THE PREVENTIVE MAINTENANCE MONTHLY

TB 43-PS-576, 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. Masculine pronouns may refer to both genders.

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

MSG Half-Mast
The Preventive Maintenance Monthly
LOGSA, Bldg. 5307
Redstone Arsenal, AL 35898-7466

Or E-mail to:

psmag@logsa.army.mil

Internet Address:

http://www.logsa.army.mil/psmag/pshome.html

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
0024401

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THE PREVENTIVE MAINTENANCE MONTHLY
TB 43-PS-576
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NOW, HOW DO YOU LIKE BEING LEFT UNPROTECTED OUT HERE IN THE COLD?

KNOK KNOK

COLD WEATHER ISSUE

Left Out in the Cold . . . See Page 27

Cheap Insurance

The business of building military equipment—from trucks to tanks to helicopter—has come a long way from the days of stubby pencils and drafting paper.

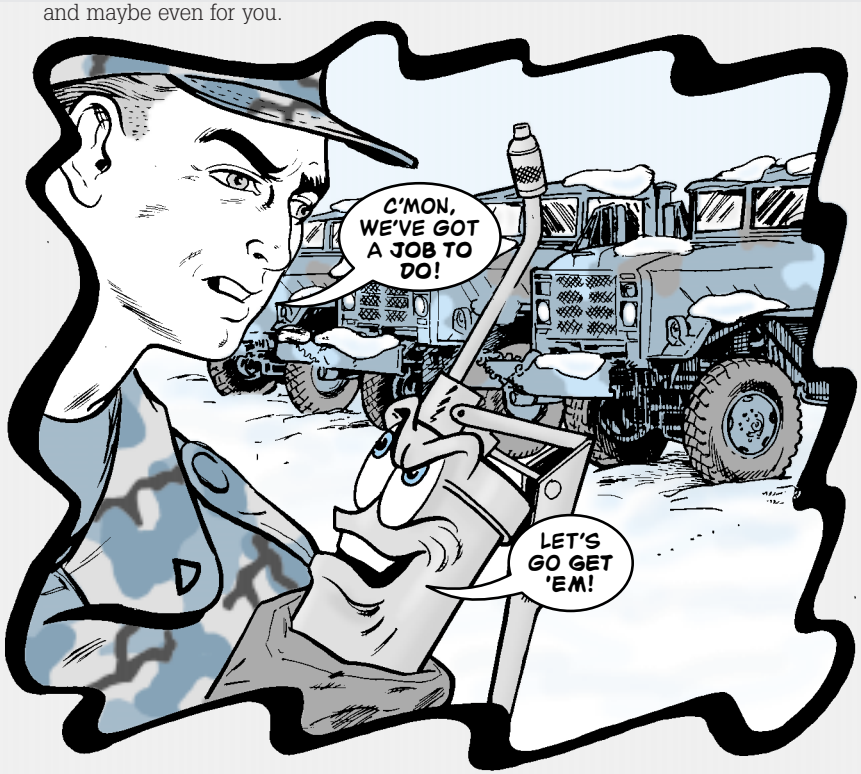
But while today's engineers use computers to draw and manufacture almost everything, the business of maintaining equipment starts with a very basic task: the application of lubricants by hand.

Whether you're running a fleet of ancient M35A2s or brand-new FMTVs, lubricants are necessary to keep those trucks hard at work.

It also doesn't really matter that the lubricants are better than they used to be. They still must be **applied when needed** and **in the amounts called for** by environmental conditions.

So it just makes sense for you maintainers to pay some respect to the equipment you've been given to defend your country. Get out that lubrication order or find out where the information is located in your -10 or -20 TM.

Greasing a fitting or using an oil can is cheap insurance for your equipment—and maybe even for you.



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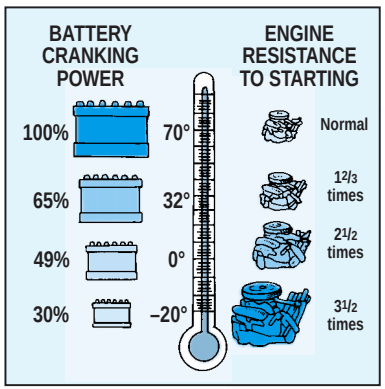
Keep Batteries Strong for the Cold

If you don't know the condition of your vehicle's batteries, you could find yourself stranded in the cold this winter.

A weak battery has little chance of surviving winter because even a good battery suffers in the cold. Note that…

❄ A fully-charged battery loses a third of its cranking power at 32°F, compared to its cranking power at 70°F.



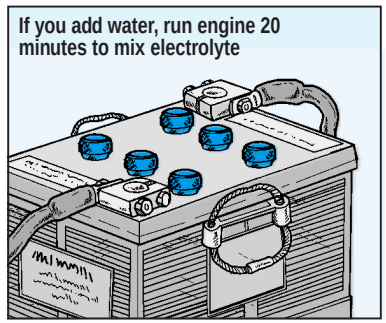
At 0°F, it has less than half its power.

At –20°F, it has only 30 percent of its power.

Here's how to determine if your batteries are strong enough for the cold.

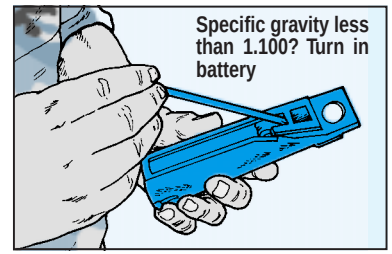
❄ Make sure you've got a copy of TM 9-6140-200-14, the battery bible.

❄ If you've just added distilled water to a battery, start the vehicle's engine and let it run for at least 20 minutes. That gives the charging system a chance to mix the water and electrolyte. If you don't let 'em mix, you'll be testing water only. This mixing also helps keep water from freezing, which prevents cracked battery cases.

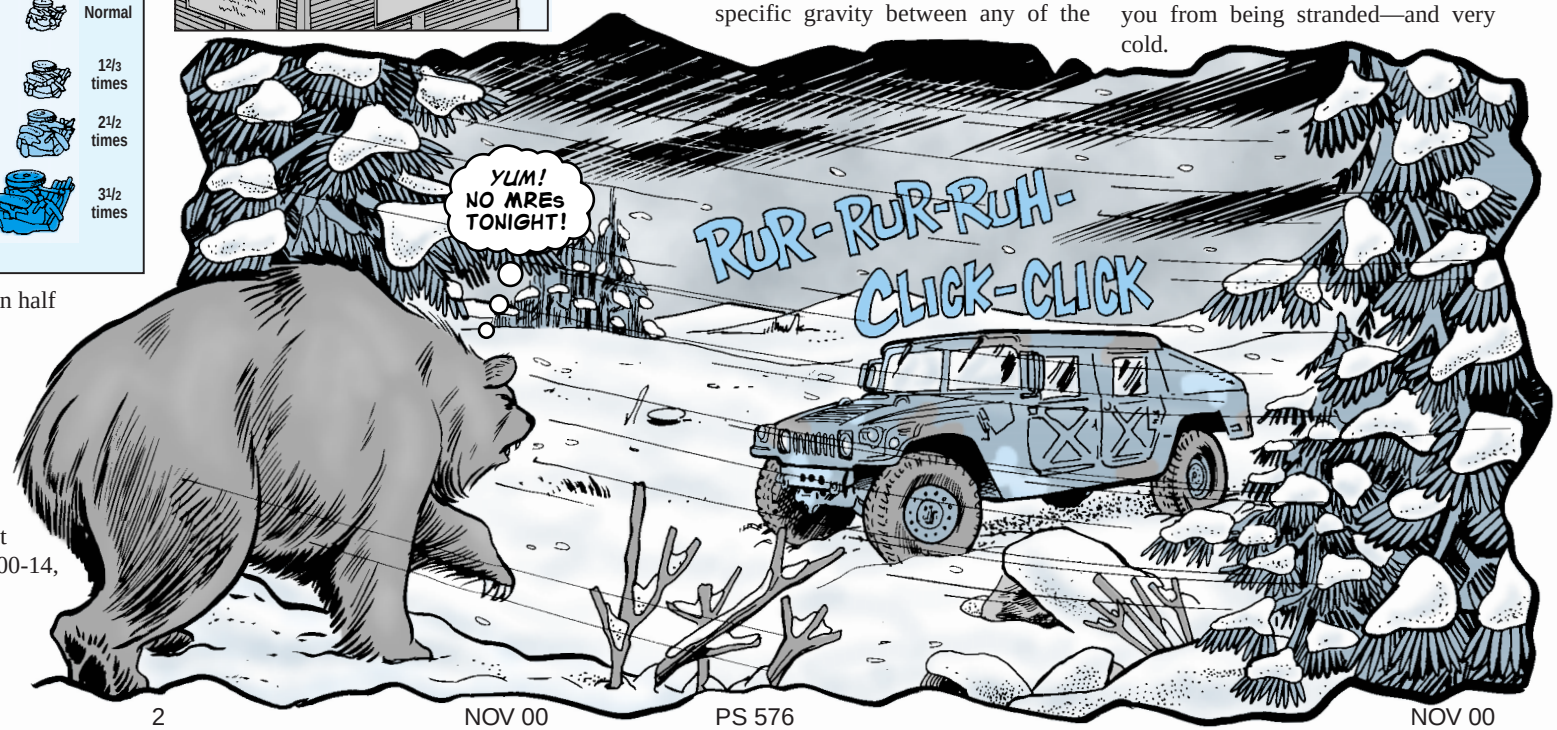


❄ Eyeball Chap 3 of the battery pub for testing procedures. That means using the optical battery/antifreeze tester in the Common shop sets.

❄ Using the info in Para 3-6 of the TM, test the battery's specific gravity. If any cell's specific gravity is less than 1.100, turn in the battery. It'll freeze in cold weather. If there is a difference in specific gravity between any of the cells of more than 0.025, turn in the battery, too.



Keep in mind that it's a good idea to run the specific gravity test on a "new" battery from supply, too. It could save you from being stranded—and very cold.



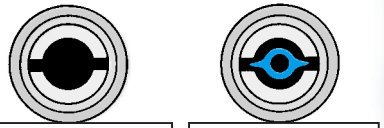
PS 576 NOV 00

Safe Slave Starting

Combine weak batteries with temperatures below freezing and you get vehicles that won't start without help.

That help often comes from slave cables. Using the cables correctly will keep you safe and your vehicles on the job. So heed these precautions:

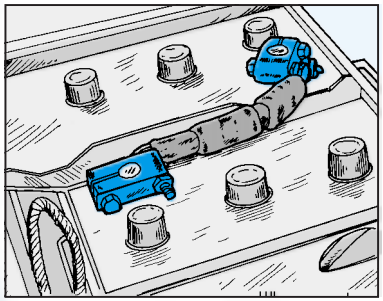
- Read the slave-starting steps in your vehicle's operating instructions.
- Never stand between vehicles being slaved and never position them nose-to-nose.
- Have your mechanic make sure the electrolyte in all battery cells is above the plates and **is not frozen**. Never slave frozen batteries. They can explode.



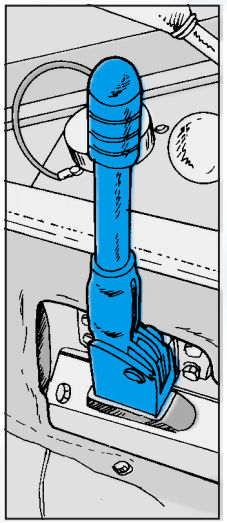
Electrolyte level low

Electrolyte level OK

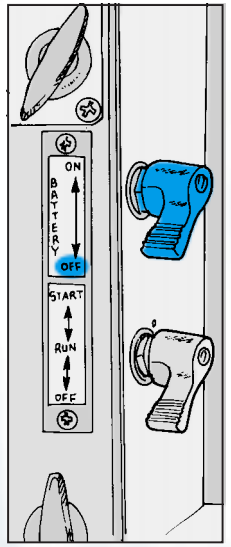
- Make sure all cables and terminals on the dead vehicle's batteries are tight and free of corrosion.



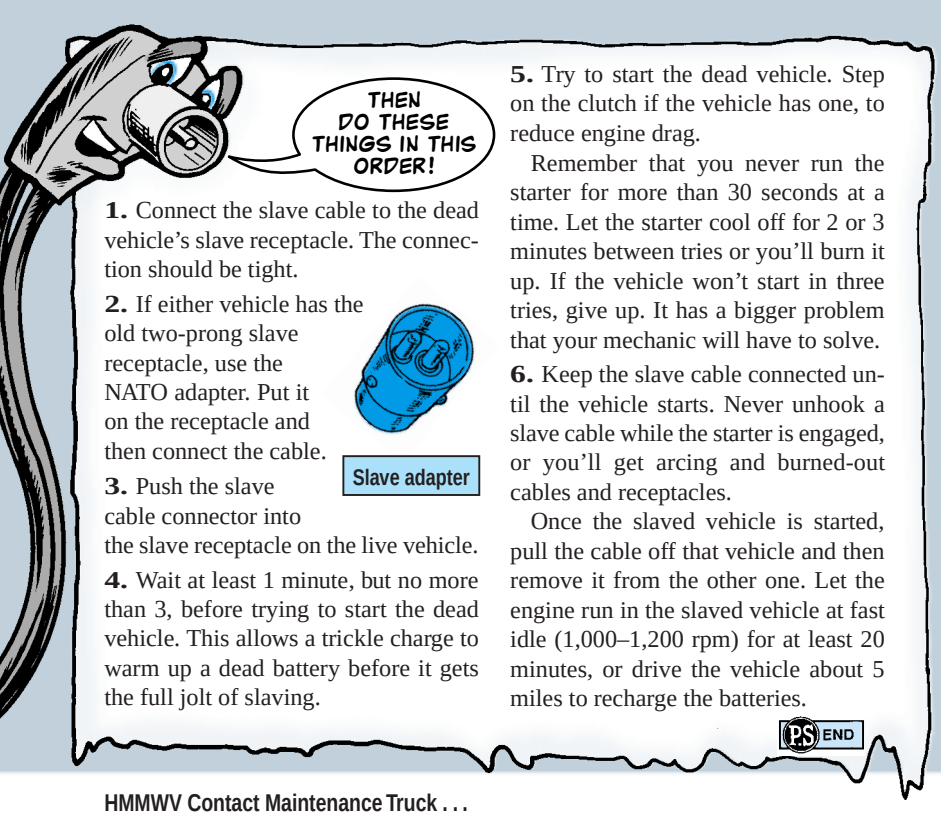
- Set the parking brakes on both vehicles. Shift both transmissions to neutral. Keep the live vehicle's engine running at a fast idle.



- Make sure the dead vehicle's battery switch is OFF to prevent arcing when you connect the slave cable.



PS MORE



1. Connect the slave cable to the dead vehicle's slave receptacle. The connection should be tight.

2. If either vehicle has the old two-prong slave receptacle, use the NATO adapter. Put it on the receptacle and then connect the cable.

Slave adapter

3. Push the slave cable connector into the slave receptacle on the live vehicle.

4. Wait at least 1 minute, but no more than 3, before trying to start the dead vehicle. This allows a trickle charge to warm up a dead battery before it gets the full jolt of slaving.

5. Try to start the dead vehicle. Step on the clutch if the vehicle has one, to reduce engine drag.

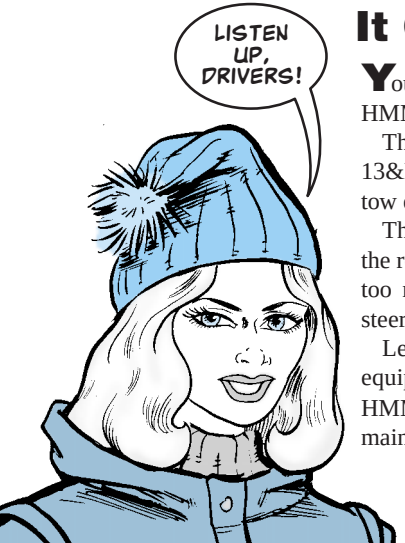
Remember that you never run the starter for more than 30 seconds at a time. Let the starter cool off for 2 or 3 minutes between tries or you'll burn it up. If the vehicle won't start in three tries, give up. It has a bigger problem that your mechanic will have to solve.

6. Keep the slave cable connected until the vehicle starts. Never unhook a slave cable while the starter is engaged, or you'll get arcing and burned-out cables and receptacles.

