

Issue 487

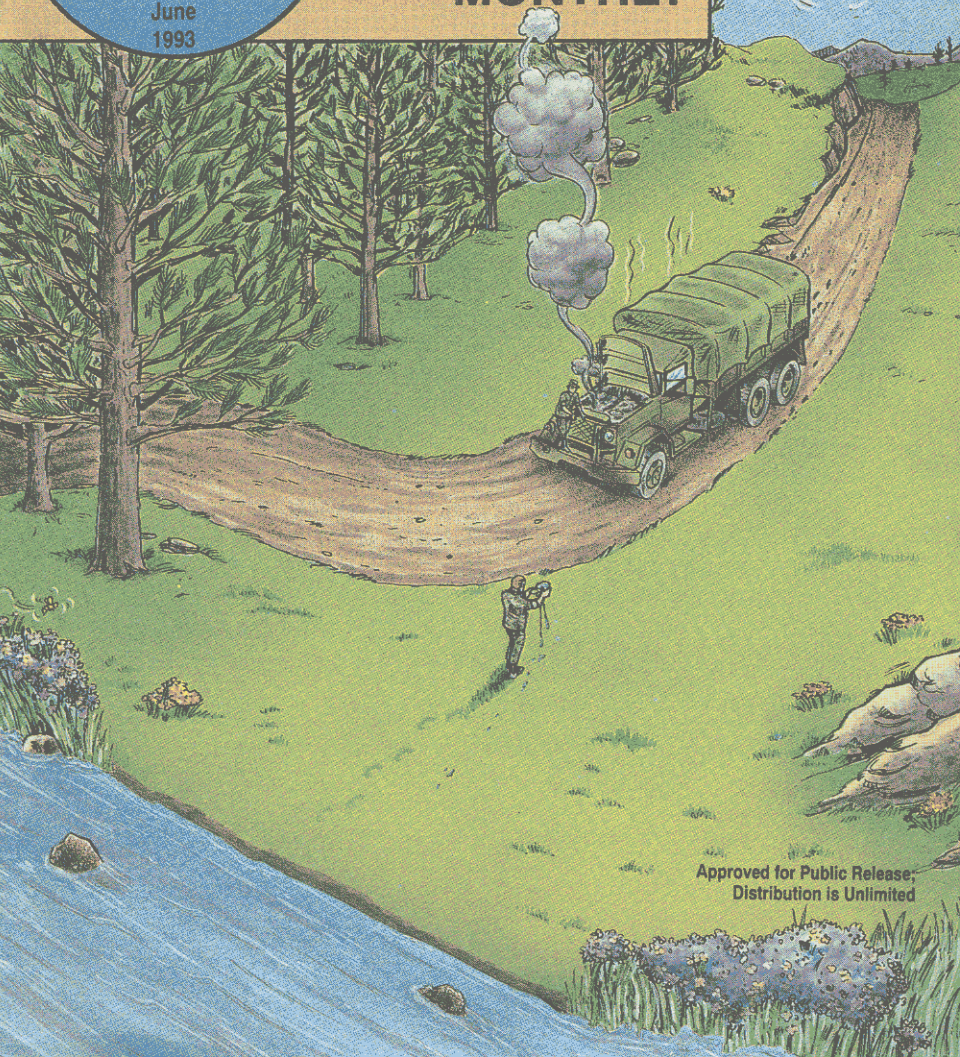
PS

June  
1993

# THE PREVENTIVE MAINTENANCE MONTHLY

TB 43-PS-487

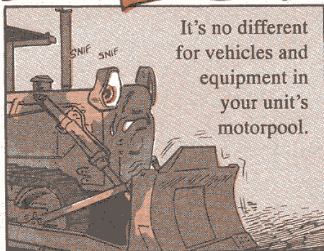
Read this copy  
and pass it on!



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# PT FOR PM!

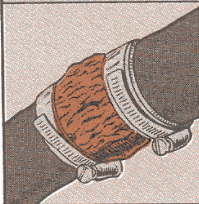
A major part of a soldier's endurance comes from regular physical training. No training, no endurance.



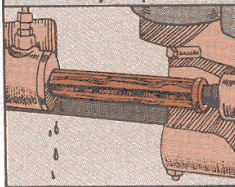
It's no different for vehicles and equipment in your unit's motorpool.

They can't endure without exercise either. Equipment can wear out just sitting in one spot too long. For instance:

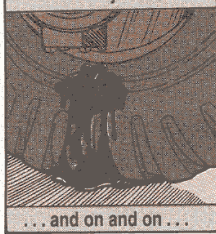
Hoses get soft and mushy or dry rot ...



... polished surfaces corrode, then cut seals next time you operate ...

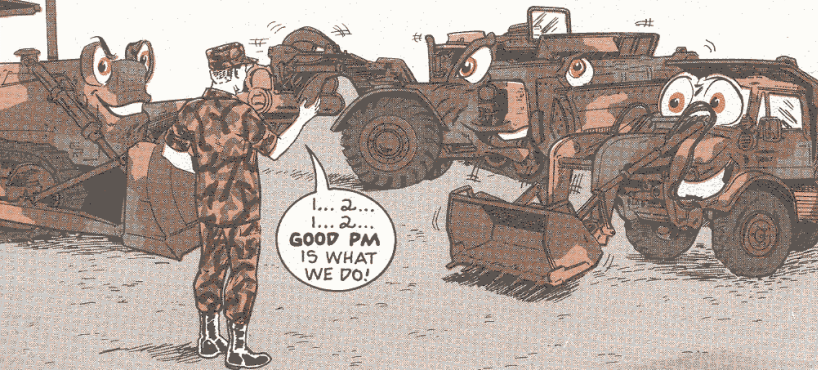


... seals dry out ...



... and on and on ...

But you NCOs can help keep your unit's equipment fit as a fiddle and ready to go. Just include PT as part of your PM program.



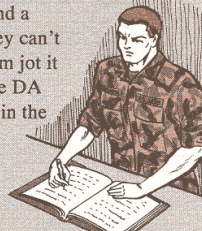
Set up a schedule to have your operators and drivers run their equipment for 20 minutes or so at least once a month.

THAT ACE IS DUE FOR A WORKOUT.



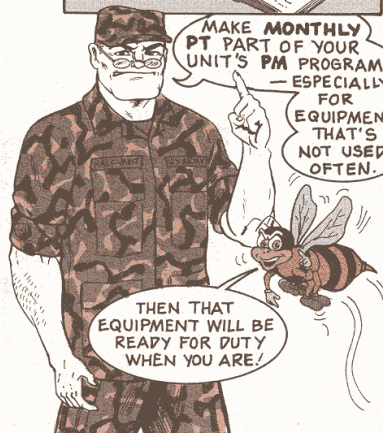
Have 'em look for leaks, listen for unusual noises, look for shiny spots or rust around nuts and bolt heads ... anything that doesn't look, feel, smell or sound right.

If they find a problem they can't fix, have 'em jot it down on the DA Form 2404 in the equipment folder.



MAKE MONTHLY PT PART OF YOUR UNIT'S PM PROGRAM — ESPECIALLY FOR EQUIPMENT THAT'S NOT USED OFTEN.

THEN THAT EQUIPMENT WILL BE READY FOR DUTY WHEN YOU ARE!



**PS** THE PREVENTIVE MAINTENANCE MONTHLY

TB 43-PS-467, The Preventive Maintenance Monthly, is an official publication of the Department of the Army, providing information for all soldiers assigned to combat and combat support units and all soldiers with unit maintenance and supply duties. All information published has been reviewed and approved by the agency responsible for the equipment, publication or policy discussed. Application of the information is optional with the user.

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You are invited to send PS your ideas for improving maintenance procedures, questions on maintenance and supply problems, questions or comments on material published in PS. Just write to:

MSG Half-Mast  
The Preventive Maintenance Monthly  
Lexington, KY 40511-5101

By Order of the Secretary of the Army:

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General, United States Army Chief of Staff

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**MILTON H. HAMILTON**  
Administrative Assistant to the Secretary of the Army  
04100

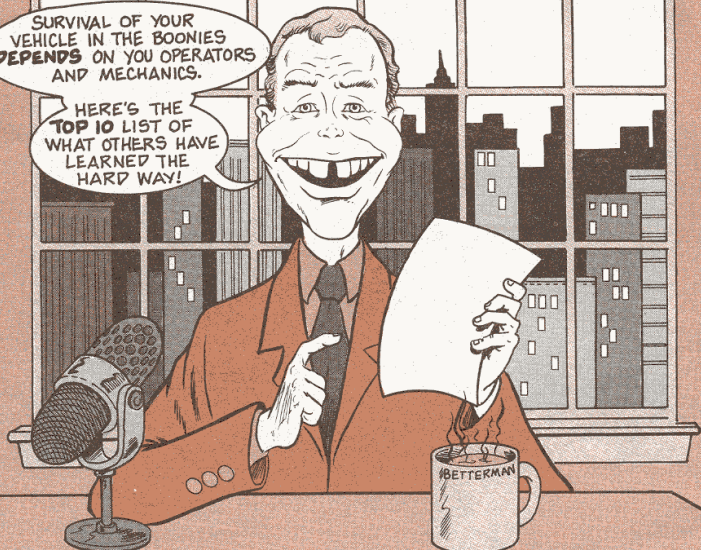
PS, The Preventive Maintenance Monthly (ISSN 0475-2953) is published monthly by the Department of the Army, Lexington, KY 40511-5101. Second Class Postage is paid at the Lexington, KY post office and at additional mailing offices. Postmaster: Send address changes to PS, The Preventive Maintenance Monthly, Lexington, KY 40511-5101.

# TOP TEN

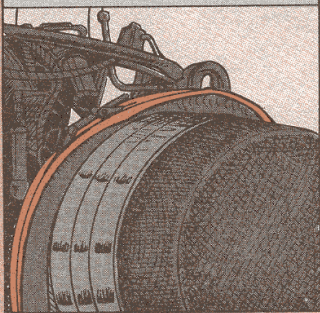
# LESSONS LEARNED

SURVIVAL OF YOUR VEHICLE IN THE BOONIES DEPENDS ON YOU OPERATORS AND MECHANICS.

HERE'S THE TOP 10 LIST OF WHAT OTHERS HAVE LEARNED THE HARD WAY!



10 M1 tank V-pack seals and plenum seals must be right and tight before starting the engine.

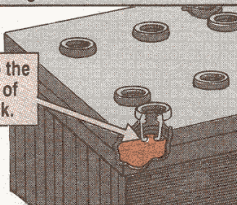


9 All air cleaner elements—need to be cleaned daily . . . sometimes more.



8 Check battery electrolyte level daily during hot months.

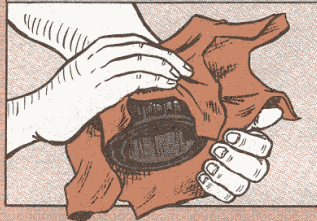
Fill it to the bottom of the neck.



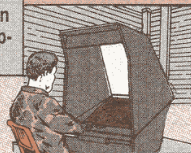
7 Adjust the voltage output to 26 volts during summer months.

6 Before changing types of fuels in your vehicle, purge the fuel tank.

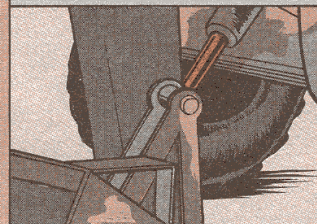
5 To keep the fine dust off parts while you're making repairs, wrap greased parts with waxed paper or newspaper.



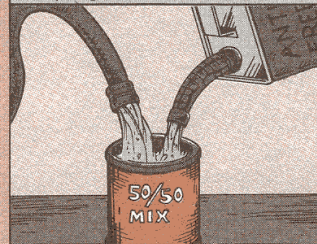
4 Keep MPL on all equipment up-to-snuff.



3 Be careful when touching up with CARC. Paint on hydraulic cylinder rods ruins seals.



2 Use an antifreeze/water solution of 60/40 or 50/50. This mix helps keep engines cool.



1 Keep all your TMs with you in the field. You'll need 'em.



Dusty conditions may forgive you for a few things. Lack of maintenance is not one of them.

# Beating the Heat

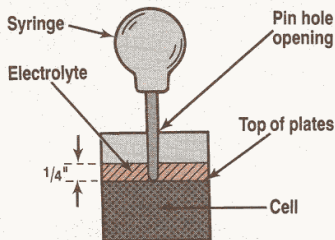


There's only one way Vulcan batteries can beat summer heat. And that's with your help.

High temperatures suck out a battery's electrolyte and drain its power. Gas pressure — evaporation — makes it more likely batteries will explode if they're not vented. And then there are the usual problems like corrosion to fight.

Give batteries a fighting chance. Make these points part of your PM battle plan:

Check the electrolyte levels in the system batteries daily — not weekly — when it's very hot. Remember the system batteries must be fully charged — 27-28 volts — to get a valid electrolyte reading.



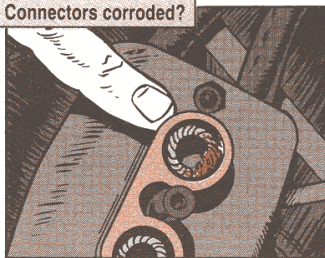
Add distilled water, NSN 6810-00-682-6867, if necessary with a syringe until 1/4 inch of water covers the cell plates.

Unscrew the connectors and eyeball the sockets. Clean out any corrosion with soap and water and a nylon brush.

# with Battery PM

Clean off any corrosion on the terminals, hold-down clamps, and battery box the same way.

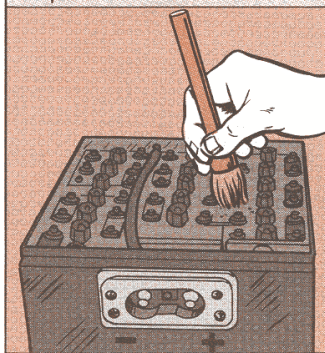
Connectors corroded?



Never use a wire brush. It can cause short circuiting.

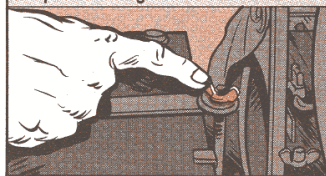
Pull the battery case cover and check for potassium carbonate powder — the white stuff — on the outside of cells and on the case. If you spot any, tighten the vent caps to keep powder out of the cells.

Use a nylon brush to brush away the powder.

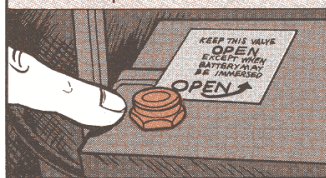


If that doesn't get rid of all potassium carbonate, follow the thorough cleaning procedures on Page 4-5 in TM 11-6140-203-14-4&P.

Make sure all battery tiedowns are in place and tight.

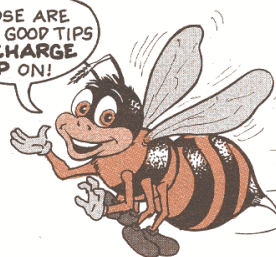


Check that all the battery case vents are open.

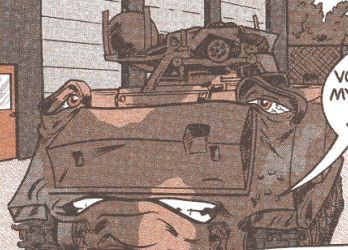


Encourage Vulcan crews to do the same before they go to the field. If a battery explodes in the heat, the tiedowns help contain the explosion. If the vents are clogged, the battery will explode.

