provided to all drivers in the proper use

of ground guides, and to all personnel in how to act as ground guides.

- Have ground guides escort *all* vehicles *on and off* rail cars.
- Ensure ground guides are used when backing and in congested areas—two ground guides when vision is restricted and at all times for tracked vehicles.
- Remind drivers to keep ground guides in view at all times.
- Instruct ground guides *never* to walk backwards and never to be on the same rail car as a moving vehicle.

Load teams

- Provide gloves and correct tools for the job.
- Provide instruction in proper use of tools. Inspect tools, blocking, lashing, spanners, and towbars for serviceability before use.
- Require all tank turrets and howitzer tubes to be in travel lock.
- Prohibit sleeping on, in, or around rail cars.

Power lines

- Require antennas to be removed or tied down and internal equipment secured.

Drivers

- Assign only qualified drivers.

Port operations

Ground guides/drivers

- See rail operations section.

Off-limit areas

- Ensure unauthorized personnel are not allowed in area.
- Establish and enforce no-smoking areas.

Slippery surfaces

- Remind personnel that slippery surfaces are common throughout the port area and to be continuously alert to avoid slipping.
- Remind personnel to clean up all spills as soon as possible.

General

- Identify nonswimmers and require that they wear personal flotation devices when near water.
- Ensure personnel are informed that port is a hardhat area and briefed to remain alert for movement in all directions.
- Ensure personnel are instructed never to walk or drive under a suspended load.
- Ensure personnel are briefed concerning the dangers of working around open hatches on ships. (Some of the newer ships have no hatch combings.)

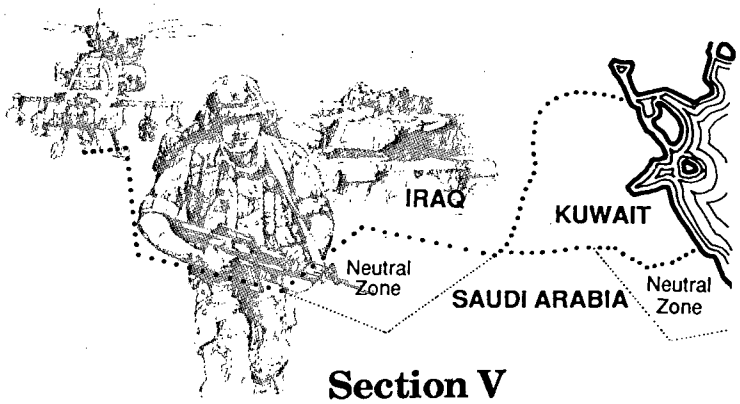
Airlift operations

Ground guides/drivers

- See rail operations section.

General

- Use DD Form 2133 (Joint Airlift Inspection Record) to prepare for movement.
- Check hazardous material for compatibility. Certify any potentially hazardous materials.
- Ensure that fuel and brake systems have no leaks.
- Have personnel check vehicle and fuel containers for proper levels.
- Ensure that cargo and vehicle equipment is secured to prevent movement while in flight.



Section V

Accident Reporting

The "minor" accident in your unit may seem unimportant; however, added to others Armywide, it may help to identify a trend. Trend identification is essential to analyzing accidents in order to develop safety programs to protect soldiers and equipment.

The Army Safety Center needs to know about accidents that happen in your unit; your accident reporting to your chain of command is crucial to our ability to help soldiers operate safely. Report aviation accidents by PRAM message (Preliminary Report of Aircraft Mishap). Report the following information for ground accidents:

- Unit.
- Time/date of accident.
- Location of accident (coordinates/country).
- Name, rank, SSAN, and MOS/job series of person(s) involved.
- On/off duty.
- Component (RA, USAR, ARNG, civilian).
- What was the victim doing?
- What were the injuries?
- What materiel/property damage occurred?
- What was estimated accident classification? (Class A = $1,000,000 or more; Class B = $200,000 to $999,999; Class C = $10,000 to $199,999; Class D = $2,000 to $9,999)
- What happened?

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