Once the slaved vehicle is started, pull the cable off that vehicle and then remove it from the other one. Let the engine run in the slaved vehicle at fast idle (1,000–1,200 rpm) for at least 20 minutes, or drive the vehicle about 5 miles to recharge the batteries.

PS END

HMMWV Contact Maintenance Truck . . .



It Can't Tow Anything!

You are not authorized to tow anything—trailers, HMMWVs, or any other vehicle—with your CMT-H.

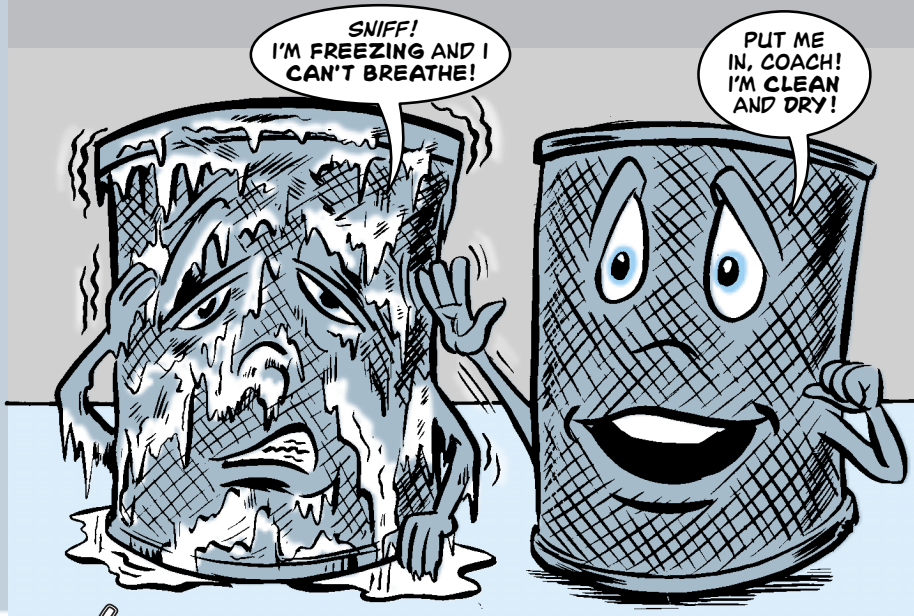
The last WARNING at the front of TM 9-4940-563-13&P says that the CMT-H cannot be employed to tow either a trailer or another HMMWV.

The center of balance of the CMT-H is too close to the rear axle to allow any towing. A towed load moves too much weight off the front end, causing loss of steering control, especially on wet roads or off-road.

Leave the towing of trailers loaded with parts or equipment to larger trucks, or at least to another HMMWV that is not loaded down with the contact maintenance shelter and tools.

All Vehicles . . .

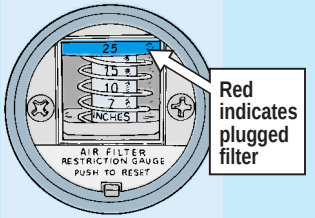
Keep Air Filters Dry

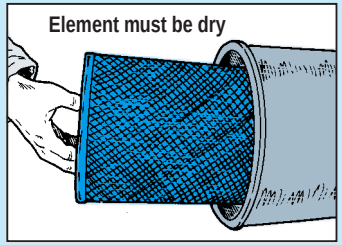


Ice and snow will turn air filters into blocks of ice that will not let clean air through to engines.

Moist air or snow sucked into the filter can freeze on the element. Once the element's coated with ice, air can't get through.

So, in damp, cold weather, keep an eye on your vehicle's air restriction indicator. On some vehicles, once the indicator shows red, the filter's plugged. On others, once a pointer reaches the red level on the indicator, the filter is plugged. Get the element cleaned and dried out, or get a new one.





Always keep snow cleared away from the air intake. In damp, cold weather it's a good idea to have a clean, dry element on hand for a quick switch.

Boosting Corrosion Protection

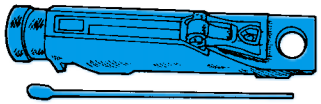
The freeze and corrosion protection provided by your vehicle's coolant diminishes over time. That means you need to check on the condition of the coolant regularly.

Here's how to make sure your coolant is up to the job:

Non-arctic Military Antifreeze

Check the freeze protection. Use the battery/antifreeze tester, NSN 6630-00-105-1418, from the Common shop sets.

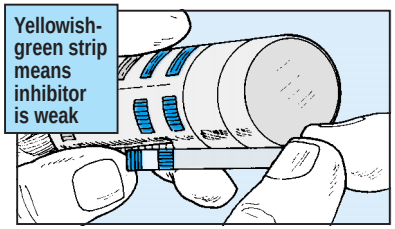
Check freeze protection with tester



Always use a 60/40 mix of antifreeze to water. This protects against freezing down to –50°F. It's better than plain water in hot climates, too. That's spelled out in Para 4b of TB 750-651, the antifreeze bible.

To make sure the reserve alkalinity (corrosion protection) levels are normal for ethylene glycol antifreeze, MIL-A-46153, use antifreeze test kit, NSN 6630-01-011-5039.

Dip a test strip into the coolant. A blue strip means it's OK. A green strip means the coolant is marginal, but is OK to use until the next service. A yellowish-green strip means the coolant needs a shot of inhibitor right away.



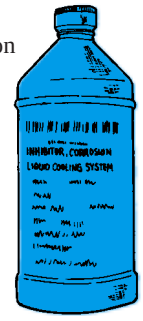
To check the corrosion protection of commercial antifreeze, A-A-52624, use commercial test strips that test for the nitrite level in engine coolant.

Some available test strips include Penray part number TS-100, Fleetguard part number CC2602 and Detroit Diesel Powertrac part number 23522774. The strips come with information on how to use them.

You can boost the coolant's corrosion protection only once, so make sure you note it on a DA Form 5986-E. The next time the level or corrosion protection is down you must replace the coolant.

Here's how to use the corrosion inhibitor:

1. Draw a sample of the coolant in a clear container. If it's contaminated with rust or solids, replace the coolant.



2. Add 1 pint of corrosion inhibitor for every 17 quarts of coolant. One quart of inhibitor comes with NSN 6850-01-160-3868. NSN 6850-01-287-8067 gets a gallon.

3. Mix the boosted coolant by running your vehicle for a few minutes. After the engine has cooled, retest the reserve alkalinity level. If the coolant fails the test, replace it.

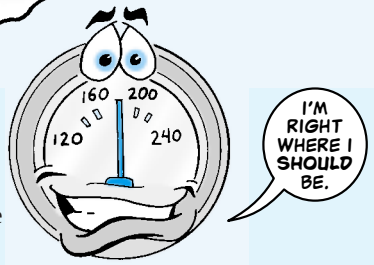
Arctic Antifreeze

Things are a bit different if your vehicle uses full-strength arctic antifreeze during extremely cold weather (–50°F and lower).

When the weather gets warmer, switch back to non-arctic military or commercial antifreeze. The rotation between types of antifreeze will ensure your coolant's corrosion protection stays strong.

Keeping Cool in the Cold

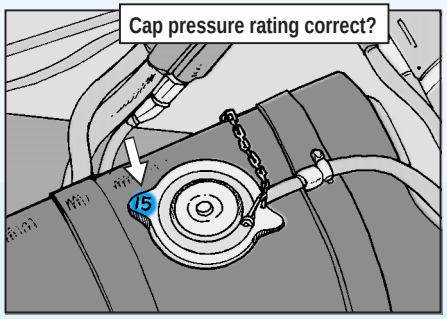
No matter how cold it is outside, your vehicle's cooling system should be able to reach 160° to 180°F. If yours won't, have the thermostat checked. It may be stuck open and need replacing.



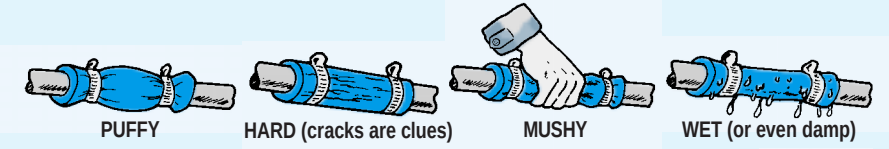
A vehicle system that always runs at more than 200°F also needs attention. A bum thermostat, a clogged radiator, a bad radiator cap or filthy coolant may be the culprit. The engine's air flow may even be blocked.

To speed up heating in freezing weather, you can partially cover the air intake grilles with canvas when starting the vehicle. Be sure to remove the cover after the engine reaches operating temperature.

Look at the radiator cap. It should be the one your TM calls for. Just any cap won't do. The pressure rating of the cap is vital. Too low a rating lowers the boiling point of your coolant. Too high builds up pressure that'll pop radiator seams or blow hoses.



Hoses need to be touched as well as looked at. They must withstand heat, pressure and vibration. They're rubber, so they rot, harden and crack with age. You need both eyes and hands to detect bad hoses. Report any bad hoses that show these signs:

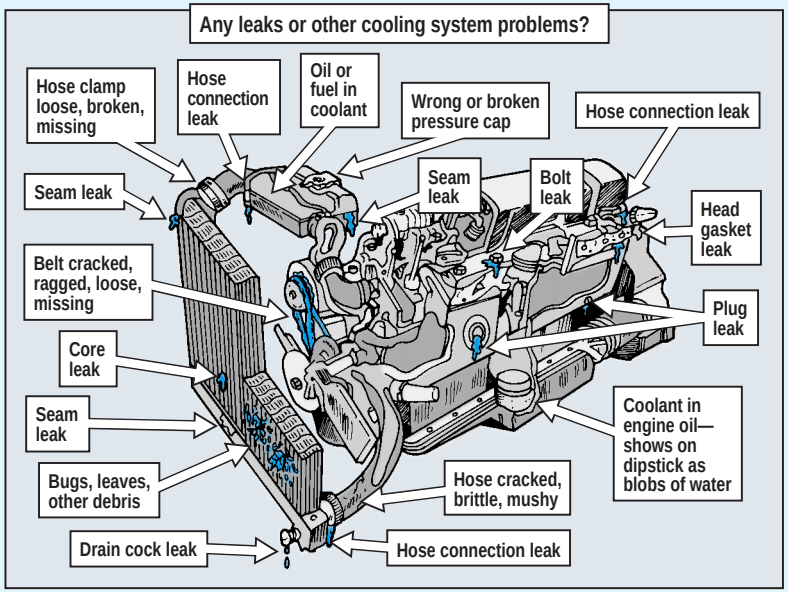


PS MORE

Check the radiator. Look for leaks on the top tank, front and back of the core and bottom tank.

Leaks may not show up when your engine is cold, so look for rust and odd-colored dribbles where coolant has leaked and dried.

Later, when you've got the engine running at operating temperature and pressure, check those places again for wet spots. Use a flashlight during both inspections.



Finally, take the radiator cap off. If the cooling system is hot, open the filler cap slowly until all pressure is gone. Use a rag or glove to protect your bare hand from the hot cap.

The coolant should be at least over the top of the core. It should be almost clear—and colored by the antifreeze.

If your coolant is muddy-looking or has bits of junk in it, your cooling system needs draining and flushing, maybe even cleaning. Report it.

If you see a rainbow of oil slime on top of the coolant, you've probably got a leak inside the engine. Exhaust gas or oil is getting into your cooling system. Pull the crankcase dipstick and check for water in the oil. Little blobs will show on the dipstick. Either way, report it.

Note, drivers, that air-cooled systems don't need much attention. All they need is a good flow of air—meaning all the airflow shrouds must be in place.

PS END

All Vehicles . . .

Muster the Rust Buster

Corrosion attacks Army equipment relentlessly. Rain, salt, wind and sand take their toll. The destruction isn't always noticeable but it's enormous, and the cost is staggering.

Your best weapon against that corrosion is rust inhibitor. Just wipe or spray the inhibitor every 8 months or so to the inside and underneath your vehicles. It will slow the spread of new rust and clean up old rust.

It won't harm painted surfaces, plastics, rubber, glass or wiring, but it will make them shine for a week or two. If that ruins your camouflage efforts, keep it off the outside of your equipment.

The inhibitor works by eliminating moisture that holds salt, dirt and other pollutants that eat up metal. It also lubes moving parts and penetrates existing rust.

The inhibitor is petroleum-based and contains no silicones, solvents, or anything else classified as hazardous material. Even though the inhibitor contains no hazardous material, the headshed recommends that you wear a respirator, goggles and gloves when applying it because of possible irritation to your respiratory tract or skin.

Order the amount of inhibitor you need:

Quantity	NSN 8030-01-414-
16-oz bottles (12)	7423
5-gal container	8947
55-gal drum	7430

NSN 8030-01-389-1413 brings a 55-gal drum of inhibitor, a spray applicator and an instruction video. You can get a copy of the video by itself for free by calling (800) 856-6798.

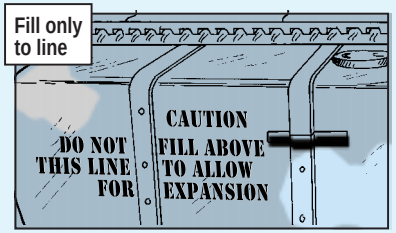
As a rule of thumb, it takes about 2 gallons to treat a HMMWV and up to 3 gallons for a 2 1/2-ton or 5-ton truck.

Water in Fuel Will Freeze

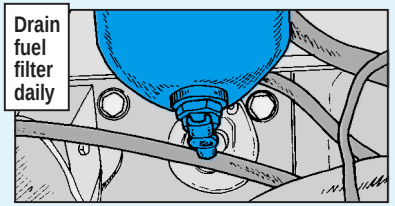
It'll be real hard to start your vehicle this winter if the fuel lines are plugged with ice. But ice is what you'll have if you fail to keep water drained from the fuel filtering system.

Here's how to keep the fuel flowing and your vehicle going:

- Fill fuel tanks to within 2 inches of the bottom of the filler neck (or to the mark painted or stenciled on the tank). When you fuel your vehicle, keep ice and snow away from the tank opening.



- Drain fuel filters **every** day you operate. If you get more water than usual, report it.



- If you're still using old-style diesel fuel or gasoline, consider adding icing inhibitor to the fuel. But first, make sure it hasn't already been added (JP-8 comes with an inhibitor already in it).

If you can use the inhibitor, use no more than 1 pint per 40 gallons. Too much inhibitor will cut performance and damage engines.

Add the inhibitor to the tank first, so it can mix properly. How much inhibitor you add depends on the amount of fuel you mix it with.

Here are the proper ratios:

Fuel	Inhibitor
40 gallons	1 pint
30 gallons	3/4 pint
20 gallons	1/2 pint
10 gallons	1/4 pint

Here's the stuff to use:

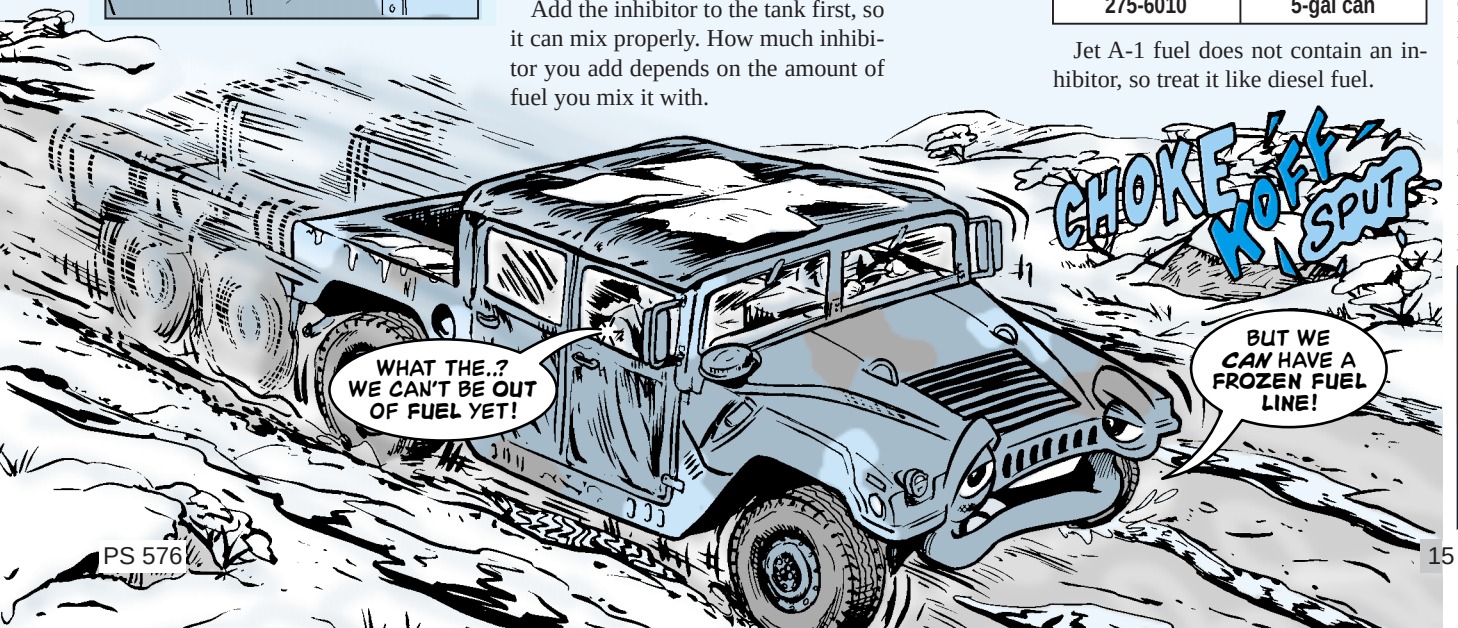
Diesel fuel inhibitor

NSN 6850-01-	Size
377-5074	5-gal can
089-5514	55-gal drum

Gasoline inhibitor

NSN 6810-00-	Size
597-3608	1-gal can
275-6010	5-gal can

Jet A-1 fuel does not contain an inhibitor, so treat it like diesel fuel.