THOSE ARE SOME GOOD TIPS TO CHARGE UP ON!



## Regulating

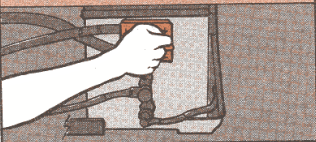


TOO MUCH VOLTAGE SHORTENS MY BATTERY'S LIFE. NOT ENOUGH VOLTAGE MAKES IT WEAK.

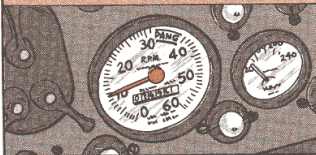
THAT'S WHY VULCAN REPAIRMEN NEED TO CAREFULLY FOLLOW THIS PROCEDURE FOR ADJUSTING THE MIG3'S VEHICLE VOLTAGE REGULATOR.

With the cannon pointing to the right rear corner, turn the gun and system power switches off.

Disconnect the three system batteries at their connectors.



Start the vehicle engine and set the idle between 900 and 1,100 RPMs.

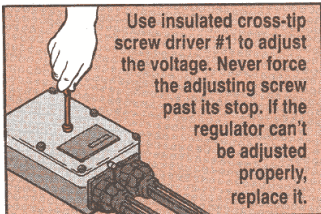


Make sure the IR and master switches are off.

Turn the headlights on and all other systems off. The regulator must be adjusted with all systems off, except the lights or the Ni-cads will overheat.

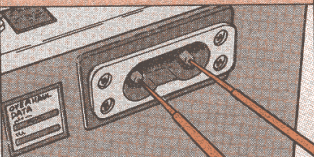
Let the engine run for 20 minutes.

Adjust the regulator according to the average temperature between 0900 and 1100 hours. If it's below 80° F, set the regulator to  $28.7 \pm .2\text{VDC}$ ; above 80° F, set it at  $27.5 \pm .2\text{VDC}$ .



Use insulated cross-tip screw driver #1 to adjust the voltage. Never force the adjusting screw past its stop. If the regulator can't be adjusted properly, replace it.

Measure the voltage at the system's Ni-cad connectors.



Once you have the correct voltage, turn off the vehicle engine. That prevents arcing when you reconnect the Ni-cads.

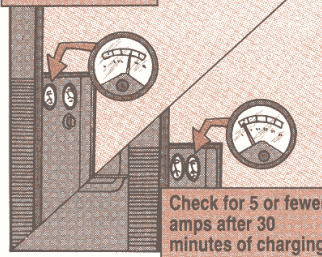
## Regulator Right

After the three Ni-cads are reconnected, turn the master switch on and run the vehicle engine between 900 and 1,100 RPMs.

Monitor the voltage at the distribution box voltmeter. It will probably be less than what you set the voltage regulator for. This is normal and is caused by the different levels of charge in the three mount batteries.

Never let the voltage exceed 29 VDC during charging. Higher voltages damage the batteries.

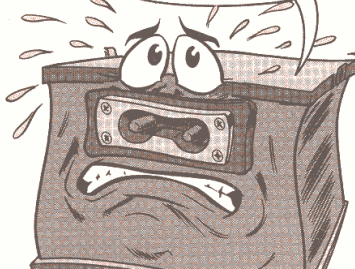
Check the voltage with a voltmeter.



Check for 5 or fewer amps after 30 minutes of charging.

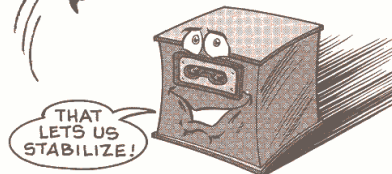
The sides of the Ni-cads should remain cool during charging (unless the battery heaters are running).

IF I BECOME WARM DURING THE FIRST 20 MINUTES, TURN ME IN.



The ampmeter should read five amps or less after 30 minutes of charging.

IF YOU'RE GOING TO INSPECT THE BATTERIES, WAIT TWO HOURS WITH NO LOAD ON THE BATTERIES BEFORE YOU REMOVE THEIR COVERS.

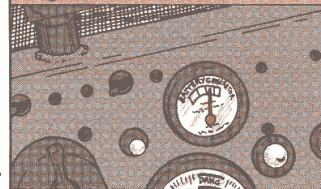


THAT LETS US STABILIZE!

After the Ni-cads are fully charged, the system lead acid batteries may be charged.

Turn the system master power switch to ON.

Run the engine until the battery generator indicator has stayed in the green zone for two hours.



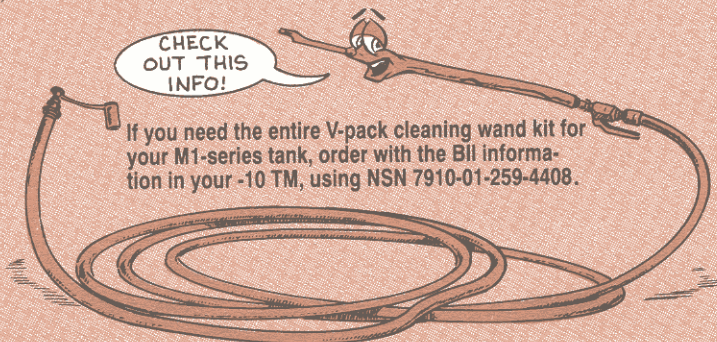
If there is a dramatic change in temperature from above or below 80° F, readjust the voltage regulator to keep batteries at their peak.

# V-PACK CLEANING WAND KIT



If you need repair parts for the wand, use the info in Fig 322 of TM 9-2350-255-24P-1 or Fig 324 of TM 9-2350-264-24P-1. You will not get all the items in the kit by ordering Item 2, distribution nozzle, NSN 4730-01-246-1231.

What you will do is spend a lot of Class IX money unnecessarily. If you need the kit, order with the BII NSN.



If you need the entire V-pack cleaning wand kit for your M1-series tank, order with the BII information in your -10 TM, using NSN 7910-01-259-4408.

## No Replacement for MBD Case

You'll be out some big bucks if you use the M26A1/M27A1 muzzle bore-sight device (MBD) case as a step ladder while boresighting your M1-series tank. A cracked case lets moisture in, ruining the MBD. The only way to get another case is by ordering a new MBD at more than \$1,000.

# Drain Sandy Hydraulics

**I**F YOU SPENT ANY TIME AT ALL IN THE DESERT, YOU KNOW THAT SAND GOT INTO **EVERYTHING!** IT GOT INTO YOUR **HAIR...** YOUR **CLOTHES...** EVEN YOUR **FOOD!**



**YIKES!**

MY  
HYDRAULICS  
ARE IN **BIG**  
**TROUBLE**  
NOW!

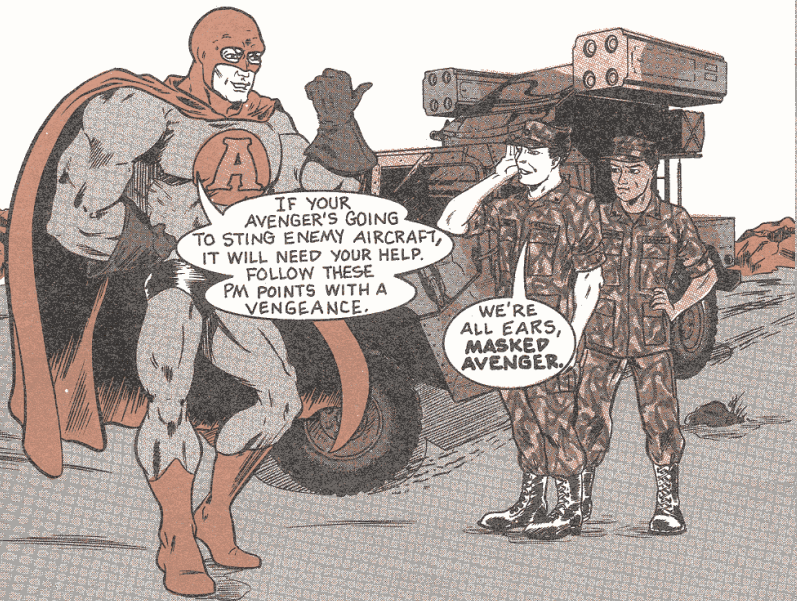


**I**f your M109 saw action there, chances are your hydraulics are full of sand. And that means you're probably facing an elevation cylinder failure.

As a precaution, you mechanics should drain the hydraulic fluid and change the filter.

Before you start, though, make sure to elevate and depress the cannon tube several times, traverse the cab 360 degrees, and activate the rammer. That gets any settled sand flowing so that it can be drained along with the hydraulic fluid.

# Keep Avenger Avenging



IF YOUR AVENGER'S GOING TO STING ENEMY AIRCRAFT, IT WILL NEED YOUR HELP. FOLLOW THESE PM POINTS WITH A VENGEANCE.

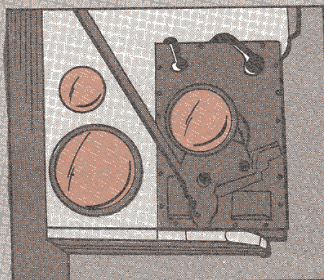
WE'RE ALL EARS, MASKED AVENGER.

## PM in the Heat

Certain components require more attention in the heat and dust of summer.

Look at the batteries' electrolyte level daily, not weekly like TM 9-1425-433-10 says. Add distilled water if necessary to bring the level up to the split rings.

Daily check the heater/ventilator intake filters for clogging and the optical sight, FLIR receiver lens, laser range finder, and IR window for dirt and grease. Clean if necessary.

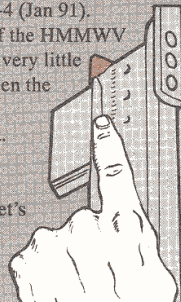


Lenses require more PM in summer heat.

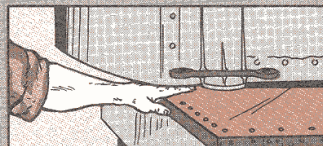
## Protection

One soldier already has lost a finger to the sharp edges of the Avenger's ladder. His ring caught on the ladder as he jumped down. Eliminate that danger by using a file to round off sharp corners. Info on taking care of sharp corners is in TB 43-0001-56-4 (Jan 91).

Keep tools off the HMMWV fender. There is very little clearance between the fender and the Avenger's turret. A wrench left on the fender tears up the turret's bottom and the HMMWV's fender when the turret's traversed.



File sharp edges to prevent accidents.



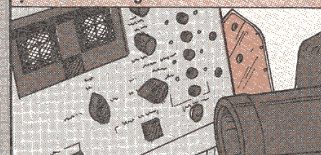
Little clearance means damage if tools are left on the fender.

Make very sure everyone's clear before you traverse. The Avenger moves 60° per second and can easily cream someone in the way.

Stow the optical sight's combining glass when you're not firing. The best place is between the turret wall and the gunner's console. The glass is easily

broken when you're climbing in and out of the turret.

Store combining glass here when you're not firing.

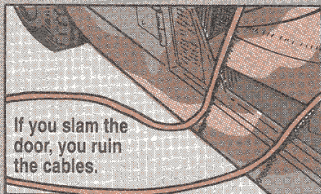


Climbing in the turret, place your left foot on the fold-down step on the left side of the turret and then your right foot on the right side of the seat frame. If you jump directly on the seat, your foot goes through the aluminum frame.

Put your right foot on the right side of the frame.



Be careful that you or the driver don't slam the passenger door when you're operating the remote control. That damages the control's cable and knocks it out.

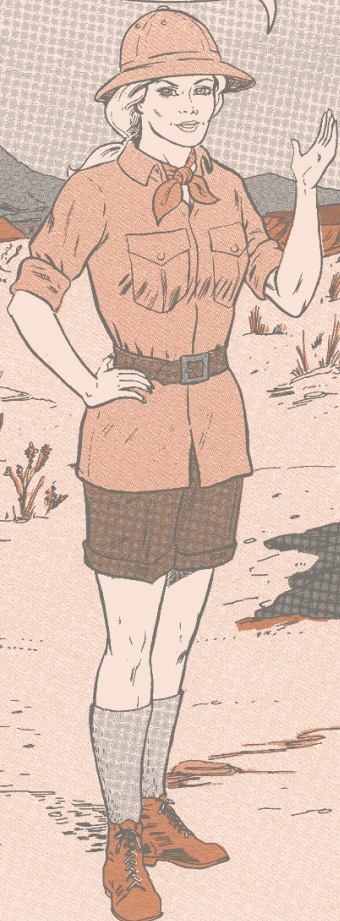


If you slam the door, you ruin the cables.



## Temperature Makes a Difference

IF YOU'RE OPERATING THE M901 IN HIGH HEAT, KEEP TRACK OF TEMPERATURE CHANGES OF **MORE THAN 50 DEGREES.**



Big temperature changes — over 50° F — make the pump for the hydraulic accumulator work hard and wear out fast. Adjust the accumulator's pressure according to the chart. Use the chart, too, to adjust the pressure as the seasons change. This chart is an update to the one in TM 9-2350-259-20:

TEMP (F)	PRESSURE (PSIG)
Below 0	825
0-40	900
40-80	1,000
80-120	1,050
above 120	1,125

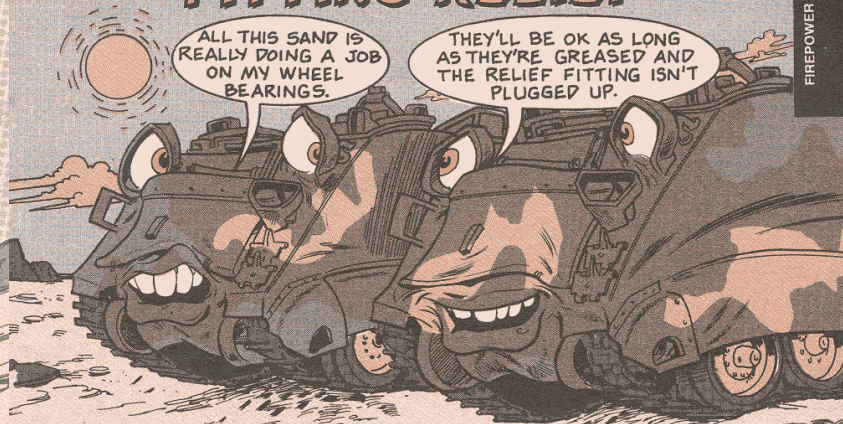
The Image Transfer Assembly also needs temperature attention as the seasons change or you will be spending extra time purging it and changing its desiccant.

Use this — also an update to the TM — for the ITA:

TEMP (F)	PRESSURE (PSIG)
Above 110	4
85-110	3
55-85	2
30-55	1
5-30	.5
Below 5	0

Before you charge either the hydraulic accumulator or ITA, purge the charging lines by blowing pressurized nitrogen through them. That removes any contamination in the lines.

## FITTING RELIEF



Out at the National Training Center, sand, heat, and rough country make it important to keep APC wheel bearings greased. That can mean lubing as often as weekly. But sand causes more problems when you're pumping grease.

Sand can plug the relief fittings. If a relief fitting's plugged, it's real easy to pump in too much grease if you're using a pneumatic grease gun instead of the manual grease gun that's part of your BII. Too much grease blows the hub seal.