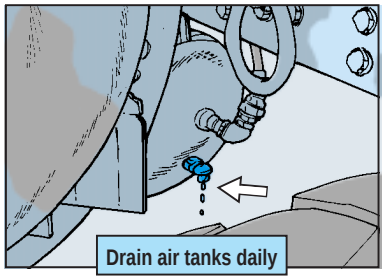
'Brake' Winter's Icy Grip

Drivers, moisture builds up in your truck's air brake system even in the best of weather. Left alone, it corrodes air lines, relief valves, check valves, even the air tanks themselves.

During winter, that water turns to ice and the problem gets even worse!

Ice plugs up the air system. If air can't get through, the brakes won't work. Water also has a nasty habit of expanding as it freezes. It can burst lines and fittings and ruin your brakes completely.

Stop that problem in its tracks by draining the air tanks after each day's run. And don't forget to close the air valves after draining. Otherwise the valves may freeze in the open position.



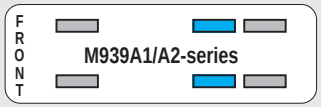
Exceptional Data

Between your vehicle's -10 TM and FM 21-305, *Manual for the Wheeled Vehicle Driver*, you can find most everything you need to know about the use of tire chains on your vehicle.

The -10 TM is boss in the matter—unless there's no info in it on tire chain use. Then the FM takes over.

There are, however, exceptions to the rules found in those pubs. Take note:

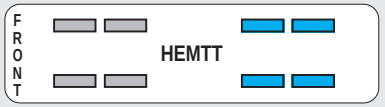
M939A1-series and M939A2-series 5-ton trucks: Use chains on the intermediate axle only. CTIS doesn't prohibit the use of chains on the intermediate axle.



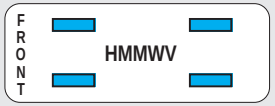
Palletized loading system (PLS): Use chains only on axles No. 3 and No. 4. Don't use chains when driving on hard surfaces where there is no wheel slippage. Chains can cause severe component damage under "no-slip" conditions.

Also, set the CTIS to CROSS COUNTRY and proceed no faster than 10 mph on-highway or 15 mph off-highway.

HEMTT: Use chains only on both rear axles. On M978 fuel tankers, never use chains when driving on paved surfaces. They could cause sparks.



HMMWV: Although Page 3-28 of TM9-2320-280-10 says to use chains on all four wheels, **you can use chains on just the frontwheels as a set,** or **just on the rear wheels as a set.** It's OK to use chains on runflat tires, too.

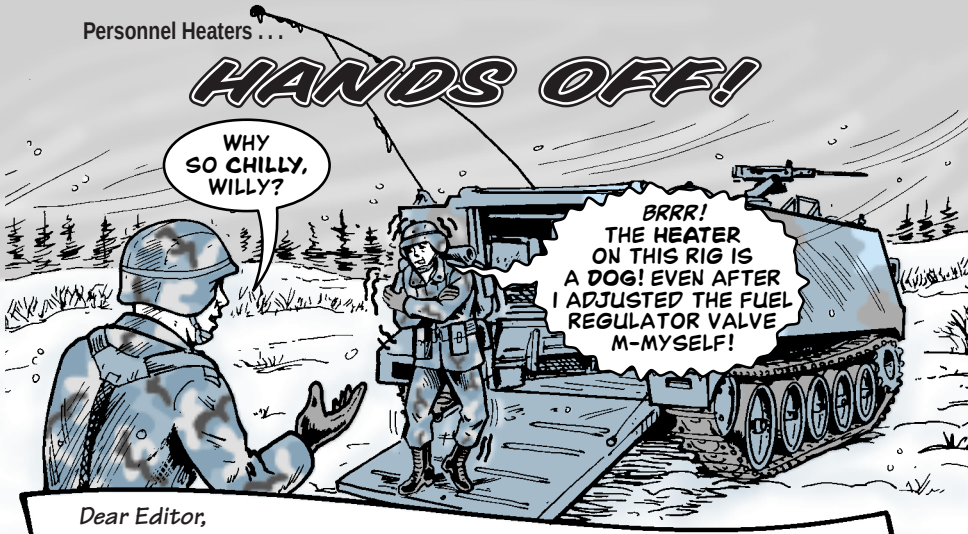


Remember, also, that it's still important to select the right transfer range for driving conditions, as prescribed in your -10 TM.

For a cross-reference list of chains and tire sizes, visit Team Tire's web site:

http://www.tacom.army.mil/immc/Support/Teamtire/chain.htm

HANDS OFF!

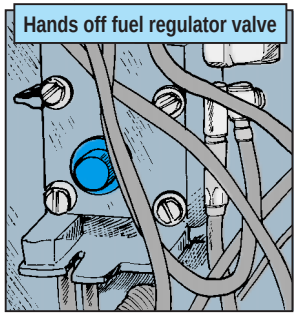


Dear Editor,

I work at a contract maintenance facility. One of the things we work on is personnel heaters.

Nearly every time we disassemble a "bad" heater, we find that someone has readjusted the settings on the fuel regulator valve.

Crewmen get frustrated when their heater doesn't put out enough warm air. They adjust the valve to increase the heat. Unfortunately, that usually makes the heater get TOO hot and the overheat switch shuts it down automatically. Since the heater won't work, we have to repair it.



Most of the time, you can get more heat by following the proper start-up and shutdown procedures in the heater's -10 TM. If that doesn't help, the heater should be reported.

The only time the fuel regulator valve can be properly adjusted is when the heater is on a heater test stand. Crewmen should NEVER touch the valve.

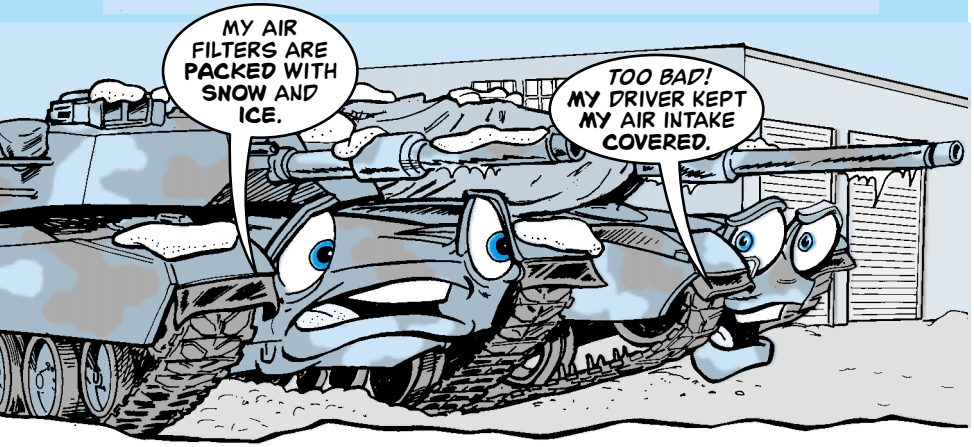
Jim Carter
FORSCOM QAR
Ft Hood, TX

FROM THE DESK OF THE Editor

Hopefully, your letter will lead crewmen to take a hands-off approach to their heater's fuel regulator valve!

Combat Vehicles . . .

Keep Air Filters Dry

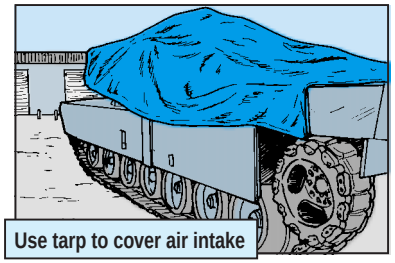


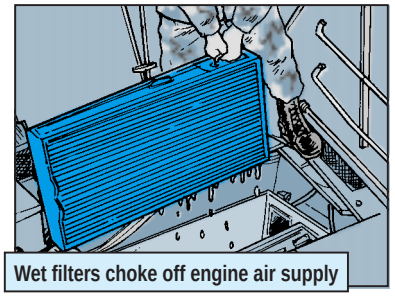
If your combat vehicle's air filters get wet or freeze up, its engine can't get the air it needs to keep running. Pretty soon you've got a burned-out engine.

So keep those air filter elements as dry as you can when Mother Nature throws a little slop your way.

Start with the air cleaner intake. When your vehicle is sitting, cover the intake with canvas or plastic to keep out rain, sleet and snow. Make sure you remove the cover before operating, though.

During operation, keep a close eye on the air cleaner indicator or air filter clogged light so you'll know when the element is plugged. Get a plugged filter cleaned, dried out, or replaced—whichever is needed—as soon as possible.


Use tarp to cover air intake


Wet filters choke off engine air supply

Keep Heater Outlets Clear

Your vehicle's personnel heater is for personnel. Keep everything else away.

Loose stuff like field jackets, gloves, aerosol cans, TMs, ammo bags or anything else near the outlets can start a fire.

The air temperature at heater outlets can reach 300°F when the heater is running on high. That's hot enough to burn most everything that's combustible inside a combat vehicle.

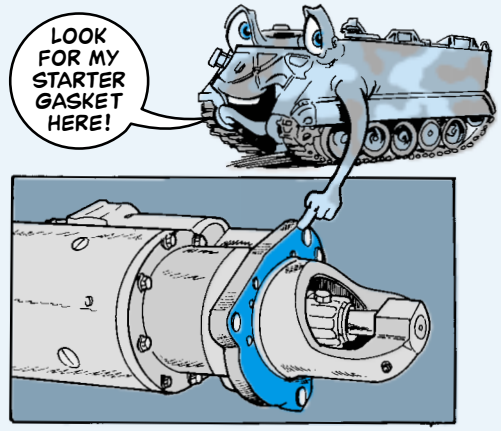
Don't be among the many who have learned the hard way—from fires or explosions that could've been prevented.

Don't Forget the Gasket

Mechanics, all it takes is a missing gasket to freeze up the starter on an M113, M109, M992, or M578 vehicle.

Water gets inside the starter when there's no gasket to stop it. You know what happens to water when the temperature dips to 32°F and below. It freezes solid and stops the starter cold.

The next time you pull the powerpack, take a quick look to make sure the starter gasket, NSN 5330-00-980-1546, is in place. If it's not, install it.



M113-Series FOV . . .

Uncovering All the Bases

Drivers, the canvas cover for your vehicle's intake and exhaust grilles is made to keep ice, snow and other debris out of the engine compartment when the vehicle's not in use.

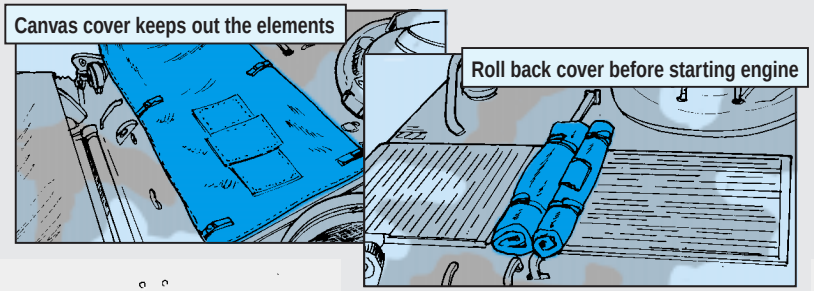
The cover is **not** made to help the engine warm up faster during cold weather.

Some operators keep the grilles covered anyway. They figure the faster the engine warms up, the sooner the mission will be accomplished.

Not true. In fact, the mission may not get accomplished at all. Leaving the cover in place heats the engine too fast and can burn it up.

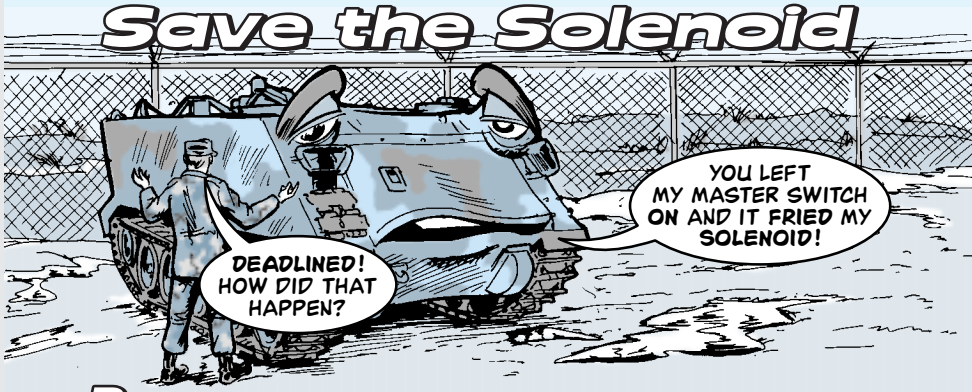
Also, fumes from the engine compartment that would normally be vented through the exhaust grille are forced into the driver and crew compartments. That's a deadly proposition.

Always roll back the cover from the exhaust and intake grilles before starting your vehicle. Secure the cover in place with the straps provided.



M113A3 Personnel Carrier . . .

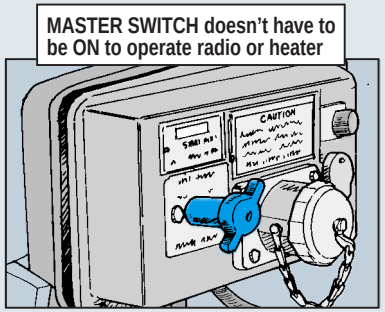
Save the Solenoid



Drivers, there's no need to keep the master switch on just to use your M113A3 carrier's personnel heater or radio. Both work just fine with the switch off.

Leaving the switch on keeps the steering lockout solenoid energized. If it's on long enough, the solenoid will burn out and deadline your vehicle.

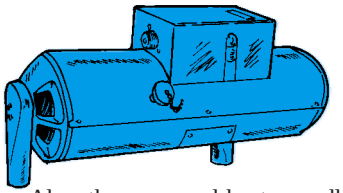
Just make sure you remember to turn the radio off when you turn off the engine. If it's still on the next time you start the engine, you'll end up with a fried radio.



M992A2 Ammo Carrier . . .