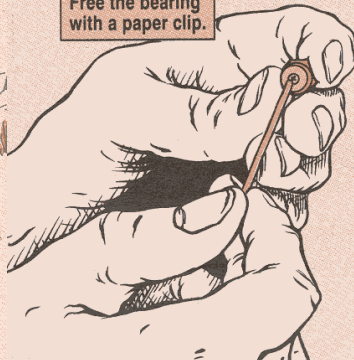
That's why you should only pump grease by hand.

If pumping gets hard after 6 to 8 shots of lube, you know something's wrong. It's probably a plugged relief fitting.

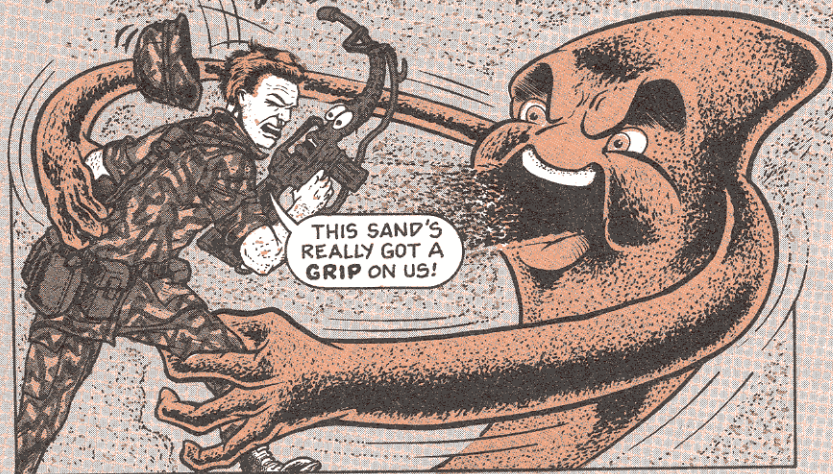
### HERE'S HOW TO CURE IT:

1. Take off the relief fitting with a 7/16-in socket wrench.
2. Work the fitting's valve bearing with a paper clip until the bearing moves freely.
3. Screw the fitting back on.
4. Pump again.
5. Grease should come out of the fitting. If it doesn't, your mechanic needs to take a look.

Free the bearing with a paper clip.



# Sandbag Desert Problems



The number one problem for rifles, machine guns, and pistols in the desert can be summed up in one word: sand.

It's everywhere. Wind blows sand into the smallest openings in your weapons, like the muzzle and ejection port. Sand mixes with lube and creates a grinding compound that acts like scouring powder, grinding up moving parts.

You're not going to shut out sand completely. Its forces are too superior. But your weapon can do its job in the desert if you focus on these PM rules:

- Clean your weapon as often as possible. That means at least daily. Even wiping it off with a clean, dry cloth every chance you get will help. Clean in enclosed areas when possible where you can get away from blowing sand.

- Give special attention to internal parts that move, like the bolt carrier. Wipe and brush them as clean as possible. Use your own lung power to blow out sand from areas like the trigger assembly that you're not authorized to disassemble.

- Take it easy with lubes like CLP. They will attract sand. Limit lubing to internal parts. Wipe the outside of your weapon dry.

- Magazines jam with sand. Then your weapon's shooting on empty. Unload and wipe off ammo daily. Run a rag through the magazine. Do not put any lube in magazines or on ammo.

- Use rifle covers, muzzle caps, and spare magazine bags as much as possible. Cover mounted machine guns. On rifles, keep the ejection port cover closed and a magazine installed.

# Less Is Better



MORE IS **NOT** BETTER WHEN IT COMES TO LUBING YOUR RIFLE OR MACHINE GUN.

WHOA!

**T**oo much lube lets carbon build up faster. Soon moving parts — like the bolt — have trouble moving back and forth. Eventually your weapon sputters to a stop.

In sandy areas, over-lubing is an even bigger danger. Sand mixes with the lube to form a scouring powder that grinds up moving parts.

So how much lube should you use? Your -10 TM is the best guide. It shows specifically what parts don't need much lube and what parts need a bit more.

But remember the difference between light and generous lube . . . it's important.

A light lubing is barely visible; a generous lubing is heavy enough that you can spread it with your finger. If you spray lube on like it's room freshener, you've crossed the line between generous and too much.

In sandy areas, lightly lube only internal moving parts. Don't worry about the outside of the weapon.

If you think you've put too much lube on, don't be afraid to wipe it off and start again. Your weapon will thank you.

YOU CAN SAY THAT AGAIN!

WHOA!

# PM Is Vital

The summer heat and sand can turn your powerful M203 launcher into a powerless piece of junk. Heat dries up lube and sand jams moving parts. Your M203 grinds to a halt. PM is its only friend in the desert.

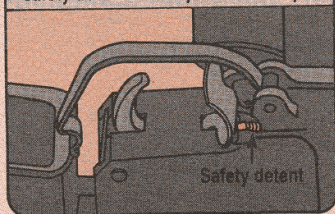
## Help your M203 like this:

✓ Clean your M203 as often as possible. That means at least daily. Wipe it off every chance you get with a clean, dry cloth. Clean in enclosed areas where you can get away from dirt and dust.

Pay particular attention to the breech insert, firing pin hole, and locator slot. They'll need the most help. Clean them with a rag and CLP, or RBC and LSA or LAW and wipe away excess lube.

✓ Lube often ... after every cleaning ... but lightly. Lubricants attract dust and sand, so limit lubing to internal parts. Wipe the M203's outsides dry.

✓ Be sure to lube the locator slot, barrel tracks, firing pin hole, and safety detent ... but just a few drops.

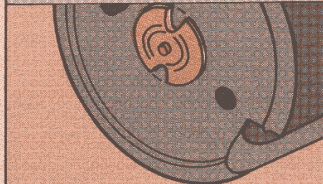


Too much lube gunks up the insides. If it gets hard to make your M203 function, it probably needs cleaning and lubing.

# in the Desert

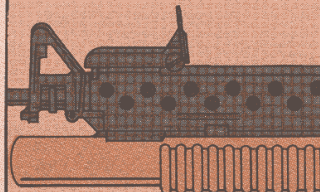
During your daily PMCS, look for these common problems:

✓ Breech insert loose or sticking up above the breech face? Using fingers only, try to turn breech insert to check for looseness.

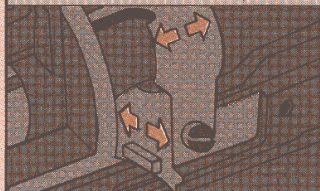


✓ Firing pin sticks out of breech insert?

✓ Barrel cracked, dented, out-of-round or difficult to move?



✓ Barrel assembly bracket moves at all along the barrel? Bracket moves side-to-side more than 1/8 inch each side of center for a total of 1/4 inch?



✓ Barrel extension loose?

✓ Leaf sight or quadrant sight mounting screw loose?

✓ Make sure bore is clear of obstructions prior to firing.

Report any problems to your armorer.

PROTECT YOUR M203 FROM SAND. COVER IT WHEN NOT IN USE. KEEP THE BARREL CLOSED.

WHAT'S WRONG?

MY LAUNCHER'S JAMMED!

MAYBE YOU NEED SOME COOL PM!

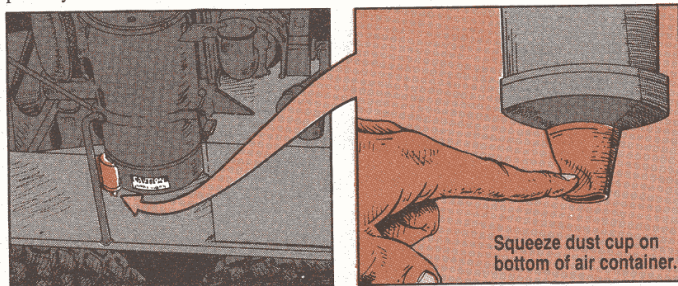
# GIVE AIR FILTERS



Clean air filters are important for all vehicles, but they're crucial on a HEMTT. The engine will not start if the filter is clogged. A dirty filter steals power and forces the Army's big beast of burden to struggle with any load.

Drivers, it's a good idea to squeeze the dirt out of the dust cup on the bottom of the air canister every day before you leave on a run. This is especially true if you're in a dusty or sandy area. This gets rid of dirt from the canister, but not from the primary or secondary air filters.

Give the filters a good brush-off if you're on the road and the engine chokes down, or you notice a loss of power and black smoke. Just pull over and shut off the engine. Pop the canister's lid and pull out the air filters. The secondary filter is inside the primary.



# THE BRUSH-OFF

Tap each filter real good with the heel of your hand to loosen the dirt. Then shake it good and tap some more. This will knock enough junk out of the filters to get you home where your mechanic can clean or replace the filters.

Never bang 'em on a rock or hard surface. You might dent them so they won't fit again.

Keep an eye on the air cleaner indicator on the dash. If the indicator moves from green to yellow or red, stop and clean out the filters.

You might want to bone up on how the canister and air filters fit together before you hit the road. Get your favorite mechanic to let you look at his TM 9-2320-279-20-1.

ALL THE INFO YOU NEED IS ON PAGES 4-3 THRU 4-7.

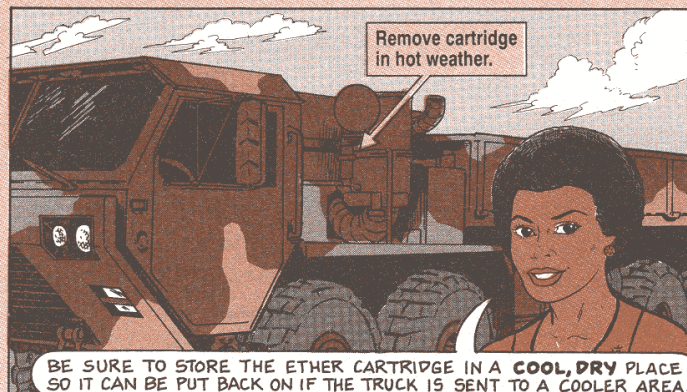


## Hot + Humid = No Ether

Hot, humid, tropical areas are murder on a HEMTT's ether start cartridge. Moisture causes it to rust and leak.

Since the cartridge is there to help the truck start in cold temps, it's not needed in places where it's summer all year.

If you're in one of the sunny areas, unscrew the cartridge from the solenoid valve and plug the hole with the cap that is chained to the solenoid.



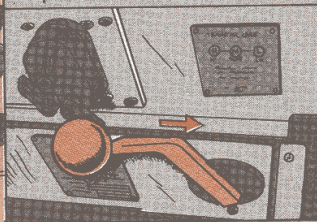
# Driving Tips

IF YOUR TIRES ARE PROPERLY INFLATED, YOU'LL HAVE BETTER TRACTION IN LOOSE SOIL, SAND OR MUD.

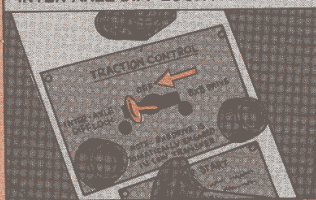
CHECK THE TIRE PRESSURE BEFORE LEAVING A ROAD AND OPERATING IN ADVERSE CONDITIONS. THESE PRESSURES ARE REQUIRED.

Tire Pressures —	(Sandy)	(Muddy)
Front (all models)	35 psi	20 psi
Rear		
M977, M978, M983	40 psi	30 psi
M984E1	100 psi	100 psi
M984E1 (when towing another vehicle)	100 psi	100 psi
M985	50 psi	40 psi
Spare Tire (all models)	100 psi	100 psi

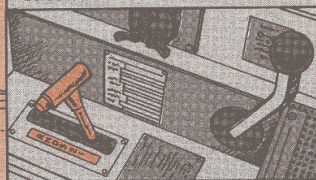
When you're starting from a dead stop... shift transfer lever to LO...



... set the traction control lever to INTER-AXLE DIFF LOCK...



... set the transmission range selector to 2 or 1.



X Start slowly on sand so you don't spin the wheels. Spinning the wheels will dig holes you'll have problems getting out of.

- X Keep the throttle steady after you reach the desired speed.
- X Turn slowly and wide when on loose sand.
- X Steer straight up and down hills when possible.

## Getting Unstuck

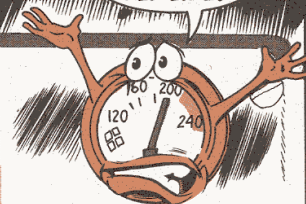
You may get stuck no matter how careful you are. Here are some tips on getting out:

- X Make sure the transfer is in LO and the traction control is in INTER-AXLE DIFF LOCK.
- X Shift into reverse.
- X Press the throttle LIGHTLY and move straight back about 20 feet, then stop.
- X Shift to 1 and move forward, turning gradually, and continue your mission.

If you can't back yourself out of trouble, STOP! Spinning your wheels will just dig them in deeper and make it harder to get the truck out. Give your recovery folks a shout to have them get you out.

## Heater Cools Hot Engines

HELP! I'M HEADING FOR THE RED LINE!



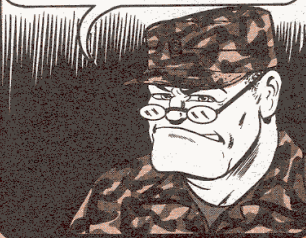
So you sit sizzling in the sun, snarled in traffic and the engine temperature gauge starts heading for the red.

What do you do? You turn on the vehicle's hot water heater. The heater will pull heat away from the engine and help keep it cool.

If the temperature hand keeps heading for the red, idle-down a diesel engine.

Diesels run cooler when idling.

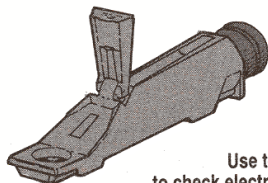
**NOTIFY YOUR MECHANIC IF OVERHEATING CONTINUES.**



# ADAPTING TO THE HEAT

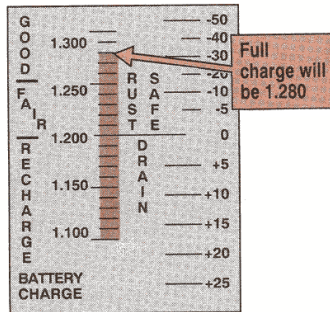
Summer heat is hard on batteries. Charging causes some of the water in the electrolyte to evaporate. Overcharging drives off much more water. Throw in high temperatures, and batteries can go dry quick.

Your mechanic can check the electrolyte using the optical battery/antifreeze tester, NSN 6630-00-105-1418.

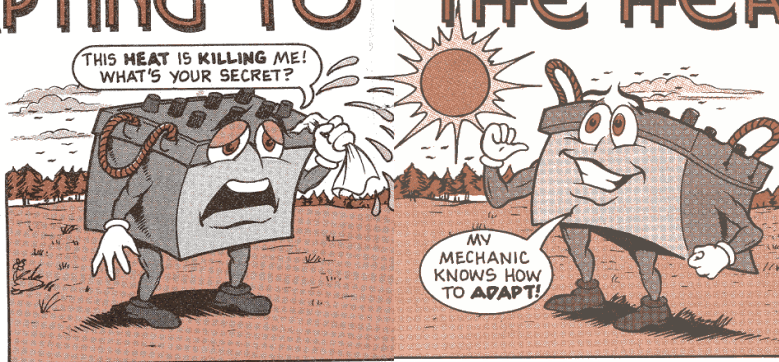


Use tester to check electrolyte

He should get a specific gravity reading of 1.280 for a fully-charged battery.

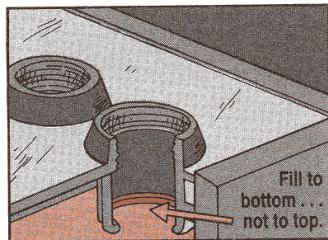


Forget what Para 2-5a of TM 9-6140-200-14 (Jul 89) says about using tropical electrolyte in lead-acid batteries in high temperature areas.



## DAILY CHECKS

Vehicle operators need to check the electrolyte level every day. It should be at least 1/2 inch above the top of the plates. If the filler hole has a lip or an indicator at the bottom, fill to that.



Electrolyte level low

Electrolyte level OK



This bird's eye view shows eye-shape

More is not better! If batteries are filled to the rim, the electrolyte will boil out through the vent caps when the battery charges.

High temperatures cause the electrolyte to expand. If the batteries were full when checked at a lower temperature, the level will be too high. Use the battery filler syringe, NSN 6140-00-808-7325, to remove the excess.

If you find a battery that needs water, let your mechanic know ASAP!

The best water is distilled water. NSN 6810-00-682-6867 gets a gallon, NSN 6810-00-356-4936 a 5-gallon jug.

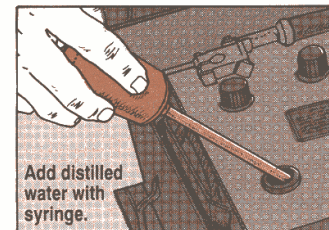
Another good choice is battery water. It has no more than 100 parts per million of impurities, and costs a little less than distilled water. Here is what's available:

Size (Gal)	NSN 6810-00-
1	286-3783
5	297-9540

Ground water contains minerals that can kill batteries. Don't use it. But if

there is no other choice, good drinking water—but NOT mineral water—can be used.

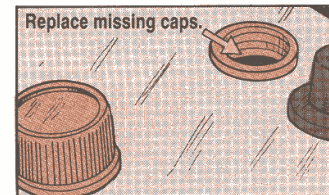
Use a battery filler syringe or a battery gravity filler, NSN 6140-00-635-3824. Both are in the No. 1 Common shop set. These fillers allow precise filling and help avoid overfilling.



Add distilled water with syringe.

## CAP OUT SAND

Be sure to keep the caps on the fill holes on your battery. That'll keep sand out of your battery. If you need a replacement cap, check with the battery shop for one from an unserviceable battery.



Replace missing caps.

## BATTERY MATCHING

It's OK to mix 6TN and 6TL batteries in a vehicle. Just don't mix those batteries with maintenance-free batteries.

# Dust and Dirt Mean More Lube

BUT ALL THE TRUCKS WERE JUST LUBED YESTERDAY.

IN HOT DUSTY AREAS LIKE THIS, WE NEED TO LUBE 'EM EVERY DAY TO SAVE THE BEARINGS.

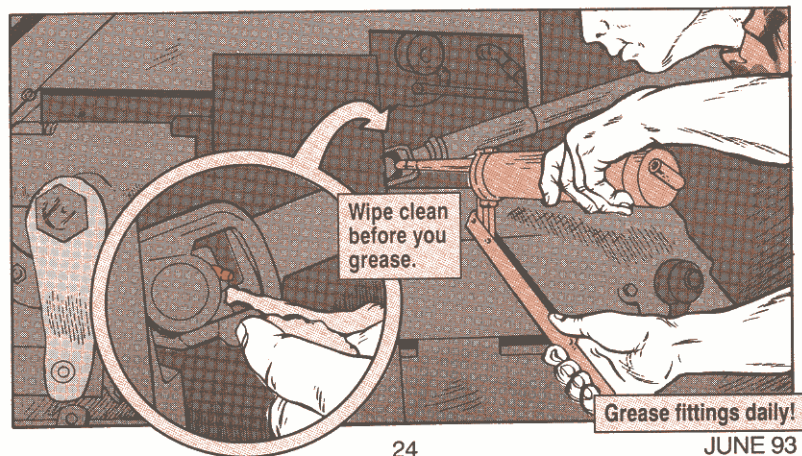


**G**rease, grease and more grease is what you need to keep your vehicle going in dry, sandy areas.

Sand and grit are everywhere in these areas: in the air, on the ground and between all the moving parts on your vehicle. Sand and grit mix with the grease and grind up bearings unless you keep 'em full of clean grease.

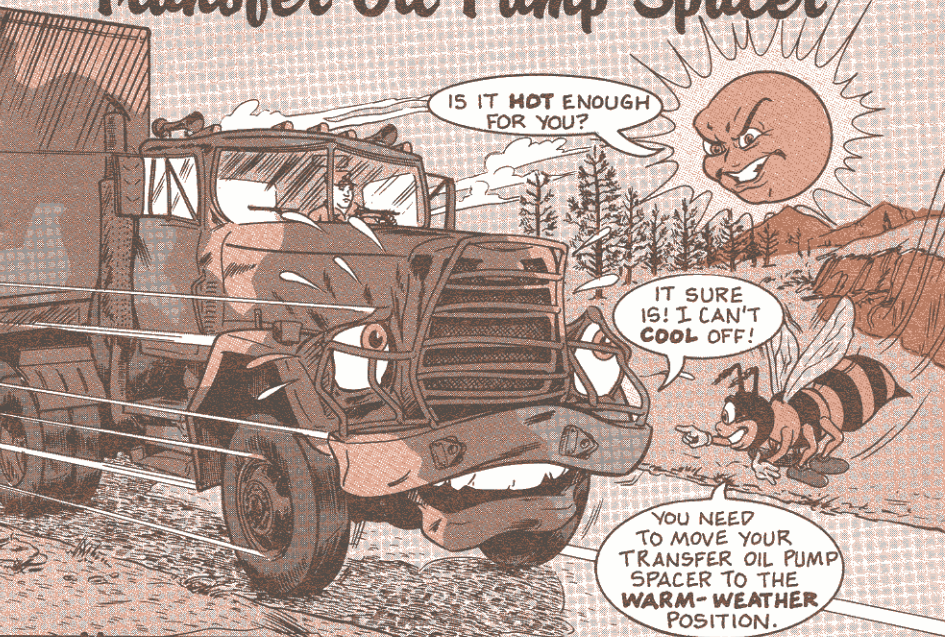
To save bearings, grease all fittings daily. Wipe the fitting clean before you pump in grease. That way grit won't get pumped into the fitting . . . and into the bearing.

Pump until you see new grease oozing out the seal. This gets rid of the old grease and any grit that's inside. Wipe the excess grease off with a rag. This keeps the grease from catching more sand and grit that can get between moving parts.





# Transfer Oil Pump Spacer

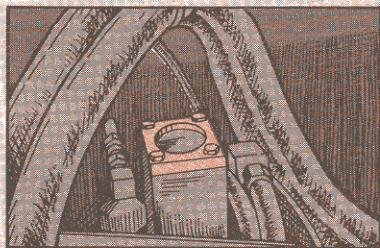


**K**ep your M916-M920 tractor truck running cool when the days grow hot: move the transfer oil pump spacer to the warm-weather position.

You've got to move the spacer and put the pump back to work—just like it shows in Para 7-9 of TM 9-2320-273-20. Otherwise, the oil can't lubricate the transfer. Next thing you know you've got burned out transfer gears.

Warm-weather seasonal service is the best time to change the spacer to the warm-weather position. Just move the spacer from between the pump and the transfer case to its stowed position behind the pump. This engages the pump and lets the oil cool the gears.

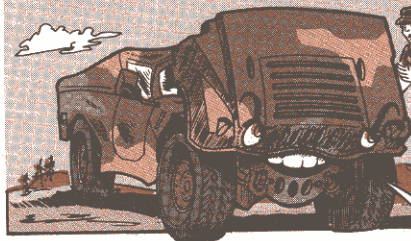
When you pull your cold-weather seasonal service, change the spacer back to the cold-weather position. Move the spacer from its stowed position and put it between the pump and the transfer case.



Stow spacer on rear of pump for warm weather.

HMMWV...

# OIL COOLER FINS PROTECTOR

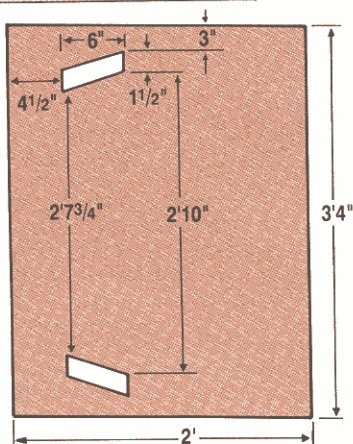


**OUCH!**  
YOU BENT MY OIL  
COOLER FINS! NOW  
I'M SURE TO  
OVERHEAT!

The fins on your HMMWV's oil cooler have to be straight and formed just right to work well. Bent fins stop air flow through the oil cooler and radiator and can cause both the engine and transmission to overheat.

Fins get bent because mechanics crawl onto the oil cooler when they pull PM on the engine or when they adjust belt tension. You can stop all that fin bending by making a cover to protect the oil cooler fins while mechanics work on the engine.

You need a piece of  $\frac{3}{4}$ -in plywood cut like so:



Round off the edges and paint the board to prevent splinters.

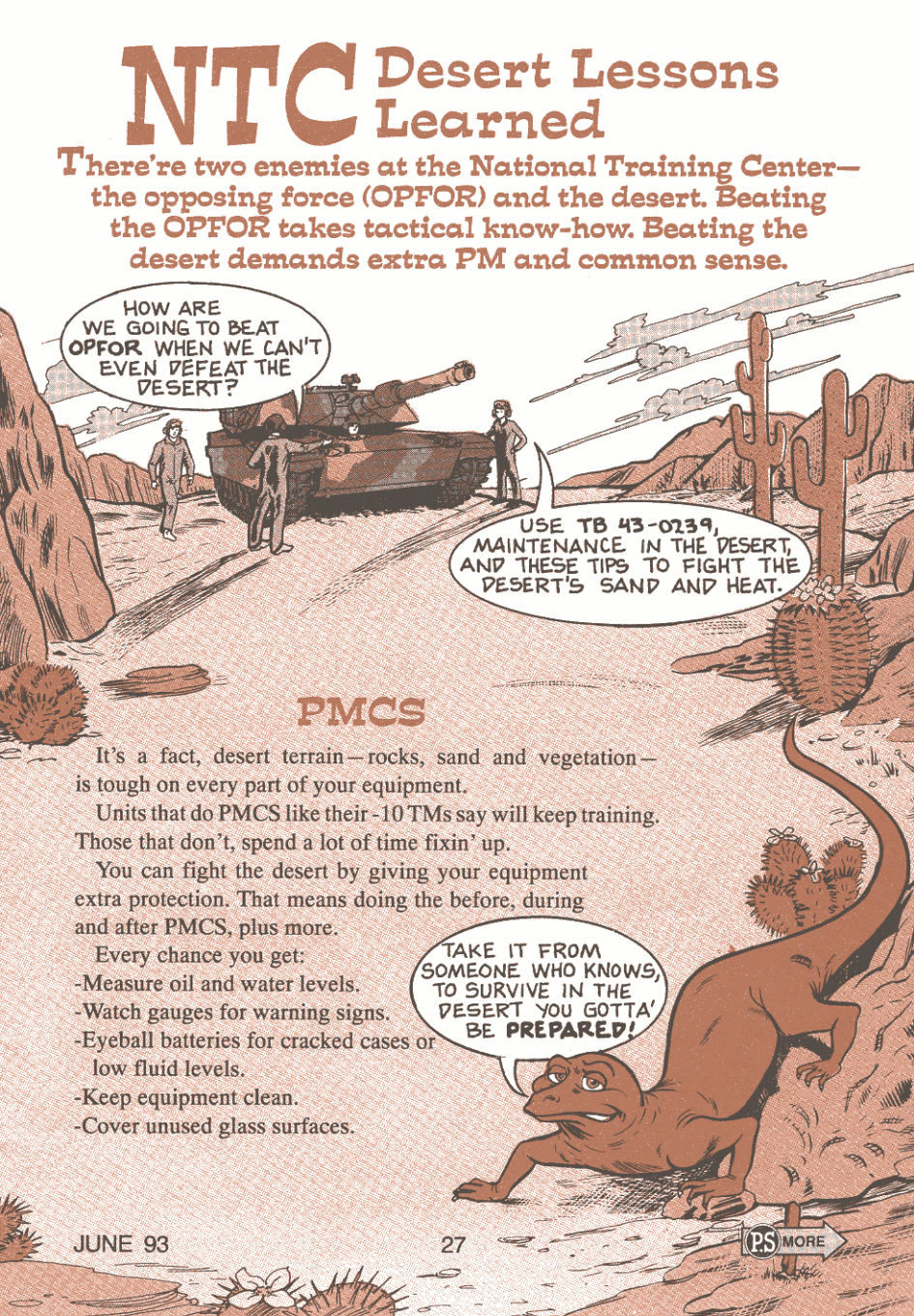


To use it, remove eye-hook seals and slip it over the two lifting rings and lay it flat on the oil cooler frame. The rings will prevent it from sliding into the raised hood.

The board stops air flow so never use it while the engine is running. It'll cause the engine to overheat. After use, replace eye-hook seals and check for bent cooler fins.

# NTC Desert Lessons Learned

There're two enemies at the National Training Center—the opposing force (OPFOR) and the desert. Beating the OPFOR takes tactical know-how. Beating the desert demands extra PM and common sense.



HOW ARE WE GOING TO BEAT OPFOR WHEN WE CAN'T EVEN DEFEAT THE DESERT?

USE TB 43-0239, MAINTENANCE IN THE DESERT, AND THESE TIPS TO FIGHT THE DESERT'S SAND AND HEAT.

## PMCS


It's a fact, desert terrain—rocks, sand and vegetation—is tough on every part of your equipment.

Units that do PMCS like their -10 TMs say will keep training. Those that don't, spend a lot of time fixin' up.

You can fight the desert by giving your equipment extra protection. That means doing the before, during and after PMCS, plus more.

Every chance you get:

- Measure oil and water levels.
- Watch gauges for warning signs.
- Eyeball batteries for cracked cases or low fluid levels.
- Keep equipment clean.
- Cover unused glass surfaces.

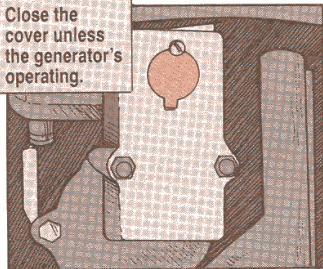


TAKE IT FROM SOMEONE WHO KNOWS, TO SURVIVE IN THE DESERT YOU GOTTA' BE PREPARED!

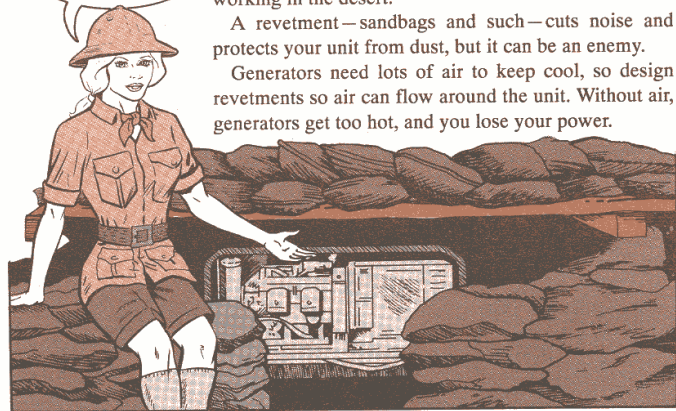
## M3 Smoke Generator

Close the access cover on the fog oil pump on your M3 smoke generator, unless it's operating. The cover keeps dirt out of the cylinder and off the rocker arms. Dirt buildup freezes rocker arms and stops the pump.