Modify Heater *before* Installing

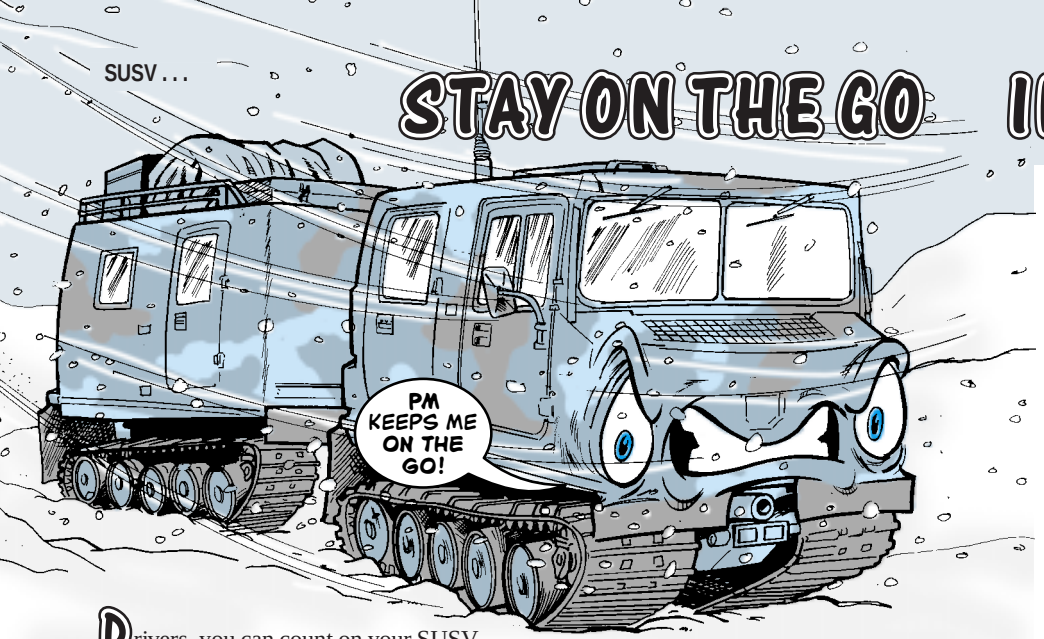
Mechanics, before you install the new A-20 Global personnel heater, NSN 2540-01-396-2826, in an M992A2 ammo carrier, you'll need to make a few modifications.



The existing fuel pump doesn't provide enough pressure for the new personnel heater. Also, the personnel heater cradle assembly doesn't allow enough clearance to install the new heater.

Modification instructions and a list of parts you'll need are found on Pages 3-22 through 3-25 of TB 43-0001-62-8 (Jan 99). If you need a copy, see your local TACOM logistics assistance representative or write to Half-Mast.

STAY ON THE GO IN ICE AND SNOW

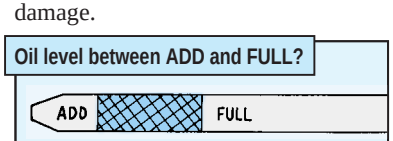


Drivers, you can count on your SUSV to go in the snow if you give it good PM. The best way to do that is by following the good words in TM 9-2350-285-10.

Before You Go

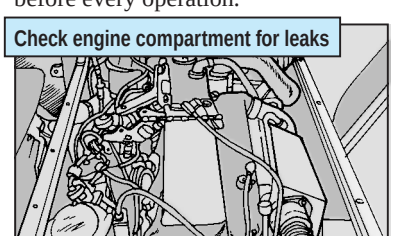
❄ Use only approved fuel and never add anything to it to try to enhance performance. All you'll do is burn up pistons and pre-chambers.

❄ Check the oil. The oil level should be between the ADD and FULL mark on the dipstick once the engine has warmed up. An oil level above the FULL mark can blow seals. Oil levels below ADD can lead to friction damage.



❄ Follow the payload restrictions on Page 1-9 of the -10 TM. An overloaded vehicle puts too much wear and tear on the engine.

❄ Eyeball the engine/transmission compartment for fluid leaks or debris before every operation.



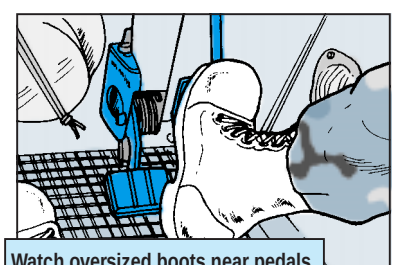
If you find trash, clean it up. If you find leaks, let your mechanic know ASAP. To keep the compartment clean, steam clean it (or clean with dry cleaning solvent and water) at every semi-annual service.

If a cleaning job can't be done with the powerpack in place, your mechanic will have to pull the pack.

Fire Prevention

❄ Make sure the parking brake is released before you drive off. An overheated brake system can cause fires.

❄ Watch your feet when wearing oversized cold-weather footgear. The parking brake is only 8 inches from the service brake. If you accidentally set the parking brake with that big boot—even partially—the brake system can overheat.



It's also easy to press against the service brake while stepping on the accelerator.

Cold Weather Starting

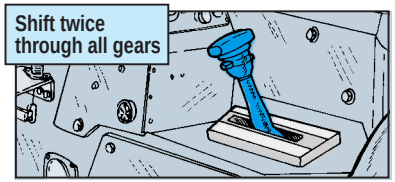
❄ In sub-zero weather, use the swingfire heater to preheat the engine before starting. Page 2-35 in the -10 TM tells how.

❄ Do not use canned ether. Ether can clog or burn fuel injector tips and ruin cylinder heads.

❄ After your SUSV is started:

1. Idle the engine for 5 minutes.

2. Then, with the brakes engaged, slowly shift the gear selector twice through all gears. This ensures the transmission fluid is warmed up.



3. Let the SUSV warm up for a total of 15 minutes before heading out.

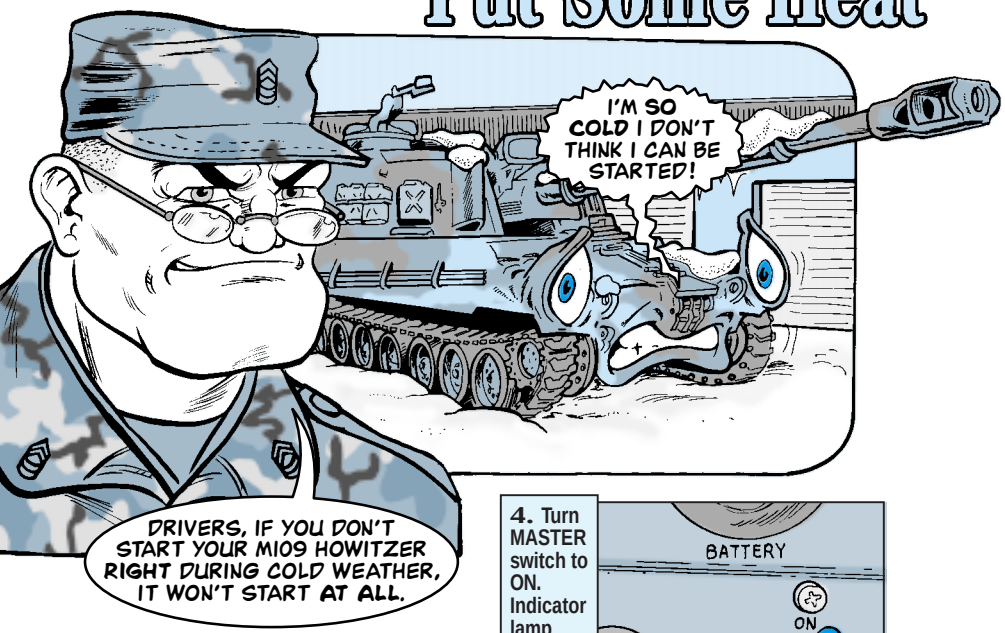
Before You Stop

Let the SUSV engine cool down slowly. Once the engine's off, there is no way to carry away heat. The sudden rise in heat can crack the block, warp a head or valves, or bake the oil until it's not slick enough to lube the bearings.

Let the engine idle at least 3 minutes to cool off. The cooldown period gives you time to eyeball the gauges, switches and warning lights for anything out of the ordinary.

If your SUSV has a full payload, it runs even hotter. Before shutdown, idle the engine at 1,400 rpm for 30 seconds, then at 900 rpm for at least 3 minutes for extra cooling.

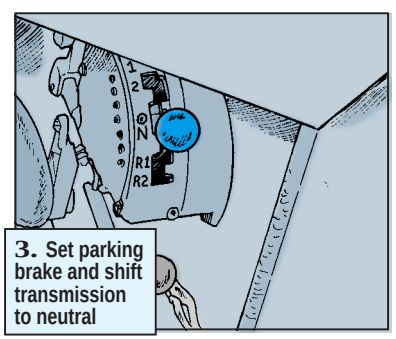
Put Some Heat in Cold Starts



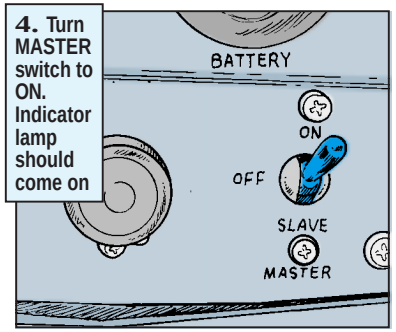
Before You Start

1. Turn off the personnel heater and shut off the COOLANT HEATER switch.

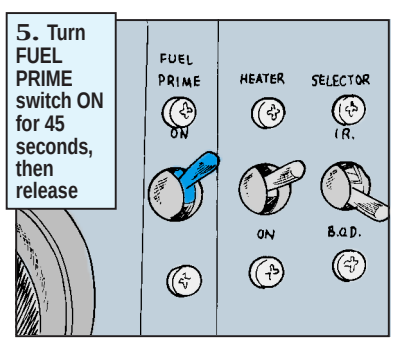
2. Make sure the battery indicator gauge is in the green range.



3. Set parking brake and shift transmission to neutral



4. Turn MASTER switch to ON. Indicator lamp should come on



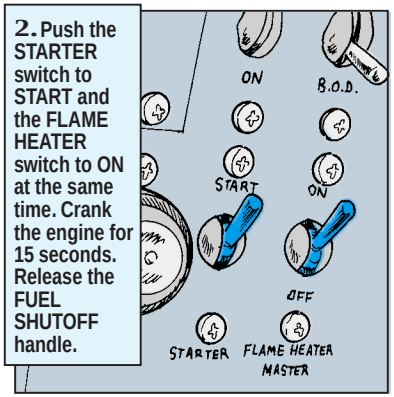
5. Turn FUEL PRIME switch ON for 45 seconds, then release

6. Set the hand throttle to IDLE. Do not use the foot throttle.

Starting

Now you're ready to start the vehicle:

1. Pull out and hold the FUEL SHUTOFF handle.



2. Push the STARTER switch to START and the FLAME HEATER switch to ON at the same time. Crank the engine for 15 seconds. Release the FUEL SHUTOFF handle.

3. Keep cranking the engine while setting the FLAME HEATER switch to ON for 1 second and to OFF for 1 second until the tachometer reads at least 300 rpm.

4. Let go of the FLAME HEATER switch. Keep cranking until the tachometer reads at least 500 rpm. The hand throttle may be increased about 1/8 travel to help start the vehicle once 500 rpm is reached. **Do not** use the foot throttle or the engine will return to idle once it's released.

5. Stop cranking if the engine hasn't started after 2 minutes, or you can burn up the starter. Wait at least 2 minutes, then repeat steps one through four. If the engine still won't start or doesn't reach 100 rpm or more after 15 seconds, tell your mechanic.

6. Release the starter switch after the engine starts and follow the engine warmup procedures in the -10 TMs.

Before Shutdown

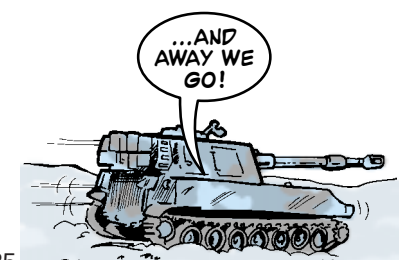
Just before shutdown, run the engine at idle and turn on the FLAME HEATER switch. If the heater is working OK, you'll see a slight decrease in engine speed and an increase in exhaust smoke. If not, call your mechanic.

Testing the flame heater also ensures that fuel is in the fuel supply line the next time you start your vehicle.

To increase the chances of an easy start the next time the thermometer takes a nose dive, have your mechanic install a cold start enhancement kit, NSN 2990-01-342-7944.

The kit maintains 1 1/2 psi of positive pressure in the fuel lines. That prevents loss of prime in the flame heater fuel supply line when the engine is not running.

Make a note of the kit until the parts manual is updated. The kit will only work with M109A2-A5 howitzers.



Clearing the Air

When it's cold outside, you have to button up your Paladin tight to stay warm. But that can put you at risk of carbon monoxide poisoning.

Carbon monoxide comes from the exhaust of personnel heaters, the engine, and from firing the main gun. If you don't vent the vapors, the carbon monoxide will increase until the levels become deadly.

Your best protection is awareness and ventilation. Follow these basic tips to ensure proper ventilation:

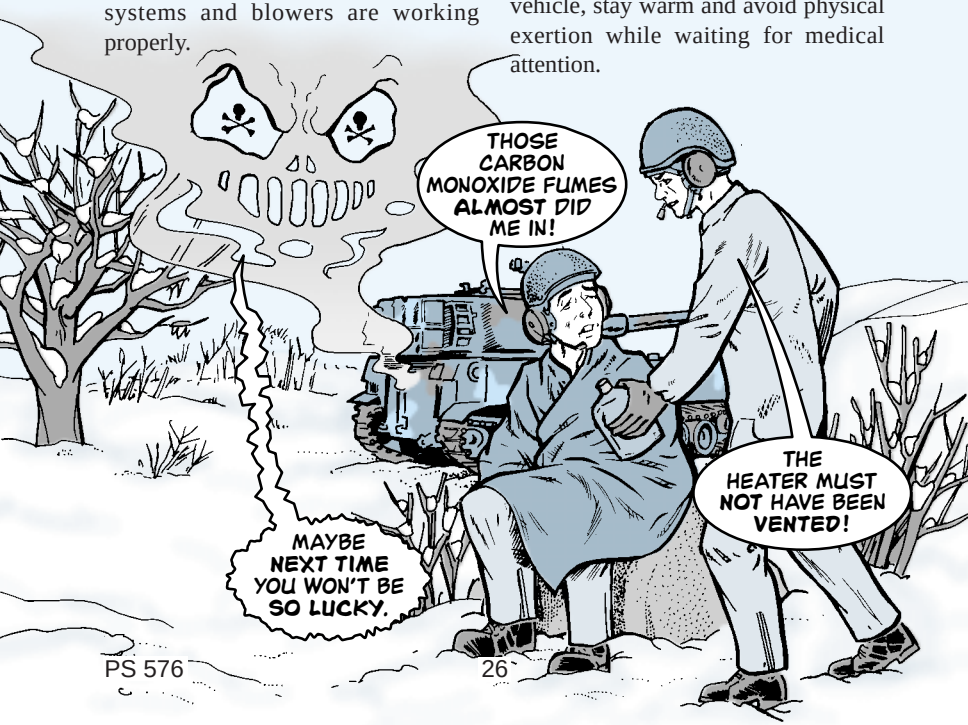
•• Do your PMCS on time. That's the only way to make sure ventilation systems and blowers are working properly.

•• Never operate the personnel heater in an enclosed area unless it is adequately vented.

•• Do not idle the engine for long periods unless you're sure the personnel compartment is ventilated.

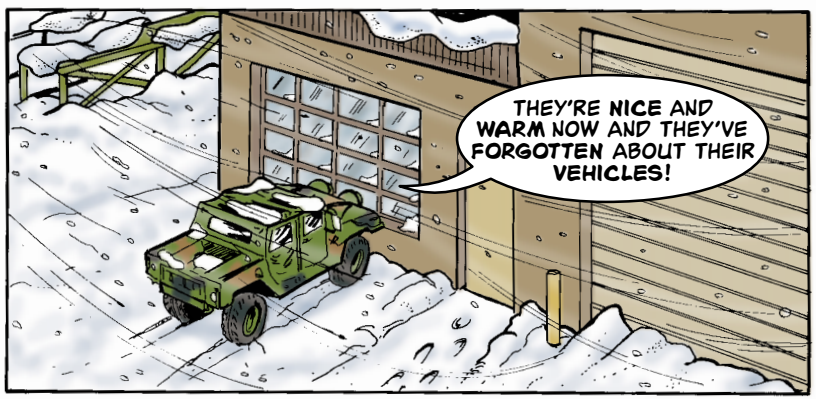
•• Do not drive your Paladin with the inspection plates, cover plates or engine compartment doors removed unless it's necessary for maintenance.

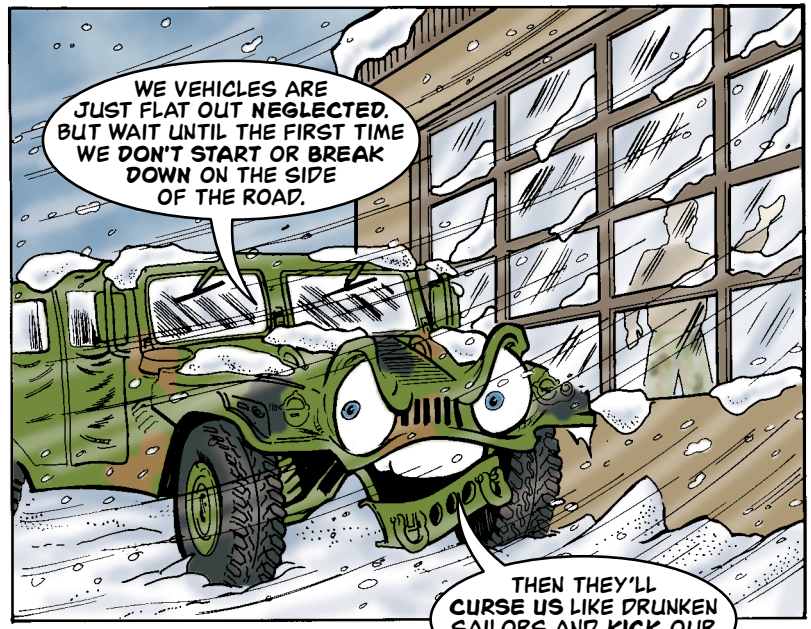
•• Be alert at all times for the symptoms of carbon monoxide poisoning: headaches, dizziness, loss of muscular control, and drowsiness. If you experience these symptoms, get out of the vehicle, stay warm and avoid physical exertion while waiting for medical attention.



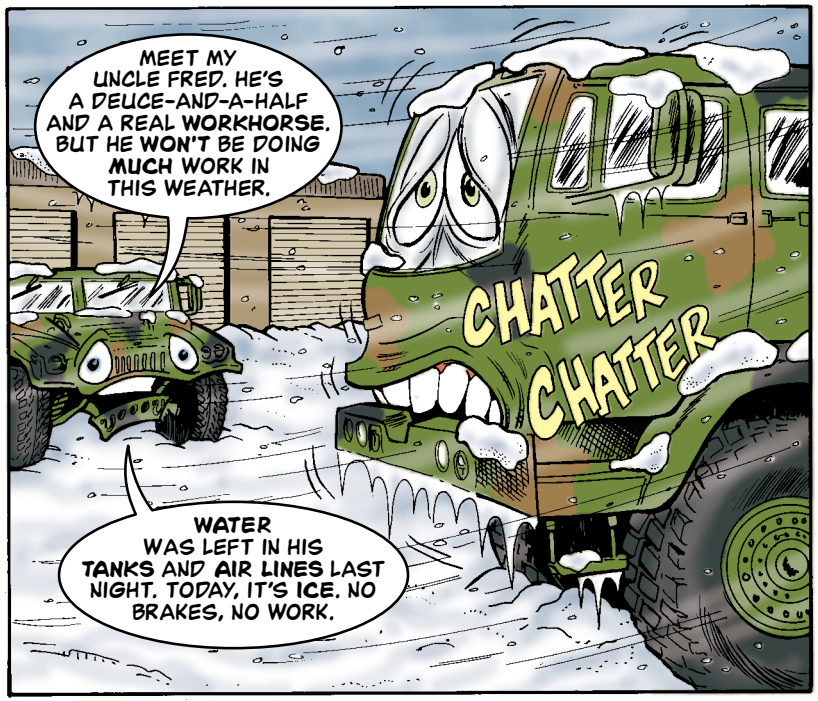

Left Out in the COLD
WHERE'S THAT GLOBAL WARMING I KEEP HEARING ABOUT?
I'M FREEZING MY TAIL OFF. LET'S GET INSIDE.


IT MUST BE AT LEAST 10 BELOW OUT THERE.
SIGH!
YOU'RE NOT KIDDING!
HEAT-O-MATIC

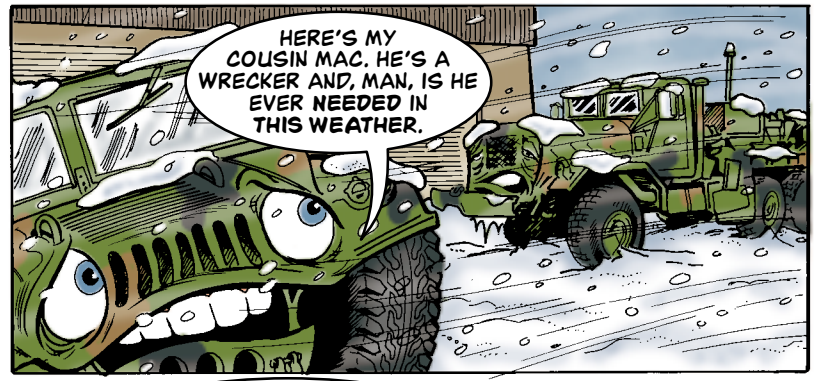

THEY'RE NICE AND WARM NOW AND THEY'VE FORGOTTEN ABOUT THEIR VEHICLES!

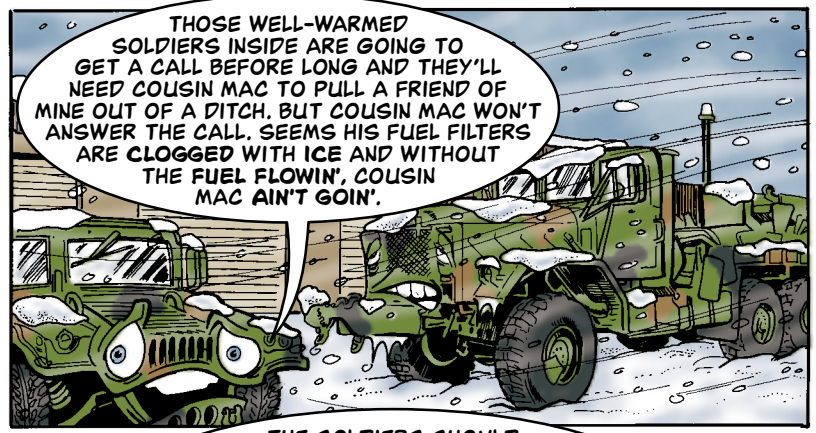

WE VEHICLES ARE JUST FLAT OUT NEGLECTED. BUT WAIT UNTIL THE FIRST TIME WE DON'T START OR BREAK DOWN ON THE SIDE OF THE ROAD.
THEN THEY'LL CURSE US LIKE DRUNKEN SAILORS AND KICK OUR TIRES IN ANGER.

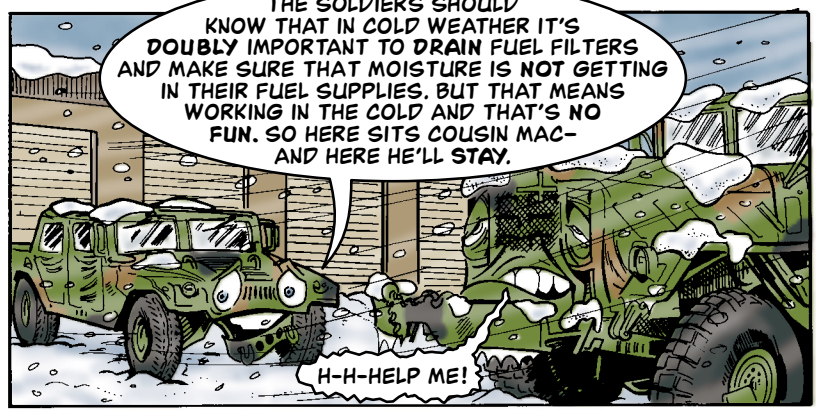

THEY EXPECT US TO PERFORM WITHOUT WINTER PM AND WE JUST CAN'T DO IT. COME WITH ME ON A TOUR OF THIS MOTOR POOL AND SEE SOME OF MY NEGLECTED RELATIVES.

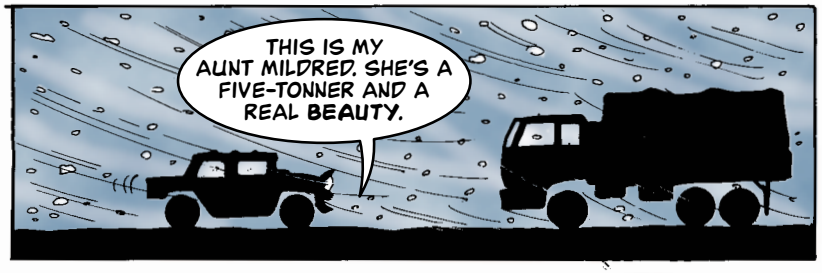

MEET MY UNCLE FRED. HE'S A DEUCE-AND-A-HALF AND A REAL **WORKHORSE**. BUT HE **WON'T** BE DOING **MUCH** WORK IN THIS WEATHER.
CHATTER CHATTER
WATER WAS LEFT IN HIS **TANKS** AND **AIR LINES** LAST NIGHT. TODAY, IT'S **ICE**. NO BRAKES, NO WORK.


GOOD PM WOULD HAVE THEM ROLLING THROUGH THE **WORST** OF **WINTERS**. **POOR PM** HAS THEM **BROKEN DOWN** IN THE CORRAL.
H-H-HELP ME!


HERE'S MY COUSIN MAC. HE'S A WRECKER AND, MAN, IS HE EVER **NEEDED** IN **THIS WEATHER**.


THOSE WELL-WARMED SOLDIERS INSIDE ARE GOING TO GET A CALL BEFORE LONG AND THEY'LL NEED COUSIN MAC TO PULL A FRIEND OF MINE OUT OF A DITCH. BUT COUSIN MAC WON'T ANSWER THE CALL. SEEMS HIS FUEL FILTERS ARE **CLOGGED** WITH **ICE** AND WITHOUT THE **FUEL FLOWIN'**, COUSIN MAC **AIN'T GOIN'**.

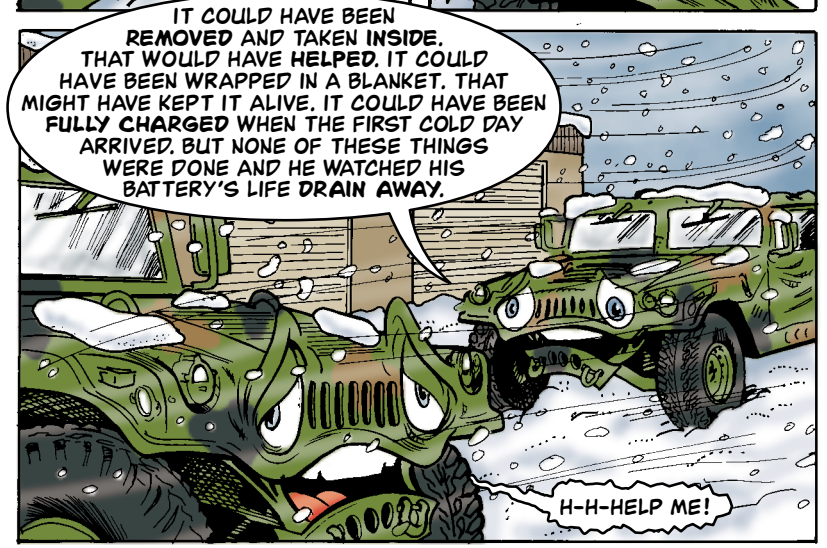

THE SOLDIERS SHOULD KNOW THAT IN COLD WEATHER IT'S **DOUBLY** IMPORTANT TO **DRAIN** FUEL FILTERS AND MAKE SURE THAT MOISTURE IS **NOT** GETTING IN THEIR FUEL SUPPLIES. BUT THAT MEANS WORKING IN THE COLD AND THAT'S **NO FUN**. SO HERE SITS COUSIN MAC– AND HERE HE'LL **STAY**.
H-H-HELP ME!


THIS IS MY AUNT MILDRED. SHE'S A FIVE-TONNER AND A REAL **BEAUTY**.


BUT SHE IS BEING DRIVEN TO HER **DEATH** IN THIS COLD WEATHER. SEE, NONE OF HER DRIVERS HAVE HAD ADEQUATE COLD-WEATHER **TRAINING**. THEY DON'T KEEP HER ENGINE AND RADIATOR **COVERED** WHEN THE SNOW FALLS AND THE WIND HOWLS. THEY DON'T ADEQUATELY **WARM UP** HER ENGINE AND HER GEARBOX **BEFORE** THEY HIT THE ROAD.
AND WHEN THEY BRING HER HOME, THEY DON'T LET HER SIT AND **COOL DOWN** A MINUTE 'CAUSE THEY DON'T KNOW THAT A COOLDOWN IS **VITAL** EVEN IN COLD WEATHER. YEP, PM IS A **DRIVER RESPONSIBILITY**, TOO.
H-H-HELP ME!


FINALLY, MEET MY BROTHER, HENRY. HIS RADIATOR IS A **BLOCK** OF **ICE**.


SEEMS ANTIFREEZE WAS ADDED BACK IN THE FALL, BUT NO TEST WAS RUN TO MAKE SURE THE PROTECTION LEVEL WAS **RIGHT** FOR THE **CLIMATE**. AND IT WASN'T. IT COULDN'T COUNTERACT ALL THE TIMES A WATER HOSE WAS STUCK DOWN HIS THROAT. BUT IT DOESN'T MATTER, HIS BATTERY IS **DEAD**, TOO.


IT COULD HAVE BEEN **REMOVED** AND TAKEN **INSIDE**. THAT WOULD HAVE **HELPED**. IT COULD HAVE BEEN WRAPPED IN A BLANKET. THAT MIGHT HAVE KEPT IT ALIVE. IT COULD HAVE BEEN **FULLY CHARGED** WHEN THE FIRST COLD DAY ARRIVED. BUT NONE OF THESE THINGS WERE DONE AND HE WATCHED HIS BATTERY'S LIFE **DRAIN AWAY**.
H-H-HELP ME!


CAN YOU SPARE A LITTLE COLD-WEATHER PM TO SAVE OUR FAMILY?
WHERE ARE YOU GOING?
OUT TO WORK ON THAT HMMWV. I JUST GOT THE STRANGEST FEELING THAT I SHOULD BE PULLING SOME PM.
ARE YOU NUTS? IT'S FREEZING OUT THERE!
SOMEBODY'S GOT TO DO IT! IT'S MY JOB!

Shucks, You're Stuck!

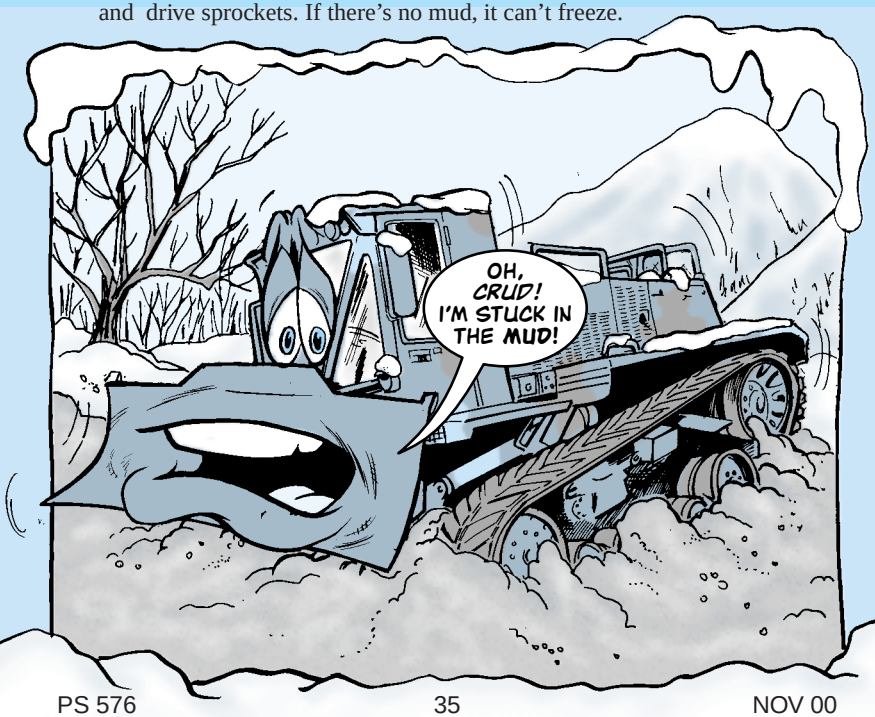
Cold weather and mud at the worksite can fool you.

Mud is soft and wet during the day, but it can freeze as hard as concrete at night. A vehicle left sitting in mud at the end of the day will be frozen in its tracks the next morning.

And, it doesn't matter if you're in the DEUCE, D5B or D7G tractors, or the M9 ACE…you can't rock the vehicle loose. You'll end up with broken track, snapped drive sprocket teeth and a vehicle that's still stuck.