Close the cover unless the generator's operating.



REVTMENT BUILDING INSTRUCTIONS ARE IN THE GENERATOR'S OPERATOR'S MANUAL...  
...SO DO IT BY THE BOOK!

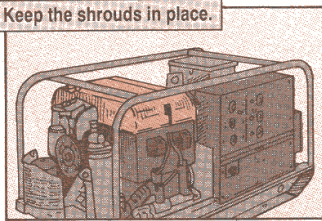


## Power Generators

Get your mechanic to change the oil and oil filter in your generator every day.

Make sure engine shrouds are in place when you operate a generator. Shrouds cool the unit by letting air circulate where it's needed. They also help shield the unit's oil from the sand that clogs filters and damages rings.

Keep the shrouds in place.



## Revetment

Leave plenty of breathing room around power units working in the desert.

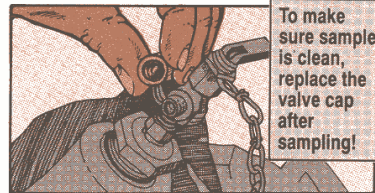
A revetment—sandbags and such—cuts noise and protects your unit from dust, but it can be an enemy.

Generators need lots of air to keep cool, so design revetments so air can flow around the unit. Without air, generators get too hot, and you lose your power.

## AOAP

If your vehicle has an AOAP valve, wipe dirt off before collecting an oil sample. Let a little oil drain from the valve, then collect the sample. That clears dirt from the valve line.

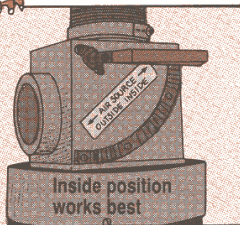
If you have to use the sampling pump, use a new tube every time.



To make sure sample is clean, replace the valve cap after sampling!

## M88A1 Recovery Vehicles

SET THE AIR INTAKE DAMPER ON YOUR M88'S PERSONNEL HEATER FOR INSIDE AIR.



Set the damper control handle to let the heater draw air from inside the vehicle.

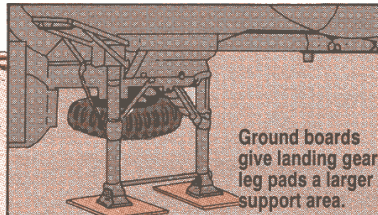
With the handle set for inside air, you breathe easier, and the heater's fuel-soaked wick stays clean and burning.

## Semitrailers

Always put ground boards under the leg pads before lowering the trailer's landing gear.

Heavy loads will force landing leg pads into soft sand.

DON'T FORGET TO USE GROUND BOARDS



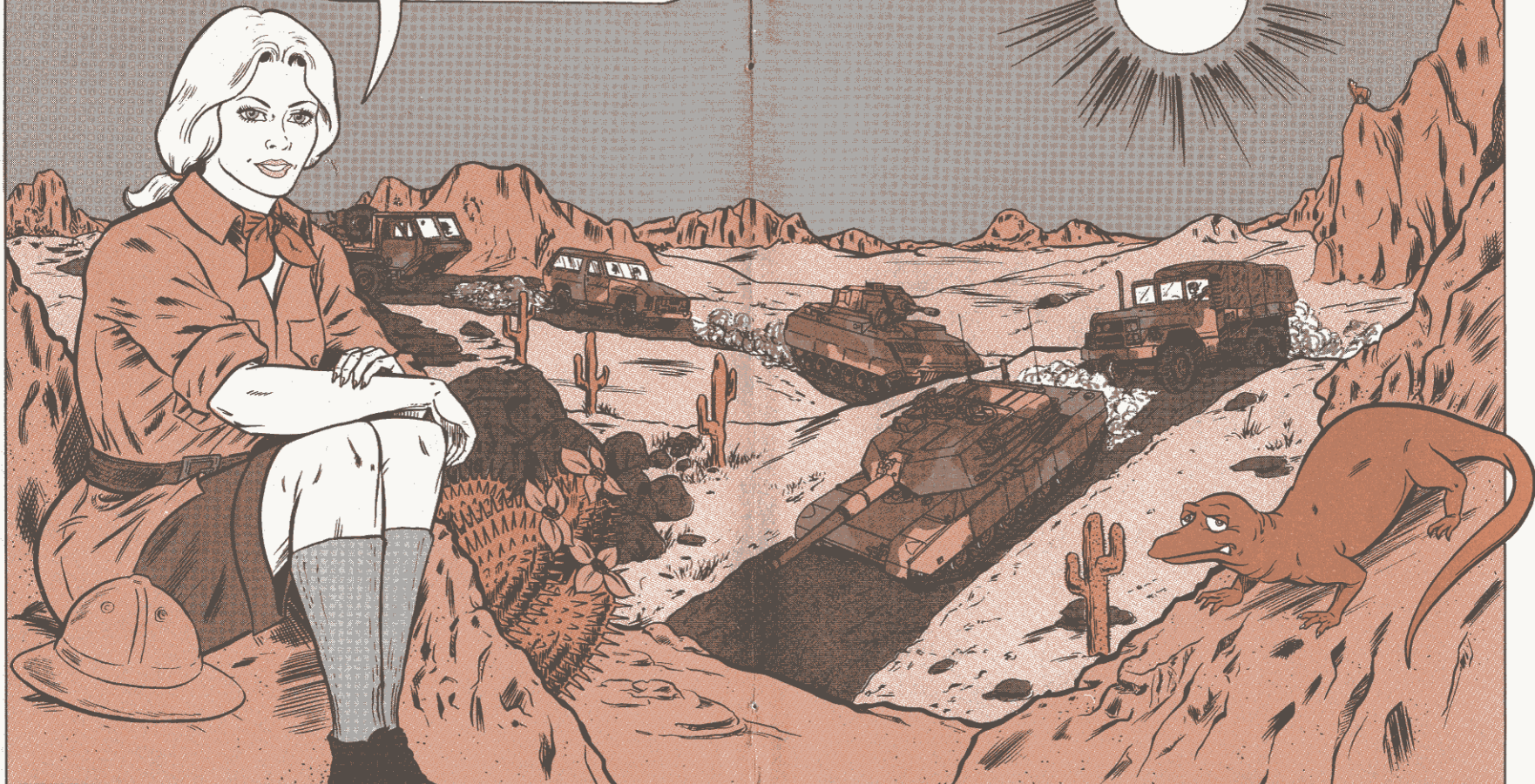
Ground boards give landing gear leg pads a larger support area.



YOU GOT IT! THANKS!

PS MORE

THE DESERT IS THE FOE YOU MUST BEAT  
IT'S WEAPONS ARE SAND, DUST AND HEAT  
THE TIME TO PREPARE  
IS BEFORE YOU GET THERE  
OR SUFFER THE AGONY OF DEFEAT.



**WE HAVE THE WORLD'S BEST EQUIPMENT ...** *Take care of it*

IF YOU WANT TO DISPLAY THIS CENTERPIECE ON YOUR BULLETIN BOARD, OPEN STAPLES, LIFT IT OUT AND PIN IT UP.

## Tracked Vehicle Safety

KEEP THESE SAFETY POINTS IN MIND WHEN YOU'RE TRAINING IN THE DESERT...

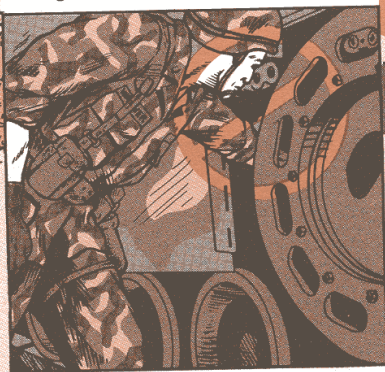
NEVER stand or sit on the outside of a tank when the turret's turning.

NEVER work underneath a vehicle if the engine's running.

NEVER touch sun-baked metal with bare hands.

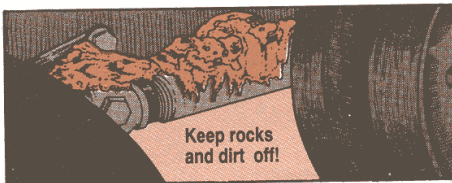
NEVER move a vehicle in a congested area without ground guides — day or night.

NEVER put your body over or around the wheels or track of a vehicle when the engine's running.



### Track

Inspect track for damage before, during and after every mission. Rocks can crack end connectors, break pins, mounting bolts, lube fittings or torsion bars. Look for leaks when greasing hubs. Moving track kicks up rocks and dirt that can lodge between the shocks and hull. If you don't take 'em out, the shocks bend and the hulls crack.



Keep rocks and dirt off!

DARN. I KNEW WE SHOULD'VE CHECKED THESE TIRES BEFORE WE LEFT.

I'LL GET THE SPARE WHILE YOU CHECK THE OTHER TIRES.



### Tires

Look at your tires at every halt. Sand and volcanic rock can wear tires thin.

Cactus spines start holes that become big flats in no time.

Drive slowly on rocky terrain, avoid traveling over vegetation, and carry a spare, if one comes with your vehicle.



### MILES

Before washing a vehicle, cover or remove the Multiple Integrated Laser Engagement System's (MILES) sensor belt, transmitter, and combat vehicle kill indicator.

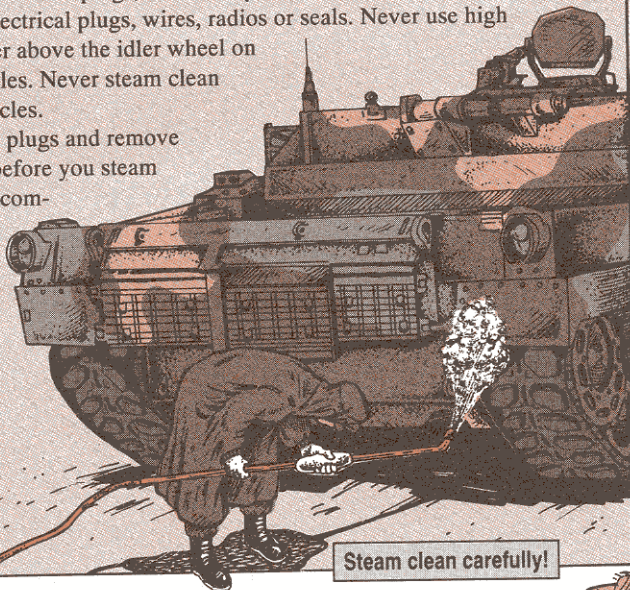
A stream of water shorts out the electronic equipment. It's best to remove all of the equipment before cleaning. If the sensor belt's left on, cover it with plastic.



## Steam Cleaning

Cover all electrical plugs, connectors and radios. Never point a stream of steam at electrical plugs, wires, radios or seals. Never use high pressure water above the idler wheel on tracked vehicles. Never steam clean wheeled vehicles.

Open drain plugs and remove drain plates before you steam clean engine compartments, or inside the turret.



Steam clean carefully!



# Keep Under Cover



**B**lowing sand will destroy aircraft windshields, optics, avionics and engines.

Clean your windshields before you cover them. Even fine dust can scratch the windshield when the wind moves the cover. If possible, don't let the covers touch the windshield at all. Put styrofoam, newspapers, cardboard or other non-abrasive material between the cover and the windshield. When you attach the cover, make sure it's snug. Otherwise, the wind will blow sand under the edges.

Sand's worst destruction is unleashed on your optics. Keep optic lenses, when not in use, covered with cling film, NSN 5330-00-766-0062.

If sand does its worst to your optics, its number 2 punch brings down your commo. When not in use, keep all avi-



onics equipment covered. Just a little sand will grind delicate commo parts to a halt.

Your engine can also fall victim to the destruction of sand. Keep the engine inlet cover on and tight. If it blows off, or up, and the engine fills with sand, kiss that engine goodbye.

Also, tape all openings or seams around windows, chin bubbles and access panels. Be sure you don't stop airflow that is needed to cool the parts.





# Bugged?

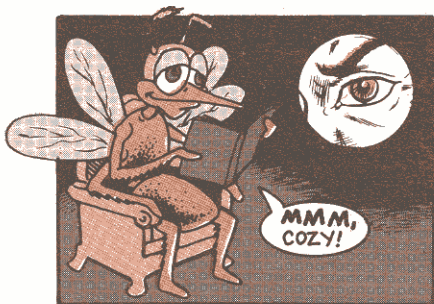
SUMMER'S SPRUNG  
THE GRASS HAS RISE,  
I WONDER WHERE  
THE BUGGIES IS?



**W**ell, wonder no more. The bugs are making homes and finding final resting places in your nickel-cadmium battery vent lines. And they're bringing their furniture — mud and trash — with them.

Bugs and gunk plug vent lines. Then battery fumes seep into the cockpit, or worse, get trapped in the battery compartment and cause an explosion.

Check the vent lines for obstructions during your daily PMCS. If you find plugged lines, use low pressure air to clear 'em.



VIPES!  
FOILED  
AGAIN!



Some lucky bugs find vent lines already furnished with gunk from a battery boilder and dirt kicked up from rotor blades.

# Keep Guns High and Dry

**M**oisture, dirt and other gremlins can get into the Cobra's 20-MM cannon and cause it to misfire--or not fire at all.



## New TIPS Address/Phone Number

The Tool Improvement Program Suggestions (TIPS) has a new address and phone number at Ft Belvoir, VA. Send your tool suggestions to:

TIPS

USA Force Integration Support Agency

ATTN: MOFI-SDC-A

Bldg 2588

Ft Belvoir, VA 22060-5587

Or call DSN 345-3252 or commercial (703) 355-2513.

Or fax your suggestion to: DSN 345-3252 or commercial (703) 355-3252.

# Adjust for the Heat

AH-H-H-H, SWEET **SUMMER**, AND A YOUNG MECHANIC'S THOUGHTS TURN TO...

I WONDER...  
IS THE VOLTAGE  
REGULATOR ADJUSTED  
FOR THIS HEAT?

IF IT'S NOT  
ADJUSTED IT  
COULD KILL THE  
BATTERY.

Well, if it's been a really cold winter or a really hot one, chances are your bird's regulator is not adjusted right!

Para 3-4c of TM 11-6140-203-14-2, the Aircraft Nickel-Cadmium Battery manual, has the word on checking your regulators. Para 3-281 of TM 55-1500-204-25/1, the General Aircraft Maintenance manual, and your aircraft's TM, gives the specifics on how to adjust regulators.

And here's a handy table for making the adjustments based on average weekly ground level ambient temperature:

Temp	Setting (volts)
Above 80°	27 ± 0.2
32 to 80°	28 ± 0.2
Below 32°	28.5 ± 0.2

# BATTLING CREEPS AND GLOBS



YOUR AIRCRAFT IS FINISHED!

I'LL WIPE YOU OUT, CREEP!



Creeps and globs may sound like something out of a horror movie, but what they can do to your aircraft is strictly for real.

Some silicone and greases “creep.” Grease applied during morning maintenance may be softened by midday heat. The softened grease—goo—creeps to other surfaces. This greasy mess makes the surface a target for dust and sand buildup. And by now, you know the destructive force of dust and sand.

Some mechanics “glob.” They apply grease and Proseal with a heavy hand, thinking that if a little works well, a lot will work even better. But that glob becomes like a magnet for dust and sand and is a prime candidate for creep.

To battle the creeps and globs, you:

**APPLY** just the right amount of lube or sealant. Wipe away any excess.

**CHECK** all lube points in the heat of the day. Wipe away any creeps.

**REMEMBER** where creeps usually start. Check these areas often.

**USE** only sealants and lubes called for by the TM. Substitutes may seem to do the same job, but they may creep more easily.

# Hot Weather Refueling

SUMMER HEAT, DUST, AND SAND REQUIRE ADDITIONAL SAFETY AND CLEANLINESS PROCEDURES WHEN REFUELING YOUR AIRCRAFT.



ARE YOU READY?

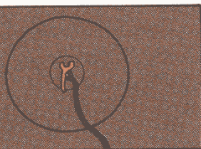
ALL GROUNDED AND READY TO RE-FUEL!

I HOPE THESE GUYS KNOW WHAT THEY'RE DOING!

Here are a baker's dozen steps to take:

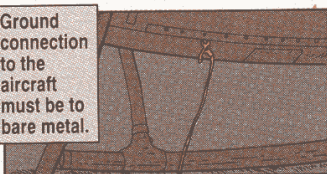
1. Ground the refueling vehicle by attaching the ground rod clip to the nearest ground rod.

Ground the refueling vehicle.

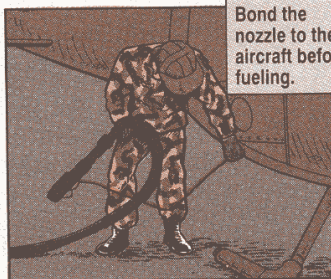


2. Ground the aircraft by attaching one end of a ground cable to the ground rod and the other end to a bare metal part of

Ground connection to the aircraft must be to bare metal.



3. Wipe around the fuel receptacle with a clean cloth to remove sand and dust.
4. Bond the refueling nozzle to the bird before you take the dust cap off the nozzle and the fuel cap off the fill port.



Bond the nozzle to the aircraft before fueling.

This bonding equalizes the electrical charges of the nozzle and the aircraft. If

the bird has a receiver for the ground plug, use it. If not, clamp the clip to any bare metal part of the aircraft.

5. Remove the nozzle dust cap and the fuel cap off the fill port. Wipe off the nozzle and the port with a clean cloth.
6. Put the nozzle all the way in the fill port until it locks in place.
7. Never leave the nozzle unattended while refueling.

Never leave the nozzle unattended.



8. Stop the flow of fuel completely before unlocking the nozzle from the port.
9. Remove the nozzle and cap the receptacle.
10. Wipe off the nozzle dust cap and recap the nozzle. Wipe the nozzle clean.

Wipe the nozzle with a clean cloth.



11. Disconnect the nozzle bond and return the nozzle to standby away from the aircraft.
12. Disconnect the ground plug from the aircraft.
13. Follow all the info in FM 10-68, Aircraft Refueling.

Ground rods are easily bent and often left behind. Order new ones with NSN 5975-01-050-5707.

Leather gloves need to be disposed of when they become fuel soaked. Order new ones with:

SIZE	NSN 8415-00-268-
1 (sm)	7871
2 (sm/med)	7872
3 (med)	7869
4 (med/lg)	7870
5 (lg)	7868

# Let HOT RADIOS Breathe

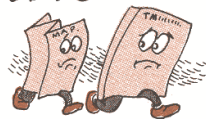
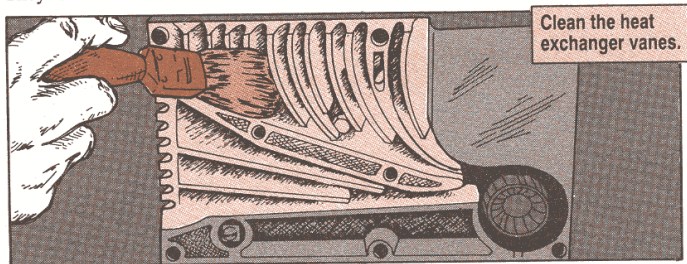


Your radios can be cool communicators or dead duds in summer heat. One of the main keys to radio survival is to keep them cool.

Here are some hot tips to keep your radio cool and keep you on the air:

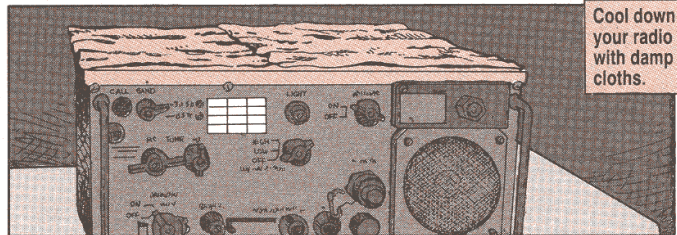
- Clean your receiver-transmitter (RT) often. If the fan vent gets clogged with sand, dust or dirt, the RT motor gets hot and burns out.

Take the side and rear panels off the RT so you can get at these commo killers. Use a brush or compressed air — whatever your equipment TM says — to clean the heat exchanger vanes and power transistor assembly. Be sure to replace the panels. They funnel air from the fan to the vanes where it's needed.



- Keep coats, field gear, maps, manuals and other items away from the RT blower fan. Blocking the air flow will cause the heat to build up inside your set.

- Put damp rags on the radio to keep it cool. Make sure the rags are damp, not wet. Soggy rags let water get inside the radio. Also, be sure that all screws are snugged down before you put the rags on the radio.



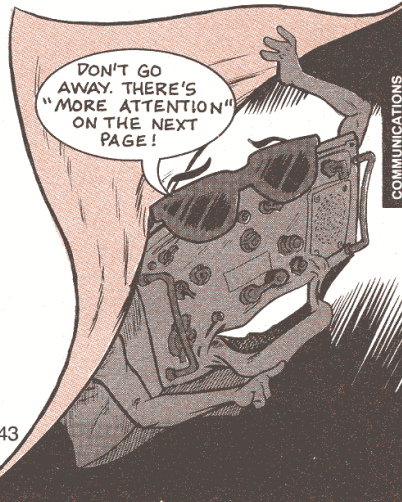
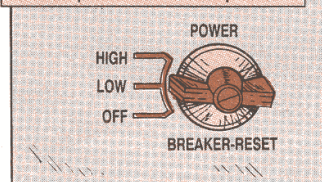
- Shade your radio with the vehicle's canvas top, or park in a shaded spot . . . anything to keep the glaring sunlight off the radio. When the sun beats down on the radio, the fan runs itself to death trying to cool your radio.

Another way to block the sun is to tape a piece of corrugated cardboard to the top of the radio.

- Use low power for transmissions of less than 15 miles. Low power draws less current, which generates less heat.

If you're transmitting more than 15 miles, use high power but keep transmissions short. When you're through, switch back to low power.

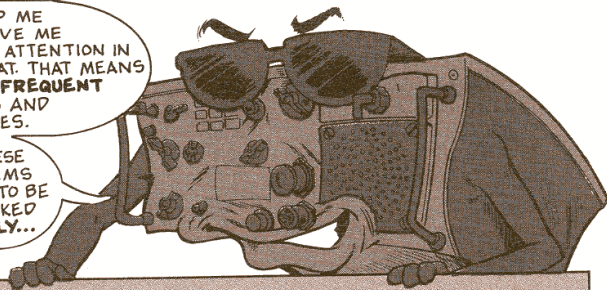
Use low power as much as possible.



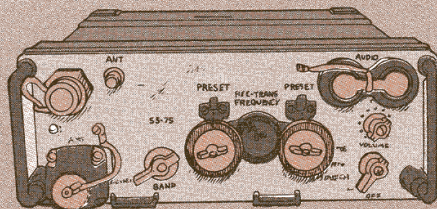
## More Attention

TO KEEP ME COOL, GIVE ME EXTRA ATTENTION IN THE HEAT. THAT MEANS MORE FREQUENT CHECKS AND SERVICES.

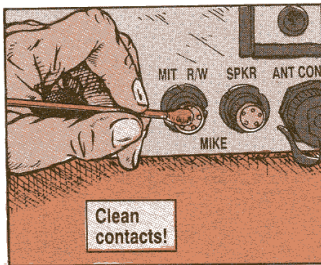
THESE ITEMS NEED TO BE CHECKED DAILY...



● **Knobs, switches and connectors.** If any are broken or missing, get them replaced.

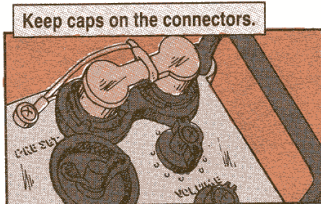


● **Contacts.** Dirt and sand work into the connectors and keep the contacts from touching. If they're dirty or making bad contact, clean 'em.



Clean contacts!

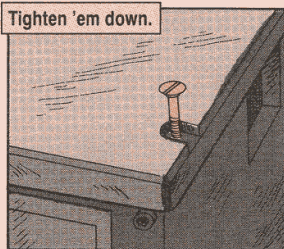
● **Connector caps.** Keep caps on audio connectors when the radio's not in use to keep out dirt and sand.



● **Receptacle locknuts.** Loose locknuts cause twisted wiring. Twisted wiring eventually means broken wiring.

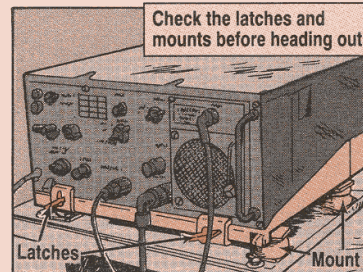
● **Panel or cover screws.** If one is loose or missing, tighten or replace it. A missing screw lets dirt and sand get inside your set.

Tighten 'em down.



● **Latches and mounts.** Loose latches and mounts can cause commo equipment to bounce out on a rough ride.

Check the latches and mounts before heading out.



PS END

Commo Shelters ...

## Canopies Beat the Heat

**Y**ou've heard the old saying, "It's so hot you could fry an egg on the sidewalk." That's how hot it gets inside your commo shelter when the summer sun beats down — only it's your commo gear that gets fried.

Canopy installation kits are available for the S-250/G and S-280/G shelters. The canopy mounts over the roof of the shelter and keeps it from getting too hot and damaging the equipment inside.

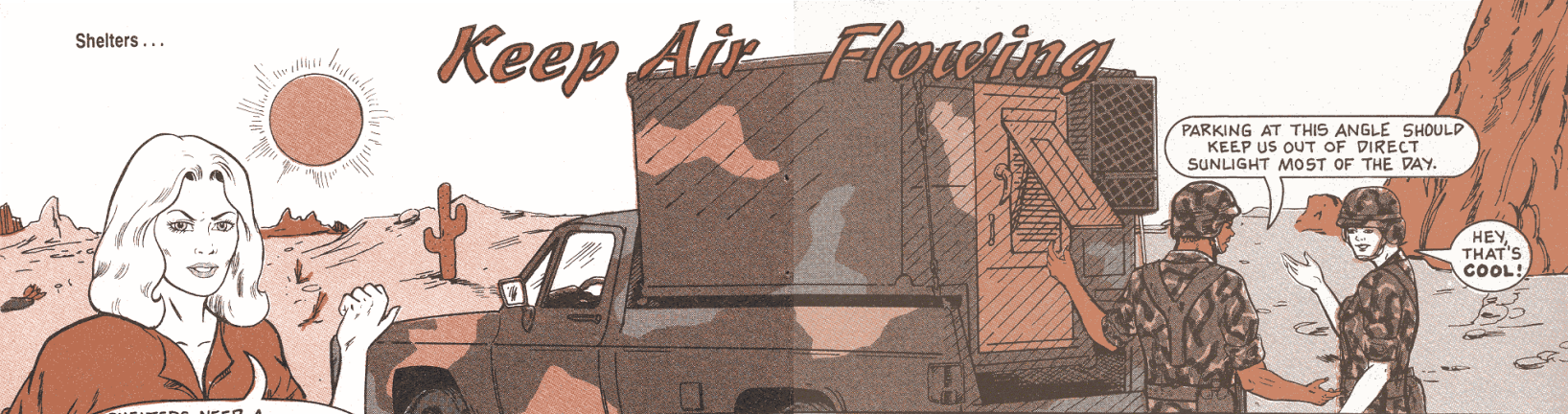
Use NSN 4940-00-937-2553 to get a canopy to cover the S-280/G shelter. An NSN hasn't been assigned for the S-250/G canopy kit yet, so order by CAGE 80063 and part number PPL 10481 on DD Form 1348-6 from RIC B16.

JUNE 93



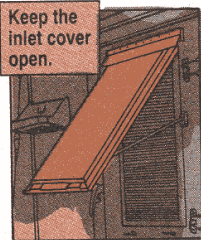
JUNE 93

# Keep Air Flowing



SHELTERS NEED A STEADY FLOW OF AIR TO KEEP INSIDE TEMPERATURES DOWN.

Radio teletypewriter equipment inside the shelter puts out enough heat to burn up a radio or power supply. They need moving air to stay in good shape.

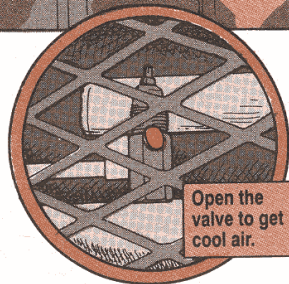


Keep the temperature down by leaving the shelter door's inlet cover open enough to let cooling air into the shelter.

Exhaust vents are behind the radio and power supply. Make sure these vents are open and that they're not blocked by clothing or other items. These vents let hot air escape.

Some equipment needs air conditioning to keep it operating. If your shelter has an air conditioner, use it. You'll need to close the vents and inlets, of course.

The receiver valve on the air conditioning unit will need to be open so that coolant is let out of the holding tank. To open the valve, turn it counterclockwise.



The most important thing about vehicle-mounted shelters is where you park them. Park your vehicle so that the shelter door is in the shade for most of the day to keep the inside area cooler.

Generators should be put in front of the vehicle to keep the exhaust and noise from entering the shelter.

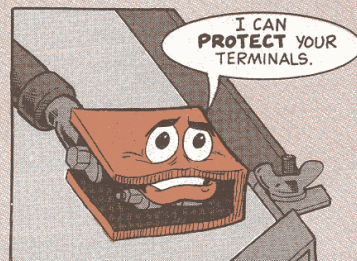
If your shelter is not air conditioned, lower the inside temperature by hanging

a water-soaked burlap cloth over the door's air inlet cover. Soak the cloth often and be sure to keep the door closed.

The door filter often gets overlooked when PMCS is pulled. Make it a habit to check the door filters when you check the radio air filters. Clean the door air filter by using the instructions in Para 3-10 of TM 11-5815-334-10.

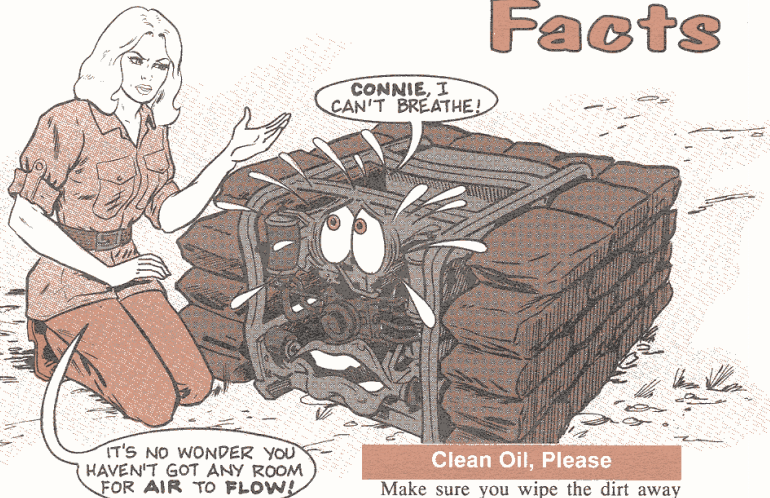
## Battery Terminal Covers

Use cover, NSN 2530-01-089-4992, for single battery terminals and cover, NSN 5940-00-738-6272, for dual battery terminals. They keep screwdrivers, wrenches, battery box covers, and other metal objects from touching both terminals, or the positive post and metal, at the same time.