Here's how to prevent that problem. Before the sun goes down:

* Park your vehicle on high ground if possible. Water drains downhill, so the mud won't be quite as deep.
* Avoid parking in deep ruts worn by other vehicles. Some are deep enough to bottom out your vehicle's hull. Leave it there and you won't be moving until spring.
* Use a shovel to scoop out mud that has collected on and between roadwheels and drive sprockets. If there's no mud, it can't freeze.



GET RID OF ICE BUILDUP

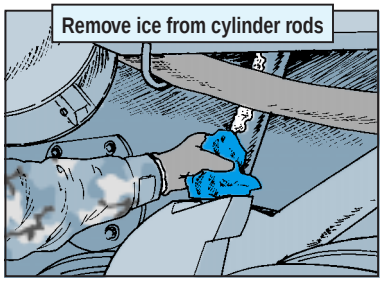
Operators, keep an eye on your construction equipment's cylinder rods for any ice buildup during cold weather.

Ice on the rods will scrape or cut seals when the rod is moved. Damaged seals lead to fluid leaks, which lead to NMC equipment. If you find any ice, get rid of it with heat or deicing fluid. Use no scrapers or tools. They'll do more harm than good.

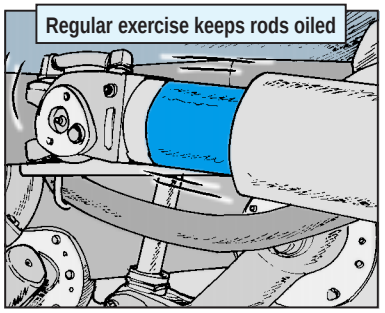
Weekly Exercise

Another rod saver, no matter what the weather, is exercise. Do it weekly. It fights rust by spreading a thin coat of oil on the rod. Rust, like ice buildup, will scrape and cut rod seals.

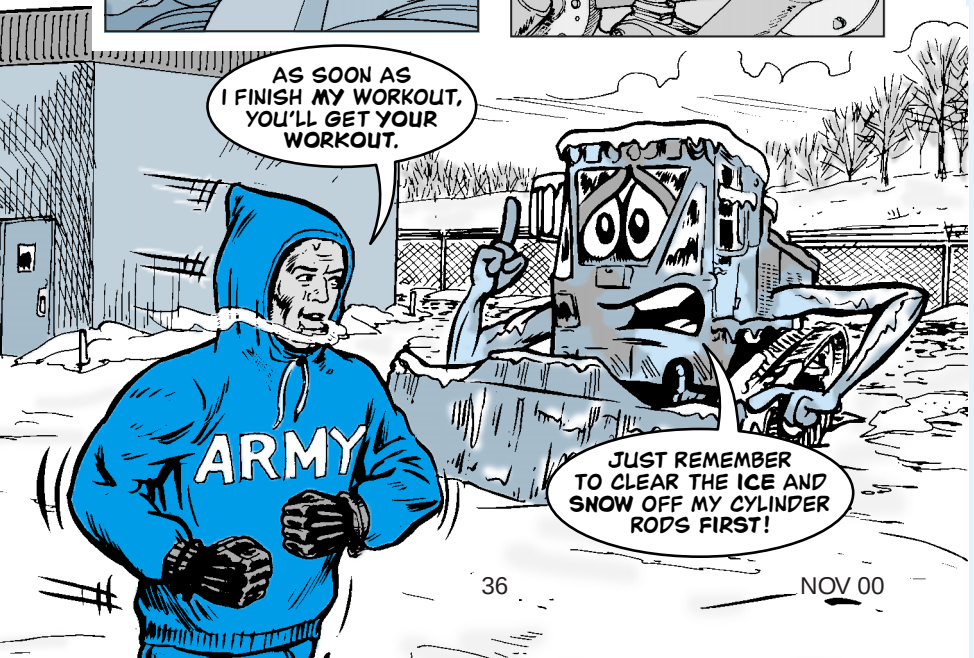
If you can't exercise the hydraulics, smear a light coat of GAA on the cylinder rods weekly.



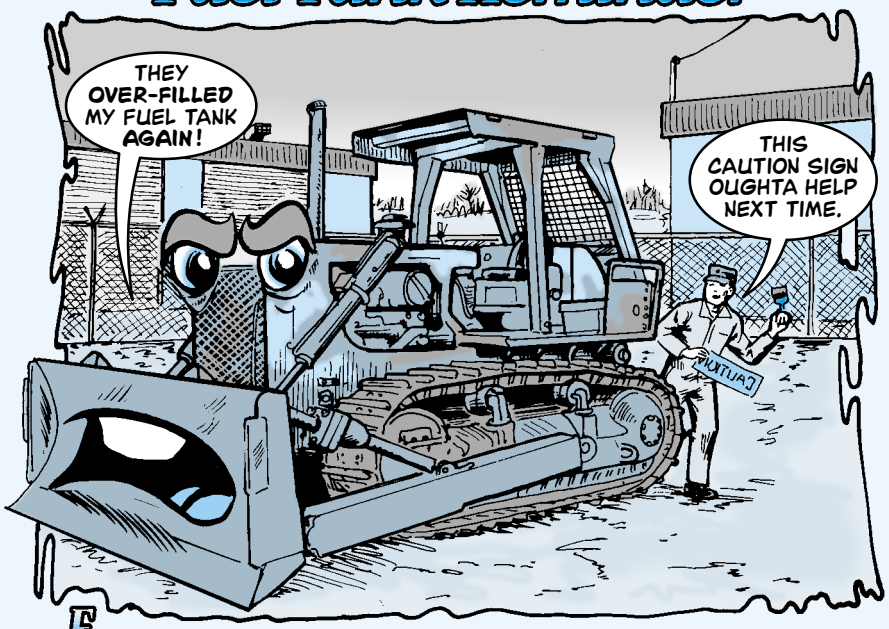
Remove ice from cylinder rods



Regular exercise keeps rods oiled



Fuel Tank Reminder



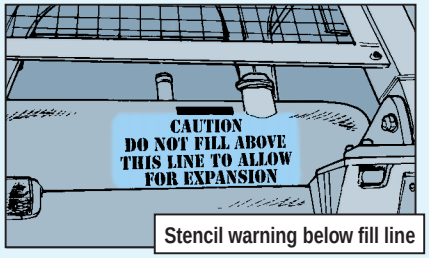
Fuel from a too-full tank spills out the tank's filler neck during construction operations. That's bad for the environment.

Diesel fuel on the outside of the dozer's fuel tank creates fumes in the cab. That's bad for you.

So it's in everybody's best interest to have a stenciled fill line on the fuel tank as a quick reminder not to overfill the tank.

If your tractor's tank doesn't have such a line, or if it has been painted over, have your mechanic use black CARC paint to stencil a new fill line at the bottom of the fill neck—about 3 inches below the top of the fuel tank.

Below the fill line stencil CAUTION—DO NOT FILL ABOVE THIS LINE TO ALLOW FOR EXPANSION, in 3-in letters. The stencils are part of the Common shop sets.



Stencil warning below fill line

Fly High with Cold Weather PM

It's a time-consuming, painstaking task to keep your birds flying when the mercury plummets and Old Man Winter throws snow, wind and ice at you. But top-notch aircraft maintainers know that preventive maintenance is critical during cold, colder, and coldest weather.

When winter starts putting its bite on you, move your aircraft inside to perform maintenance. If you can't and you're faced with some extended time outside, use a maintenance shelter or rig a temporary shelter out of tentage, other canvas, or a salvaged cargo parachute canopy. Warm your shelter with a ground heater.

A warm and ventilated work area will let you get that PM done without the nuisance of bulky clothing and heavy gloves.

Here is some other stuff to concentrate on during cold weather:

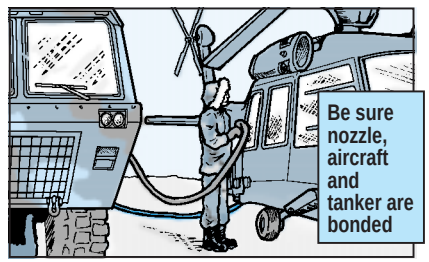
COLD FUEL~ Water in fuel can form ice that blocks fuel lines. So keep fuel tanks topped off. The gap between the top of the tank and the fuel is full of cold moist air. When that air condenses, water drips into your fuel. When you take fuel samples, drain enough fuel to get rid of all that water. Drain the sumps daily.

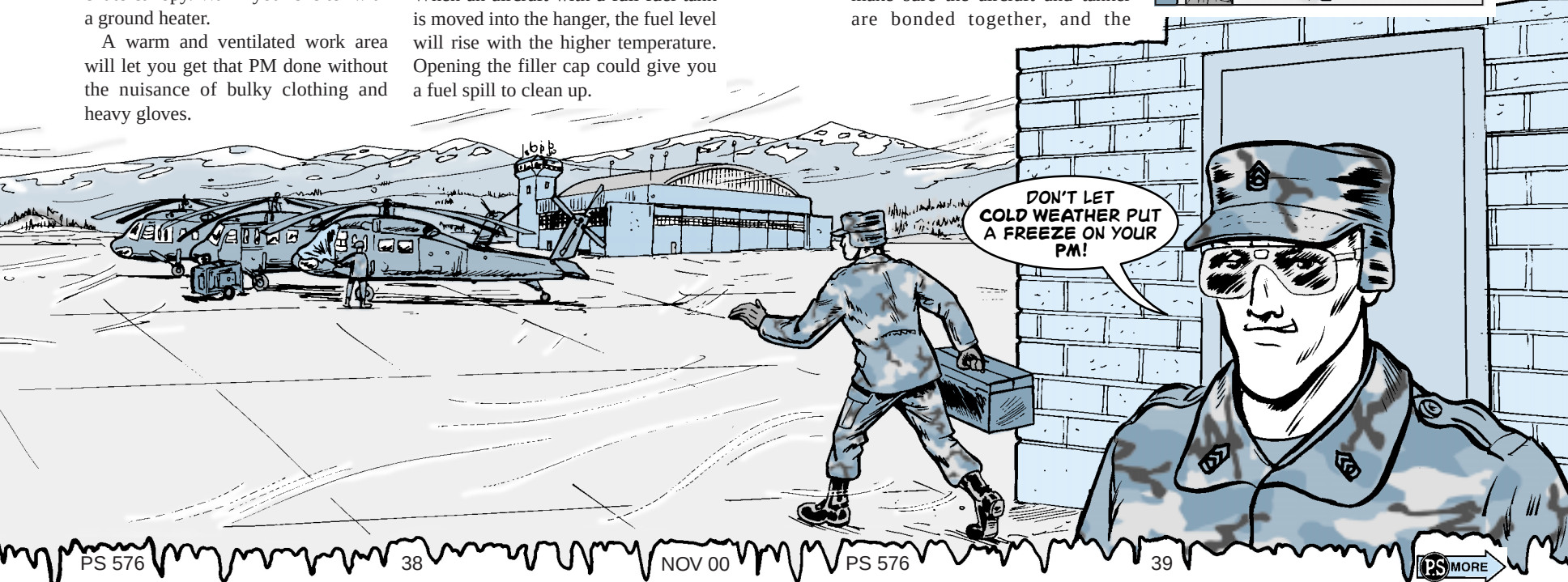
When you refuel a bird outside in sub-zero temperatures, always check the fuel level before moving it inside. When an aircraft with a full fuel tank is moved into the hanger, the fuel level will rise with the higher temperature. Opening the filler cap could give you a fuel spill to clean up.

Static electricity can fire up your winter real fast, so be extremely careful during refueling. The lower the temperature, and the drier the air, the more that static electricity becomes a hazard.

Static can result from aircraft moving through the air or by the movement of frost or snow from the aircraft. Fuel flowing through the filler neck can also generate a spark that ignites fuel.

So make sure you find a good place to ground the aircraft. Also make sure the aircraft and tanker are bonded together, and the nozzle is bonded to the bird before you remove the cap. When you're freezing while refueling you might be tempted to neglect a ground. **Don't!** You must follow grounding procedures without shortcuts.



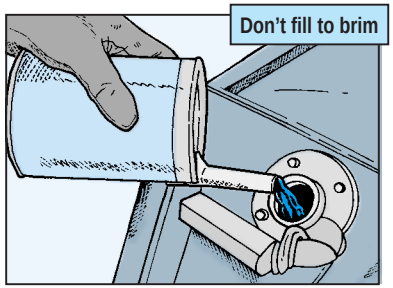


If you're not using a closed circuit fueling nozzle, put the regular nozzle in all the way. That keeps the danger of static down and reduces the chance for a fuel spill.

Use extra care if you have to take fuel out of an aircraft. Fuel spilled on your skin can cause frostbite.

COLD OIL AND GREASE~ Fuel is not the only fluid affected by cold temperatures. As the mercury drops, oil thickens, fuel's harder to ignite, and grease gels. So you must use the right fuel and lube for cold conditions. The lube chart in your TM lists the right fuel, oil and grease to use.

When you service an oil tank on a stone-cold aircraft, never fill it to the brim. Otherwise, when the oil heats up, the tank will overflow.

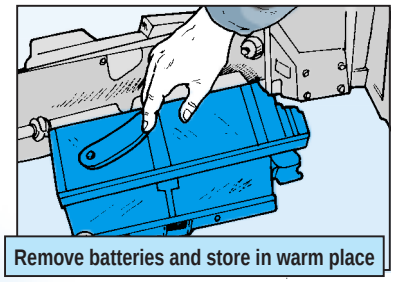


Oil leaks are a chronic problem in winter weather. So check connections, joints and seals regularly.

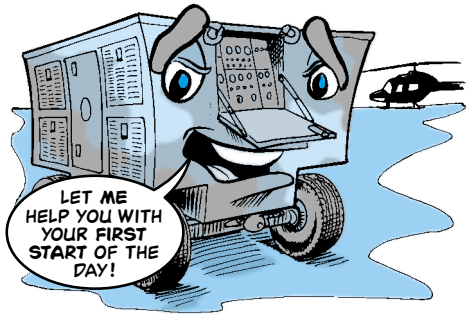
COLD SEALS~ Old Man Winter is hard on seals and gaskets. When they contract due to the cold, that opens the door for leaks. Moisture can seep in around seals and freeze. The ice formed will cut seals. Make a list of your aircraft's seal and gasket potential trouble spots. Post that list next to these tips on your bulletin board.

COLD BATTERIES~ Unless you're in the deep freeze for a long time, your nickel-cadmium batteries will do their job without much extra effort on your part. But cold starts will shorten battery life.

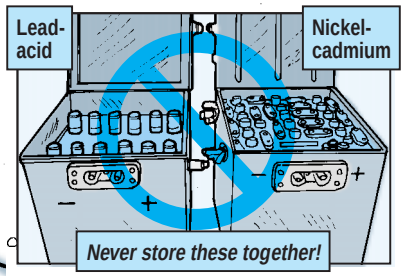
So, when possible, bring your batteries in from the cold if the weatherman predicts several days of subfreezing temperatures. If it's not possible, turn on the landing lights, searchlight or other equipment for 30 seconds before an engine start.



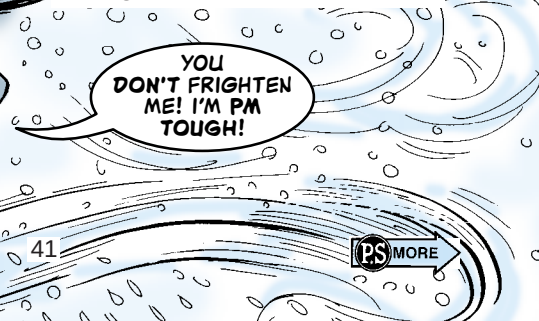
That "load" will warm up the battery a bit. Always use an auxiliary ground power unit (AGPU) on the first start of the day. It prevents a lot of drain on cold batteries.



Lead-acid batteries should also be kept warm. Cold weather saps their charge much faster than it does a nickel-cadmium battery. If you bring your batteries inside, never store nickel-cadmium and lead-acid in the same area. Fumes from a lead-acid battery can cause a nickel-cadmium battery to discharge.



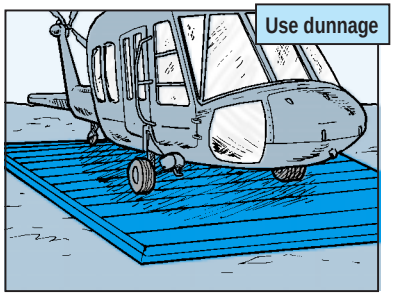
Store the batteries on a shelf or on dunnage, not on a bare floor.