# Facts Are Facts



**O**ne cold, hard fact is that hot weather does a number on your generators. Heat and dirt add up to double trouble.

The main thing is to keep your generator cool.

Here are some ways to beat the heat:

## Revetment Space

Give your generator set lots of breathing room.

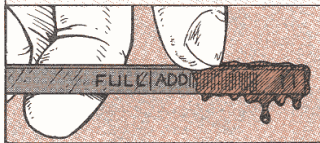
A sandbag, log or earthen revetment helps reduce noise and block dust. However, the revetment can also be an enemy if there's not enough room around the generator to keep it cool. Make sure there's at least four feet between the generator and walls. You lose power if the generator gets hot and fizzes out.

Check your operator's TM for other instructions on building a revetment.

## Clean Oil, Please

Make sure you wipe the dirt away from the oil filter cap before you check the oil level.

**Need oil? Before you stick that funnel in the fill opening, clean the dirt from both.**

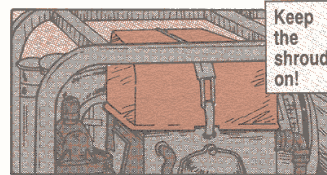


That also goes for the top of the oil can before you open it.

Check the engine oil daily. This means not only looking at but feeling the oil on the dipstick. Dirt and sand damage the engine quicker than you can figure out what's what. If you feel grit on the dipstick, get your mechanic to change the oil and filter.

## Closed Doors

Keep shrouds and doors closed. Closed doors and shrouds help circulate the air to the parts that need cooling. They also keep dirt away from the engine.

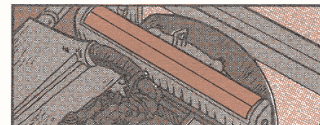


## Shutter Flip

A jammed shutter assembly won't let air flow to your generator set's engine.

Most generator sets have thermostatically controlled shutters. When the engine needs cool air, the shutter opens.

If the shutter or control jams, there's no cool air.



On small generators, check the shutter often. Move the shutter back and forth. It should move easily, then spring back to its original position.

On larger sets, you can make sure the shutter is not binding by giving the control lever a smooth open-and-shut check.

## Change Shutter

Make sure your 6-HP Mil Std engine's air intake shutter is set for SUMMER.

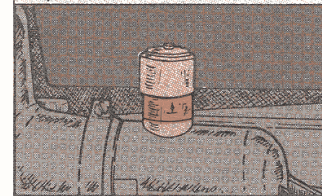
If set on WINTER, hot air is put directly from the exhaust manifold to the air intake filter. This extra heat can break down the filter. Filter pieces will be drawn into the carburetor, causing a number of problems, including fire.



## Air Cleaner Clean?

Because of fine dust, you'll need to service the air cleaner more often. Check the air restriction indicator daily.

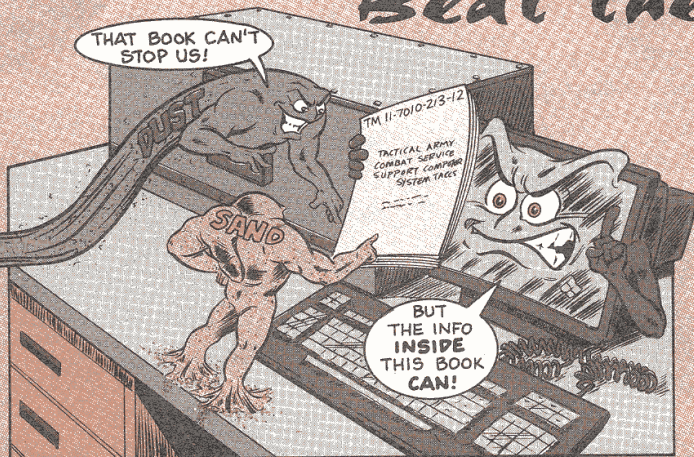
**If the red signal is visible, clean or replace the filter element.**



A dirty or clogged filter stops the flow of air and chokes the engine. It will shut down when you need it most.

Never run a generator engine without a filter. Sand or dirt in your engine will grind moving parts to bits.

# Beat the Dust Devils



Dust and sand are the big enemies of your AN/TYQ-33(V), Tactical Army Combat Service Support Computer System (TACCS).

To wage a winning battle with these tricky foes you fight every chance you get. Clean your TACCS equipment by the book — TM 11-7010-213-12.

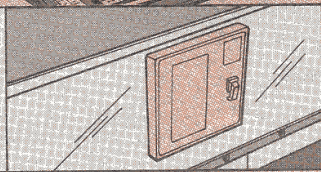
## Here are some more pointers:

- Use the dust cover of the KY-903 keyboard. It protects the keyboard from dust and dirt damage.

Never use a pencil or sharp object to press keys on the keyboard. You'll poke holes in the cover. That leaves a way for the dust devil to get in.



- Close the door to the floppy disk and tape drives. Dirt on the heads of the tape or floppy disk drive will damage the floppy or tape.



- Keep the drive heads clean with the floppy disk drive cleaning kit, NSN 7045-01-154-1315, and the tape drive cleaning kit, NSN 7035-00-348-1864.

- Make sure the cover is closed on the RP-336 printer. Dust and paper bits will stop the printer from doing its job.

Clean the print head guide shaft, platen and support shafts daily like Para 3-1.2.2.e of TM 11-7010-213-12 tells you.

To make sure the floppy diskettes stay free of dirt, put them in storage boxes.

The tape cartridges come with a storage box. Keep the cartridges in their boxes when not in use.

Here are the boxes that are available:

NSN	Num. of diskettes box holds
7520-01-239-1504	100
7045-01-192-7002*	80
7045-01-179-2980	50
7045-01-196-7227 (box with key lock)	50
7045-01-195-5260*	25
7045-01-218-0494*	10

\* Order on DD 1348-6 and put "NSN not on AMDF" in REMARKS block.

## Fix Fouled Filter

A fresh, clean supply of air. That's what your AN/TYQ-33(V) Tactical Army Combat Service Support Com-

puter System (TACCS) needs to do its job right.

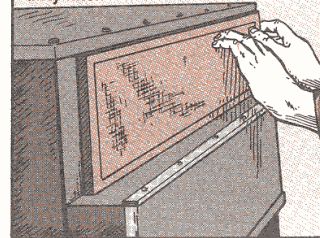
And clean air's what you get when the foam filters located in the logic module, printer, and remote logic module are free of dirt and dust.

A dirty filter keeps cool air from circulating, causing heat buildup that makes your TACCS konk out.

Check the filters daily for dirt and damage. Change 'em or clean 'em.

If you don't have a new filter, rinse out the dirty one with water, dry it and reuse it. Dry the filter completely before using it again.

Prevent heat buildup by changing a dirty filter.



# Turn Your Fan by the Season



If the engine in your Cat D7- or D8-series tractor is running cold or overheating, it could be the fan blades are not adjusted properly.

The fan blades can be set to either pull air in through the radiator or to push air out through it, depending on the season.

For hot weather, turn the blades to push air out through the radiator and carry heat away from the engine.

For cold weather, reverse the blades to pull air through the radiator and blow the warmed air back over the engine. That helps keep the engine up to operating temperature — where it runs best.

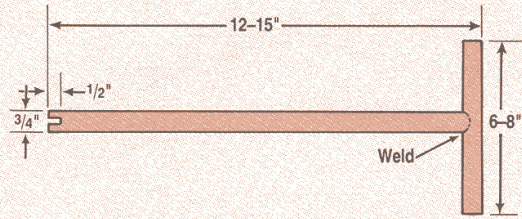
To change the fan, adjust each blade — with the engine off.

ADJUST THE BRAKES LIKE SO...

1. Push the blade in toward the hub.
2. Twist the blade to the opposite angle.
3. Let the blade spring back out and lock in position.

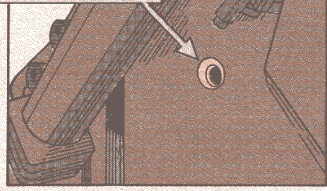
IF A BLADE WON'T PUSH AND TURN, STOP! FORCING IT CAN BEND THE BLADE OR SHAFT.

To reach the blades without removing the screen guards, make this tool from 3/4-in pipe.

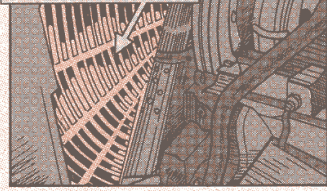


To use it, line up a blade with the access hole. Fit the tool over the end of the blade and push in to turn the blade. Then line up the next blade and repeat the procedure.

Insert tool here ...



... to adjust the blades



When you're finished, make sure all blades face the same way. Otherwise, you'll cut down air flow through the radiator and also get vibration that's rough on the fan and bearings.

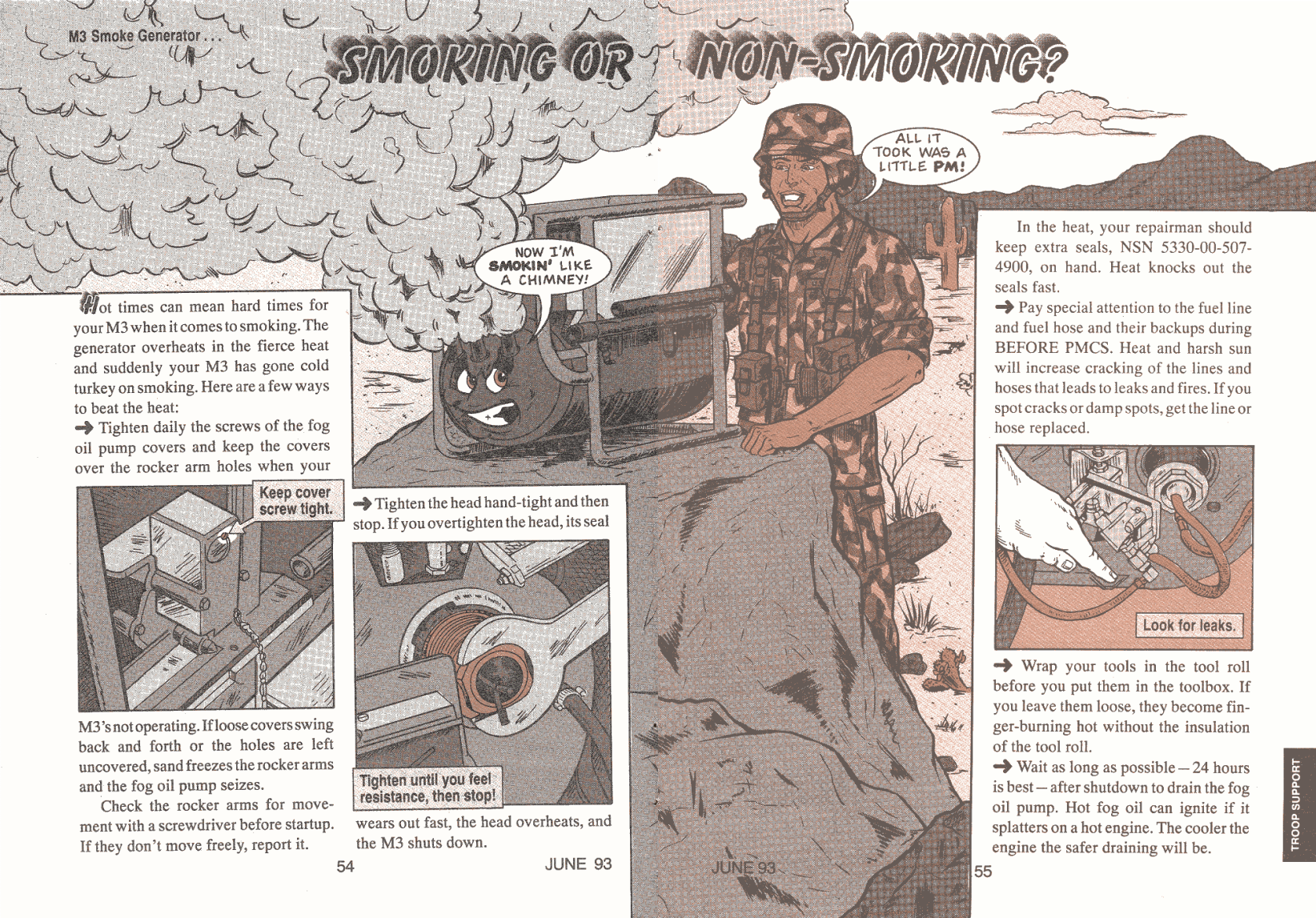
## D5B CAT Batteries

There are two different batteries used on the D5B Caterpillar tractor, depending on the model. For models D5BS and D5BNS, use battery, NSN 6140-01-203-4912. For models D5BS1 and D5BNS1, use battery, NSN 6140-01-247-2015.

## D7E Radiator Hose

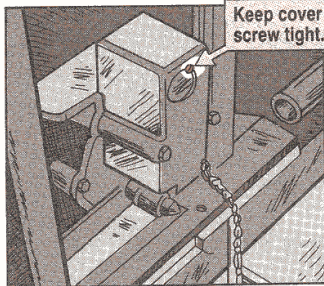
You can no longer get the lower radiator hose, NSN 4720-00-883-0475, for your D7E dozer. Order bulk hose, NSN 4720-00-231-6285, and cut it to fit. The unit of issue is by the foot, so order the length needed.

# SMOKING OR NON-SMOKING?



Hot times can mean hard times for your M3 when it comes to smoking. The generator overheats in the fierce heat and suddenly your M3 has gone cold turkey on smoking. Here are a few ways to beat the heat:

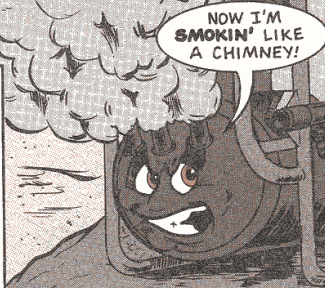
→ Tighten daily the screws of the fog oil pump covers and keep the covers over the rocker arm holes when your



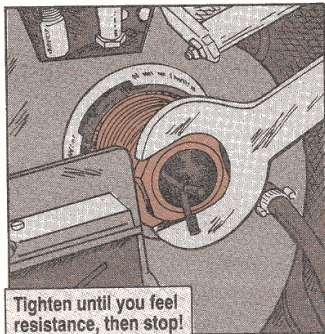
Keep cover screw tight.

M3's not operating. If loose covers swing back and forth or the holes are left uncovered, sand freezes the rocker arms and the fog oil pump seizes.

Check the rocker arms for movement with a screwdriver before startup. If they don't move freely, report it.



→ Tighten the head hand-tight and then stop. If you overtighten the head, its seal



Tighten until you feel resistance, then stop!