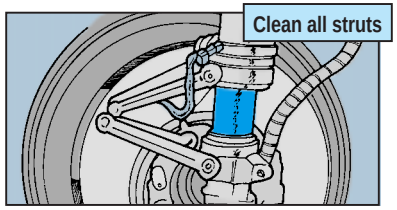
COLD TIRES~ Cold reduces tire air pressure, so check your helicopter's tire pressure often.

Tires frozen to the ground can be freed with liquid deicer. Move the aircraft immediately because deicer will form slush and re-freeze.

Use boards, dunnage or something similar beneath tires to keep them off snow or ice.



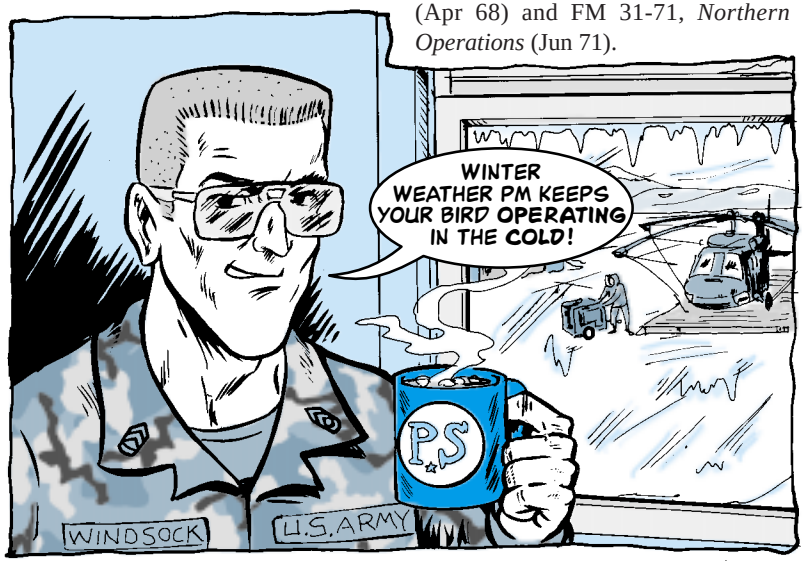
Check your landing gear often. Use a clean rag dampened with hydraulic fluid to remove ice, dirt and grit from struts and pistons.



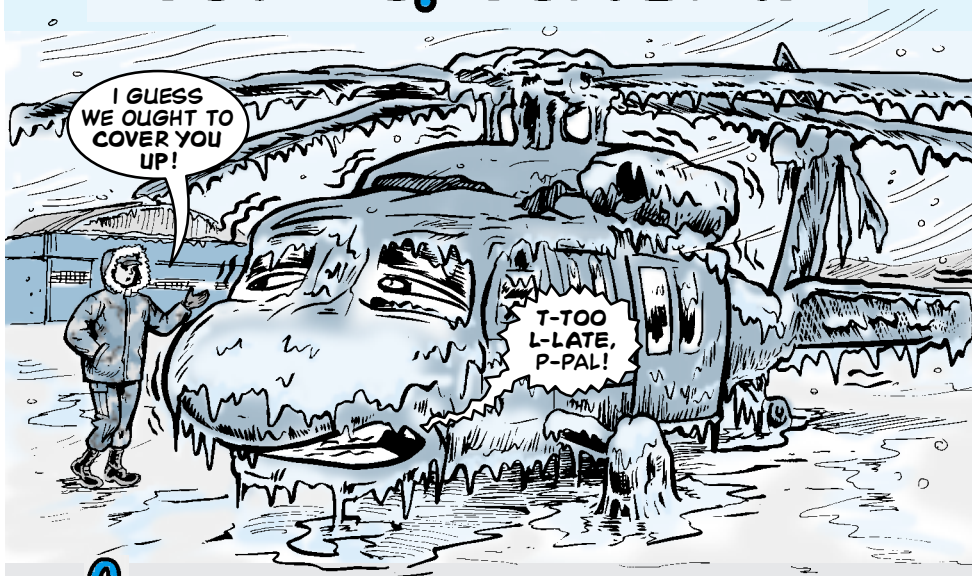
Service pressurized systems according to the instructions in each aircraft maintenance manual. Remember that any moisture will freeze into ice crystals and damage seals.

Do not bend rubber hoses or rubber-covered wires while they're cold soaked. Rubber gets brittle and stiff and could crack.

COLD WEATHER GUIDES~ for more information on winter maintenance operations, check out FM 31-70, *Basic Cold Weather Manual* (Apr 68) and FM 31-71, *Northern Operations* (Jun 71).

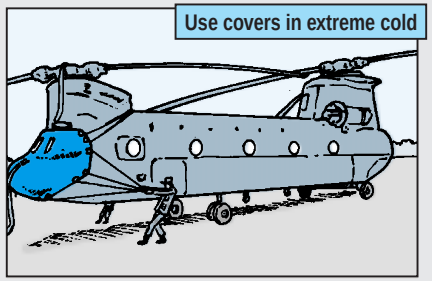


Cover Up Cold Birds



Crew chiefs, keeping your aircraft ready during winter is a tough job. It's even tougher if you leave your aircraft uncovered and unprotected on the flightline.

If you can't cover the whole bird during winter weather, at least cover up engine inlets, exhausts, exposed linkages and pitot tubes.



Cover the aircraft when it's dry. Wet covers will freeze in place. If you move an aircraft from the hangar to the helipad, cover it **before** you move it outside.

If a cover freezes to your bird, loosen the edges and use heat from a ground heater to loosen the rest of it.

Closely check uncovered areas during daily inspections. Make sure freezing rain or blowing snow hasn't seeped into exposed moving parts and frozen up the works.

After snow, sleet or an ice storm, take the engine inlet plugs and exhaust covers off and check for ice. If you find any, carefully remove it and thaw the engine with hot air, like your TM says.

Smoking in the Cold

In cold weather, condensation in the M157's fog oil tank can freeze and block the fog oil pump strainers. That stops smoking cold. But there are ways to smoke cold problems.

When it's below freezing, have your fuel supply folks add kerosene or diesel fuel to the fog oil to form a mixture that flows easier. The table below shows the right mix of fog oil and fuel.

Operating Temperature	Percentage of Fog Oil to Diesel/Kerosene
Above 32°F	100/0
32° to –10°F	75/25
–11° to –25°F	60/40
–26° to –40°F	50/50

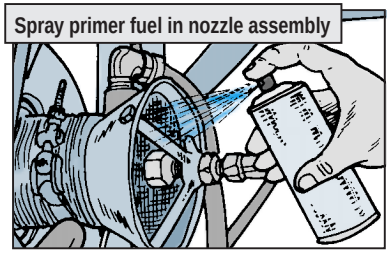
The fuel folks also need to add 16 ounces of DGME icing inhibitor, NSN 6850-01-377-5075, to every 40 gallons of fog oil.

For the engines, use Type 2 automotive combat gasoline (MOGAS), NSN 9130-00-240-8201, in below-freezing weather, **or** mix 16 ounces of isopropyl alcohol, NSN 6810-00-286-5435, to each 5 gallons of untreated gasoline. Keep all fuel tanks as full as possible to prevent condensation.

If you don't have Type 2 gas, use engine primer fuel, NSN 6850-00-823-7861, to start the M157 in cold weather.

Spray the primer into the nozzle assembly for 2 to 3 seconds and step away (primer fuel is very flammable). Have a buddy immediately push the ENGINE switch to START. Don't hold it in START longer than 15 seconds or you'll lose too much air pressure to start. Do this procedure up to three times more. If the M157 still won't start, tell your repairman.

Spray primer fuel in nozzle assembly



For the M157A2, smoking in the cold is a little different. You mix fog oil just like you did for the M157, and add 16 ounces of isopropyl alcohol to each 5 gallons of untreated gasoline or 2 ounces of icing inhibitor to each 5 gallons of other untreated fuel. Then use these preheat cycles according to the fuel you're using:

Fuel	Preheat Cycle
MOGAS	0
JP-1	1
JP-4	1
JP-5 turbine	3
JP-8 turbine	4
Diesel fuel-arctic	4
DF-1 diesel	4

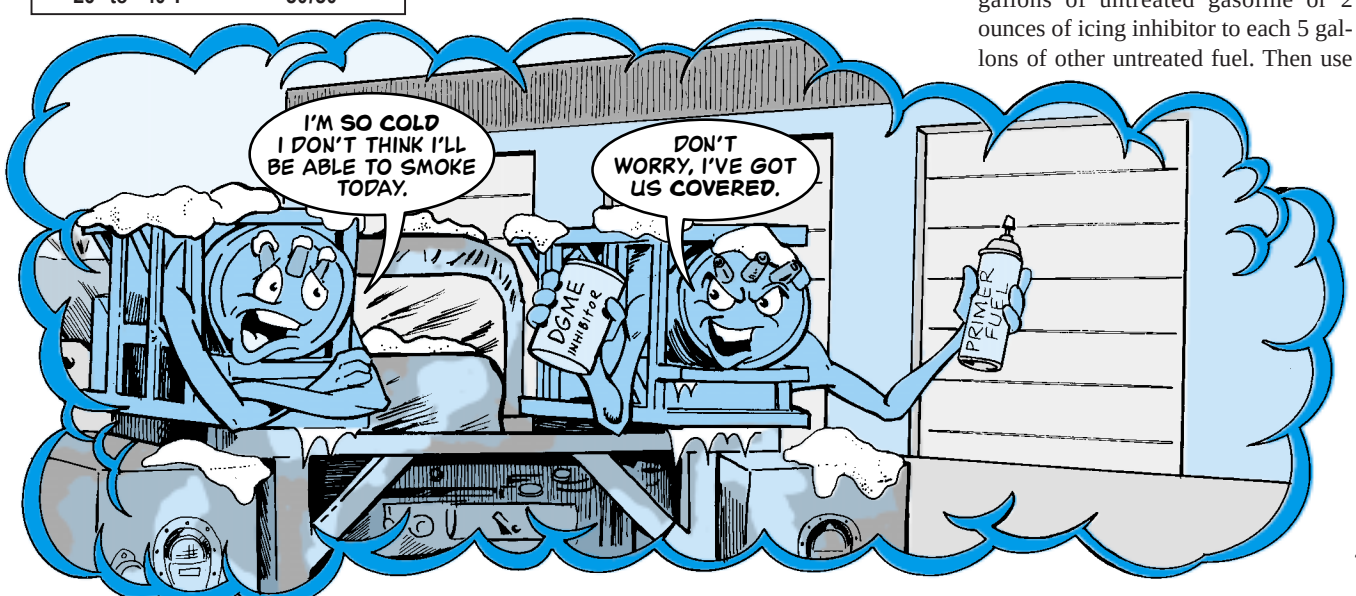
After setting the PREHEAT, hold the FUEL switch in START until the FUEL indicator comes on. Release the FUEL switch and let it flip to RUN.

After the AIR indicator lights and the PREHEAT indicator goes off, hold the ENGINE switch in START for 1 to 2 seconds and then release it. Wait 3 seconds.

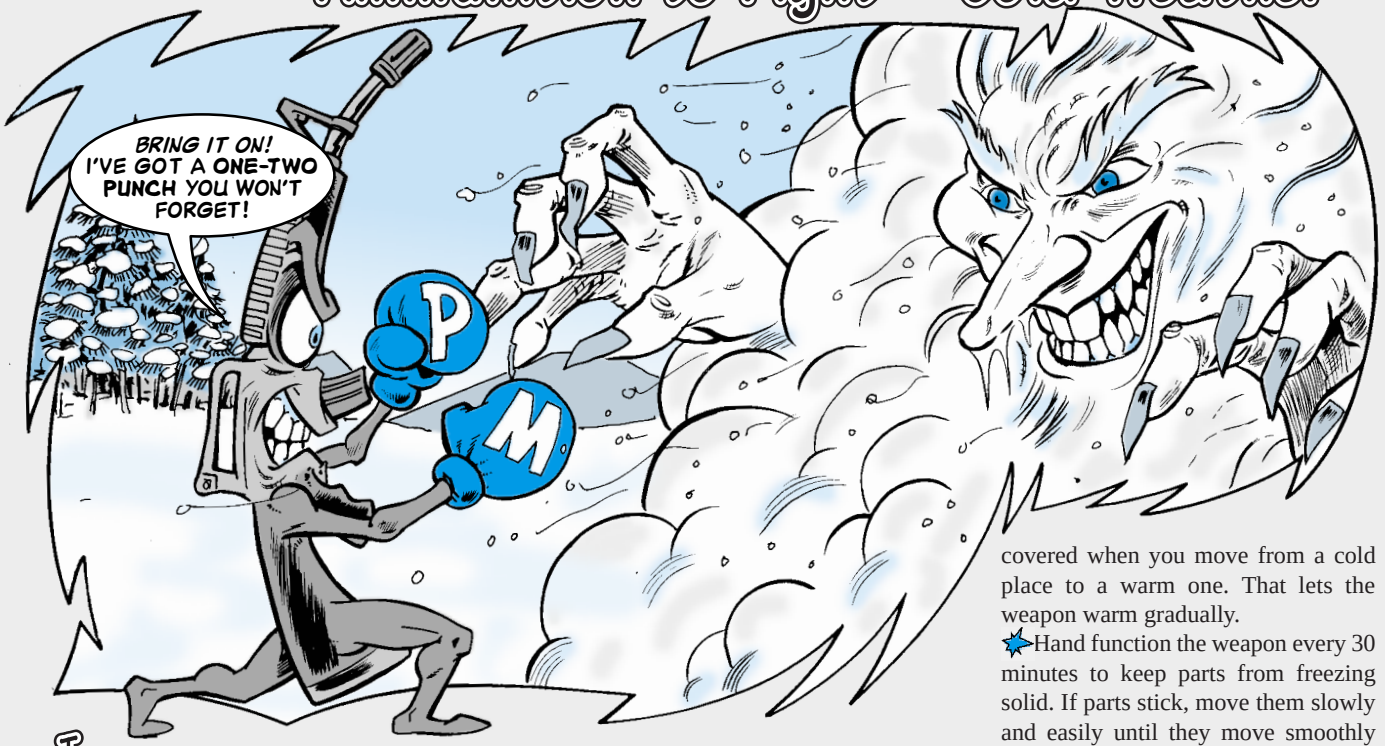
Hold the ENGINE switch in START until the ENGINE indicator lights and the SMOKE TEMP indicator reaches the green band. Release the ENGINE switch and let it flip to RUN.

Wait until the engine temperature reaches 800°F. Hold the FOG OIL switch in START until the FOG OIL indicator lights, then let the switch flip to RUN. You're ready to smoke.

For more information, see Pages 2-29 through 2-34 in TM 3-1040-283-10.

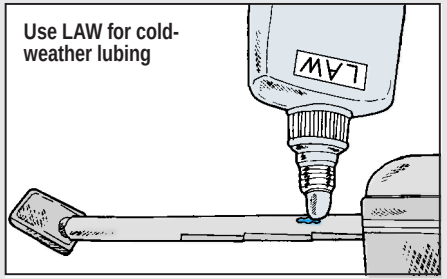


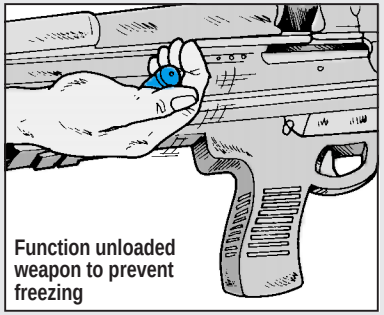
Ammunition to Fight Cold Weather



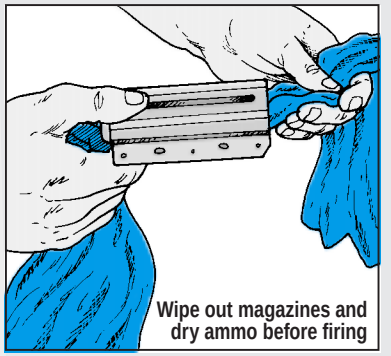
The cold will put the freeze on your rifle or machine gun if you ignore cold weather PM. Here's the PM ammo you need to help your weapon fight the cold:

- Use rifle bore cleaner, NSN 6850-00-224-6663, to remove carbon, and use LAW, NSN 9150-00-292-9689, to lube your weapons when temperatures drop below 10°F. LAW helps moving parts on most weapons slide better in cold than CLP or LSA. The exception is the M249 machine gun. It needs CLP in all weather.
- Prevent condensation from forming inside weapons by keeping them covered when you move from a cold place to a warm one. That lets the weapon warm gradually.
- Hand function the weapon every 30 minutes to keep parts from freezing solid. If parts stick, move them slowly and easily until they move smoothly again. Forcing things breaks parts.