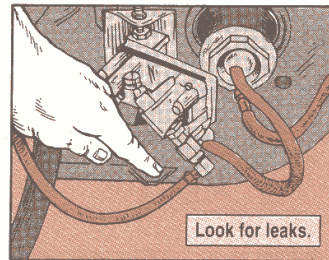
wears out fast, the head overheats, and the M3 shuts down.

ALL IT TOOK WAS A LITTLE PM!

NOW I'M SMOKIN' LIKE A CHIMNEY!

In the heat, your repairman should keep extra seals, NSN 5330-00-507-4900, on hand. Heat knocks out the seals fast.

→ Pay special attention to the fuel line and fuel hose and their backups during BEFORE PMCS. Heat and harsh sun will increase cracking of the lines and hoses that leads to leaks and fires. If you spot cracks or damp spots, get the line or hose replaced.




Look for leaks.

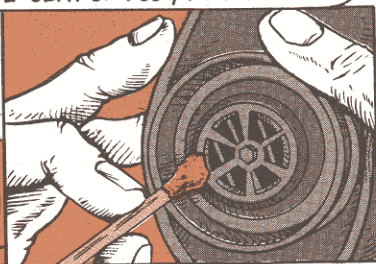
→ Wrap your tools in the tool roll before you put them in the toolbox. If you leave them loose, they become finger-burning hot without the insulation of the tool roll.

→ Wait as long as possible — 24 hours is best — after shutdown to drain the fog oil pump. Hot fog oil can ignite if it splatters on a hot engine. The cooler the engine the safer draining will be.

# DESERT MASK SEAL TEST



OPERATING IN THE DESERT REQUIRES **MORE CLEANING** BEFORE YOU DO THE SEAL TEST FOR THE M17, M24/M25 AND M40 MASK OUTLET VALVES, NBC NCOs.




USE A **Q-TIP** DIPPED IN **ALCOHOL** TO CLEAN THE OUTLET VALVE AND VALVE SEAT OF DUST, DIRT OR SAND.

With the mask properly fitted on the soldier, have him or her inhale and hold it for 10 to 15 seconds. Dip a Q-tip in H-amyl acetate (banana oil) and wave it around the outlet valves.



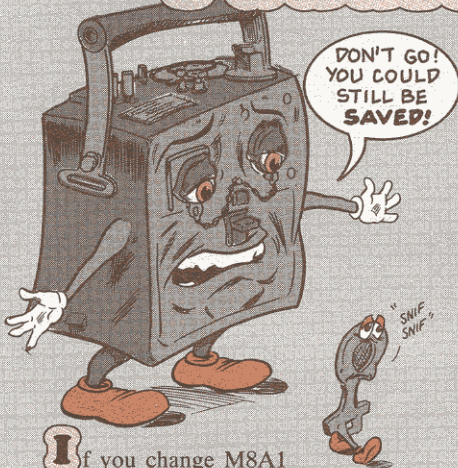
I SMELL THE **BANANA OIL**. I GUESS THE OUTLET VALVE'S **BAD**.

REMOVE IT. INSPECT, CLEAN AND INSTALL A NEW OUTLET VALVE. THEN WE'LL DO THE TEST AGAIN.

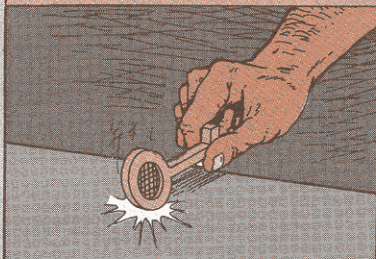


IF THE SOLDIER DOESN'T SMELL BANANA OIL, THE MASK'S **GOOD**. IF HE DOES, TURN IN THE MASK. FOR MORE INFO, SEE AMCCOM MAINTENANCE ADVISORY MESSAGE NO. **90-55**. YOUR AMCCOM LOGISTICS ASSISTANCE REPRESENTATIVE CAN GET YOU A COPY.

# Paddle Poop

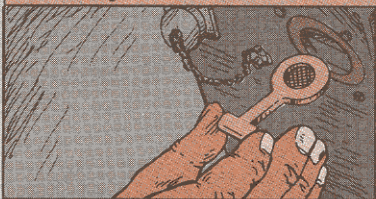


✓ Remove the paddle if the ball doesn't reach the green band. Tap the paddle on a hard surface to remove sand or dirt.



✓ Stick the paddle back in and repeat the air flow test. If the flowmeter ball now reaches green, the paddle's still good. Continue to operate for six hours before testing the paddle again.

✓ Replace the paddle if the ball does not reach green.

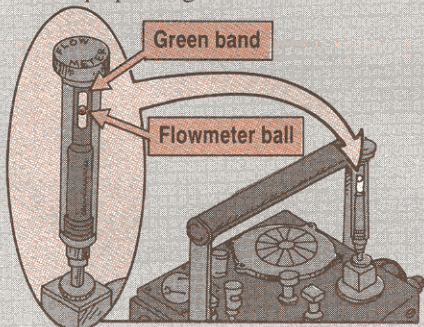


For more info, see AMCCOM Maintenance Advisory Msg 90-22. Your AMCCOM Logistics Assistance Representative will have a copy.

**I**f you change M8A1 air filter paddles in the desert by the book, you may waste paddles that are needed in case of attack.

Page 2-116 in TM 3-6665-312-12&P says replace the paddle every six hours in very dusty or sandy conditions. Do this instead:

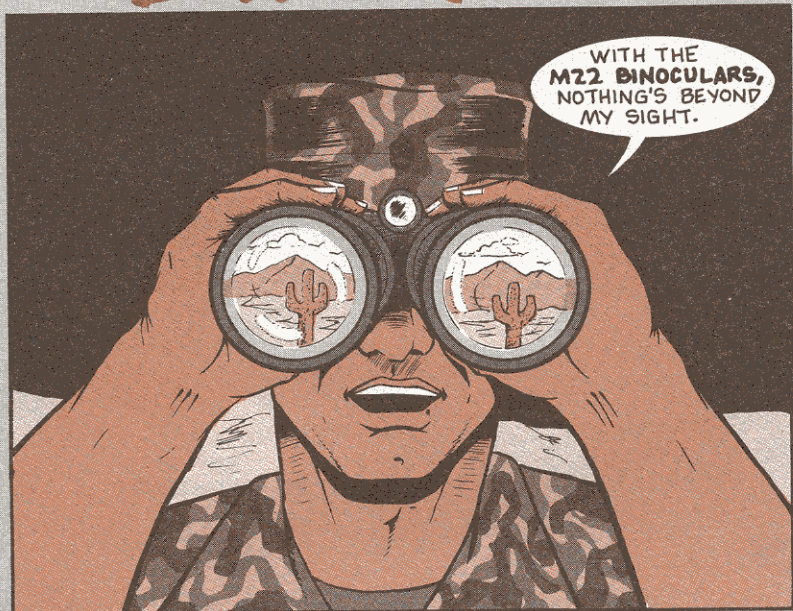
✓ Check the air flow with the air flowmeter. If the flowmeter ball reaches the green band, the paddle's still good. Keep operating.



GREAT NEWS, I'M OK!



# Better "Binocs"



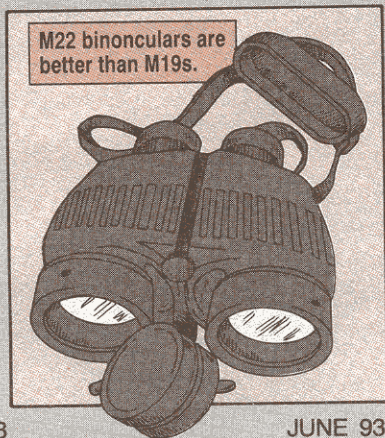
The desert seems endless when you're looking out there with bare eyes, but the M22 binoculars, NSN 1240-01-207-5787, can help stretch your seeing power. The new M22 rubber binoculars have better range pickup than the old metal M19s they replaced.

The M22 binoculars can also withstand temperatures—hot and cold—they're temperature resistant!

The binoculars' body is not repairable. You have to replace it if it breaks.

Repair parts are listed in TM 9-1240-403-12&P.

If you wear glasses, be careful not to get them caught on the small rubber eyecup on the binoculars. If the eyecup is torn off, the binoculars might scratch your glasses' lens.



# Handling the Heat



In summer heat everything is HOT — including tools and equipment! Wear gloves to protect your hands from the hot stuff. Here are NSNs for three different kinds of gloves:

Heavy duty work glove	
Size	NSN 8415-00-268-
1	7871
2	7872
3	7869
4	7870
5	7868

Anticontact glove	
Size	NSN 8415-00-227-
S	1220
M	1221
L	1222

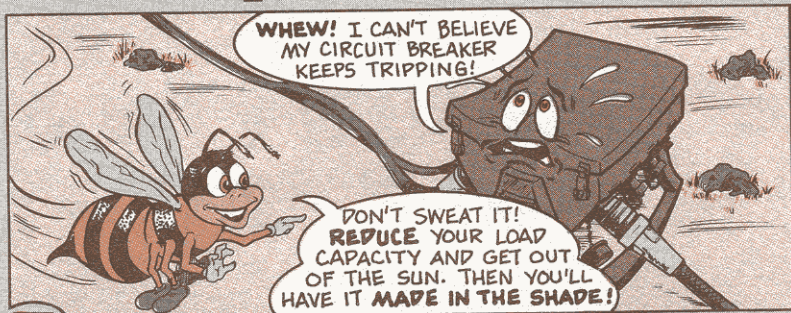
Light duty glove	
Size	NSN 8415-01-310-
1	7334
2	7335
3	7336
4	7337
5	7338

WHEN IT COMES TO HOT WEATHER, WE'VE GOT YOU COVERED!





# Heat Trips Circuit Breakers



**W**hen you operate the distribution illumination system, electrical (DISE) in the summer, you'll need to decrease the electrical load because high temperatures trip the thermal-magnetic circuit breakers.

Circuit breakers heat up when they carry current. When the air temperature is high, the breaker heats up more. Then it trips at a lower amperage than it's rated for.

Power-DISE equipment has hydraulic-magnetic circuit breakers, which are less sensitive to high temperatures.

When you use the DISE to power equipment that must have an uninterrupted power supply, the load capacity of the circuit breaker should be reduced and, if necessary, the load should be redistributed.

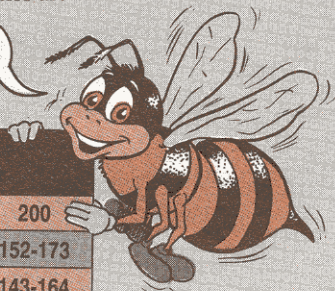
The load can be redistributed by moving loads to different circuit breakers, adding another DISE box or using a DISE box with a higher ampere rating. TM 9-6150-226-13 and FM 20-31 have the information on load balancing.

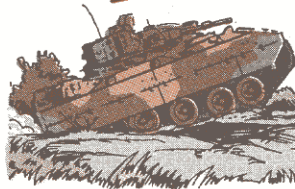
Remember, no matter what the temperature, never load the circuit breakers to their full capacity because of load fluctuations during starting and stopping.

Try to avoid exposing the DISE to direct sunlight. Put DISE boxes in the shade or make shade for the boxes. Be sure the DISE boxes are well ventilated.

**HERE ARE THE APPROXIMATE TRIP CHARACTERISTICS OF CIRCUIT BREAKERS WHEN THEY ARE HOUSED IN DISE BOXES.**

Ambient Air Temperature		Approximate Circuit Breaker Capacity In Amps Rated				
C	F	20	40	60	100	200
27	80	15-17	30-34	45-51	75-82	152-173
38	100	14-16	28-32	42-48	71-81	143-164
49	120	12-14	25-29	36-42	64-73	129-148





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RAISE THE LEVEL  
OF PMCS!



### M9 ACE Gauge NSN

Get a replacement water temperature gauge for the ACE with NSN 6625-00-936-2139. NSN 6685-01-248-1707 (Item 15 in Fig 28 of TM 5-2350-262-24P) is obsolete.

### HMMWV Brush Guard Parts

Stumped when looking in TM 9-2320-280-20P (Aug 91) for HMMWV brush guard parts? Try Fig 353, under kits. You'll find repair parts including the quick release pin, NSN 5340-01-249-0555.

### Longer CVC Cord

Need a longer cord from the radio and intercom junction box to your CVC helmet? Get the CX-13037 23-ft retractable cord with NSN 5995-01-136-5973 if you have a DH-132A helmet with the MK-1697/G headset-microphone kit. For the DH-132 helmet with the MK-1039/G kit, order the CX-10767/GR 35-ft retractable cord with NSN 5995-00-434-5755. Appendix A of CTA 50-970 is your authority for ordering.

### 20-ton Crane Shackle NSN

Use NSN 4030-00-185-0487 to get the shackle that holds the hook block to the front blade on M2380/2385 20-ton cranes. The parts info is missing from TM 5-3810-232-20P.

### Tank Shocks Revisited

We Goofed! On Page 18 of PS 484 we told you to replace the OE/HDO-30 oil in the M1's rotary shocks with turbine engine oil. Turns out those shocks never had OE/HDO-30 in 'em. They have OEA (arctic) oil instead. It's OK to mix turbine engine oil with the OEA, but never use regular engine oil.

### Wrong M16 Magazines

Do not use any M16 rifle magazines other than those listed in the TMs. Unauthorized magazines may not work with your unit's rifles. They have not been tested and may jam in battle. Use only the authorized 30-round metal magazines listed in your M16 TMs.

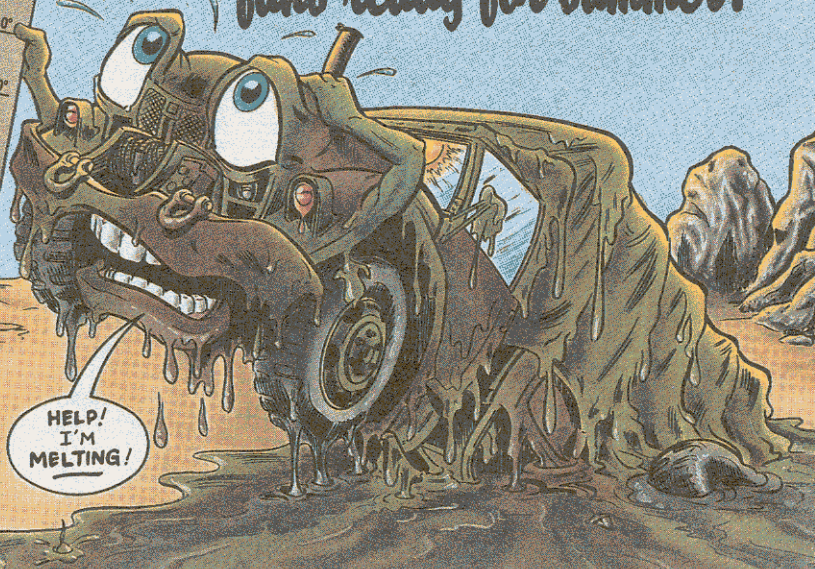
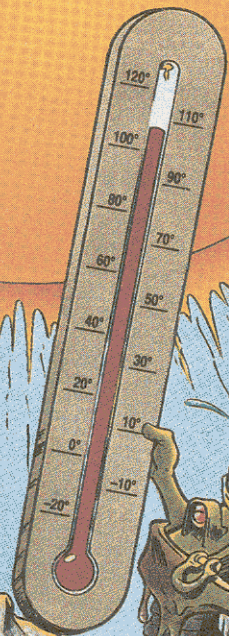
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