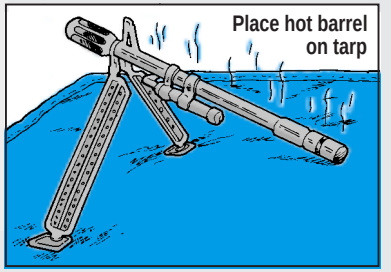




- Keep ammo dry. If necessary, wipe ammo and the insides of magazines before firing. That will prevent moisture from freezing and jamming your weapon.



- Never lay a hot weapon or barrel on the snow. Set it on a tarp or poncho. That sudden cold can warp the barrel.

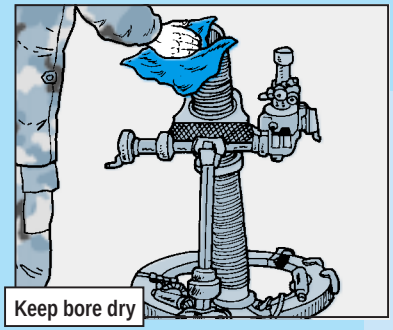


- Store weapons in a covered, wind-protected area when you're not using them. If that's not possible, cover them with a blanket or poncho. That at least shuts out ice and snow from the barrel, sights, and working parts.
- Wait until a weapon warms to room temperature before cleaning it. A cold weapon will sweat with condensation. If you clean and lube the weapon before it quits sweating, the sweat freezes when you take it back outside.

Blow Away Cold Problems

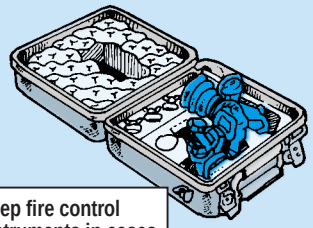
Cold can freeze something as powerful as your mortar…unless you blow away cold problems with PM. Here's how:

- Lube with LAW instead of GPL when the temperature drops below 10°F. LAW does not get as stiff as GPL in cold weather.
- Wipe the inside of the bore dry before you go into the cold. That helps prevent ice from forming.



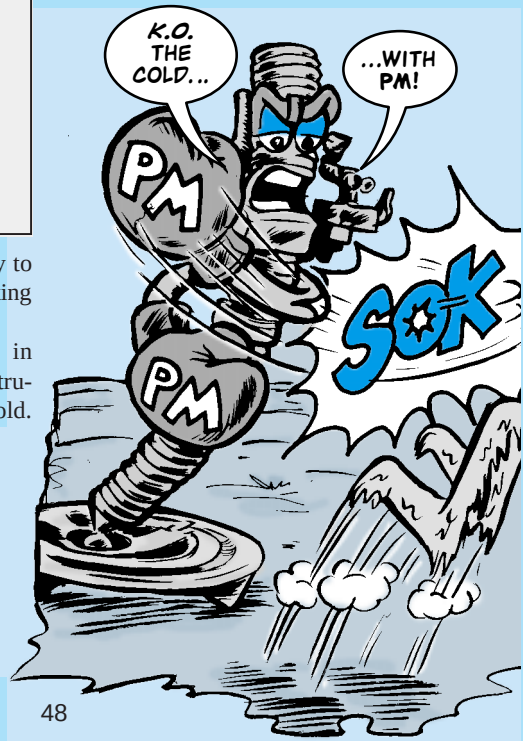
Keep bore dry

- Cover rounds until they're ready to be fired. That stops ice from coating them.
- Keep fire control instruments in their cases. They protect the instruments' delicate optics against the cold.



Keep fire control instruments in cases

- Never bring fire control instruments directly from the cold into a warm place. The sudden change in temperature cracks optics and lets condensation form inside the instruments. Leave the instruments in a sheltered—but unheated—place where they can gradually warm before you bring them inside.
- When you bring your mortar inside, wait at least an hour before cleaning and lubing it. That lets the mortar stop sweating from condensation and lets you wipe out all moisture.

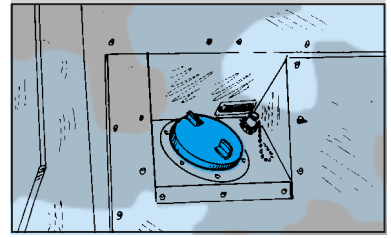


Give Cold the High Five

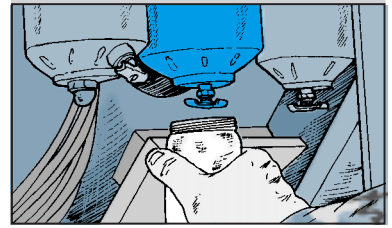
Keep your generator on the job during cold weather by giving it a helping hand. Here are five things you can do:

1. The generator set and the area around it should be free of ice and snow. Pay particular attention to the fuel tank cap and filler neck where snow and ice can become water in your fuel.

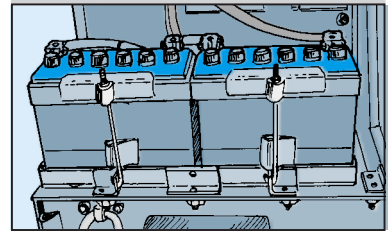
2. Keep fuel tanks full to protect against moisture, condensation and accumulation of water.



3. Drain and service fuel filters frequently to remove water and prevent freezing.



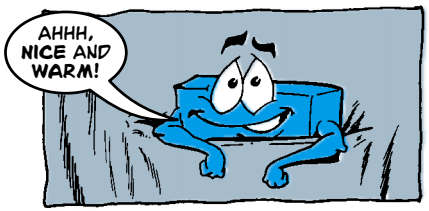
4. Keep batteries free from corrosion and in a well-charged condition. If possible, remove the batteries when not in use from the generator and store them in a heated area.



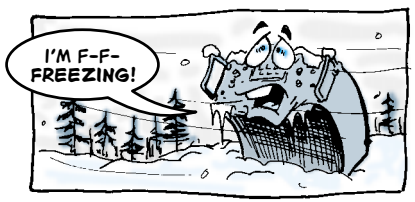
5. Do not bend or kink wiring that may have become brittle in the cold. Make all connections with care.

A Baker's Dozen

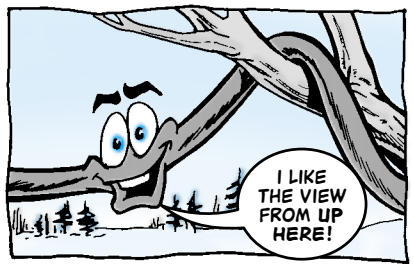
1) Carry small batteries inside your clothes to keep them warm. Reactivate cold-soaked batteries by warming them under your clothes.



2) If a radio set must be set up outside, put it in a sheltered place. A wind block, like a lean-to, helps keep sets away from direct exposure to cold air.

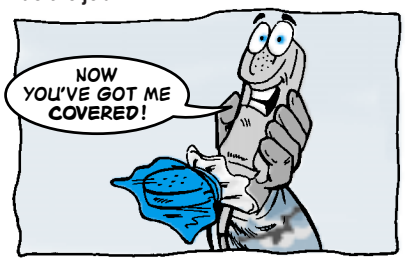


3) Raise RF cables above the ground to keep them from freezing to the ground. Use poles or tree limbs to raise the cables.

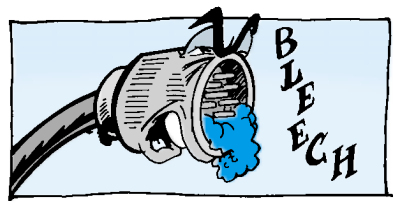


4) Check antenna systems often and remove snow, ice or slush that might diminish your signal or create a "falling ice" hazard.

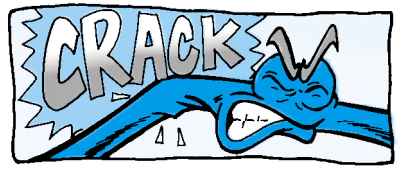
5) Put frost shields over microphones. If you don't have a shield or your handset doesn't have a place to fit one, a piece of plastic—like a battery bag—will do the job.



6) Remove all snow, ice, water and dirt from cable connections before connecting them. You'll get a poor connection or break connectors, if you don't.



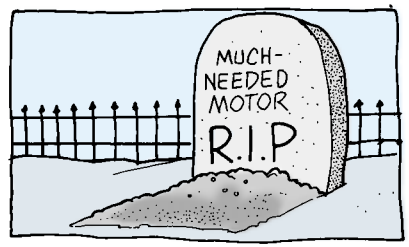
7) Rubber and rubber compounds become stiff and brittle as temperatures plunge. In cold weather, cables and wire should be flexed slowly and carefully to keep them from cracking and breaking.



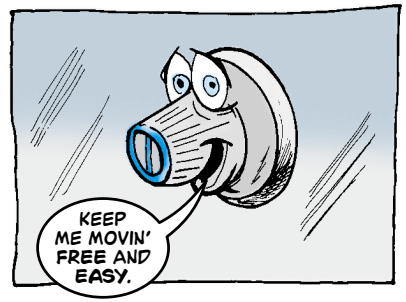
8) Lube, but don't over-lube. Lubricants can get stiff in cold weather and fail to do their job. The keys to lubing in the cold are frequent checks to make sure lube hasn't gotten stiff and frequent applications.

9) Plugs, jacks, keys, shafts, bearings, dials, and switches can malfunction due to contraction of metal parts in extreme cold. Check them often and keep them warm and clean.

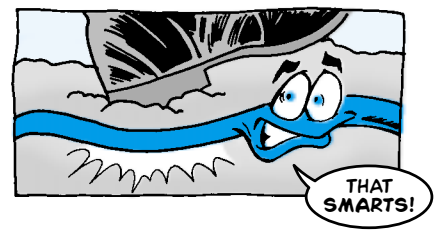
10) Make sure all motors and fans run freely. Snow and ice build-up can shut down a critical fan and kill a much-needed motor.



11) Make sure all knobs and controls move easily. Stiff controls might indicate a moisture freezing problem.



12) Keep cables out from under the snow. Pull them free after every snowfall. A cable hidden under snow is hard to find except when it's pulled loose by a big foot or run over by a track.



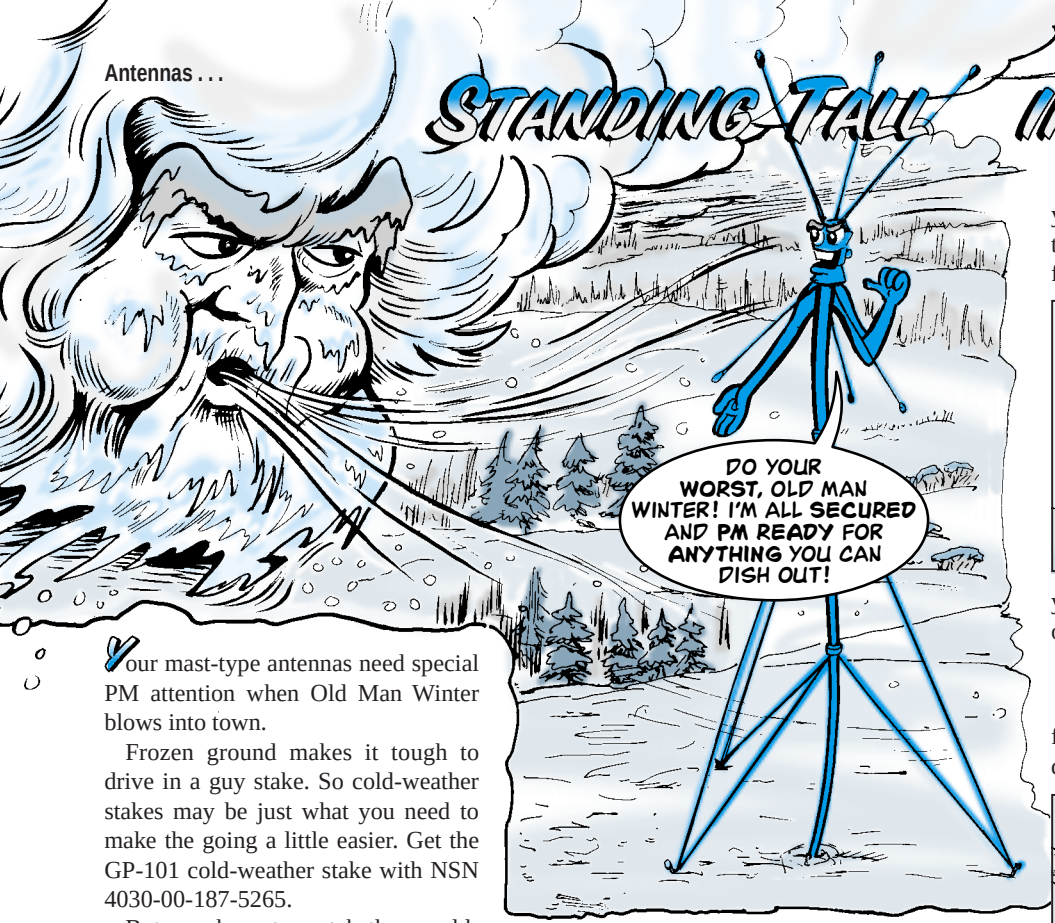
13) Any equipment that generates heat during operation will "breathe" or draw in cold air as the equipment cools. If heated equipment is brought into contact with extremely cold air, the glass, plastic and ceramic parts may break. So give hot equipment time to cool down before taking it out of a shelter into the cold.

"Sweating" is the opposite of "breathing." If cold equipment is brought into contact with warm air, the moisture in the air will condense on the equipment and freeze when the equipment is taken into the cold again.

So wrap cold equipment in a blanket or parka for a bit before you take it into a heated shelter.

Antennas . . .

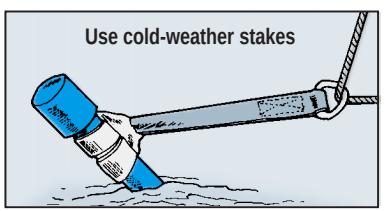
STANDING TALL IN THE COLD



Your mast-type antennas need special PM attention when Old Man Winter blows into town.

Frozen ground makes it tough to drive in a guy stake. So cold-weather stakes may be just what you need to make the going a little easier. Get the GP-101 cold-weather stake with NSN 4030-00-187-5265.

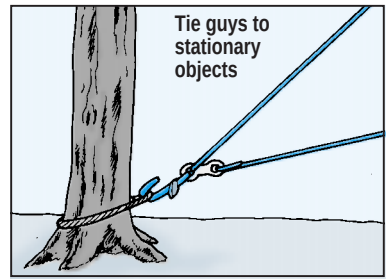
But you have to watch those cold-weather stakes. They're slimmer, so they don't hold as well when the ground thaws. Keep an eye on them during warming days.



If you're in an extreme cold and frozen situation, mountain pitons are excellent anchors for guy ropes. Go into the FED LOG-AMDF and do a name search, using PITON, MOUNTAIN. It will identify 32 NSNs you can tag and view.

In addition, in extreme cold, ropes can freeze to the ground and to guys tied to these anchor ropes. Wear gloves and take your time when handling them.

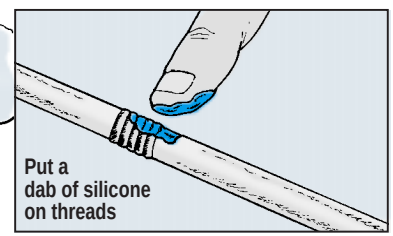
If even cold-weather stakes fail, tie your rope to something sturdy, like a tree or pole. In any case, never use fewer guys than your TM calls for. If



you use less, your antenna may end up on the ground.

Grease the Joints

To keep your antenna joints from freezing up, just add some lube. A little dab of silicone will usually do the trick.

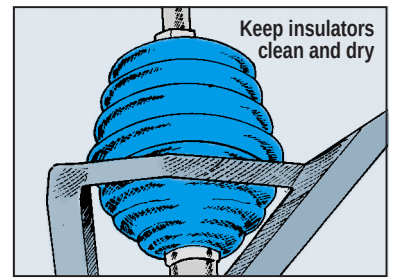


You can get a 2-oz tube with NSN 6850-00-177-5094. Or get the 8-oz tube with NSN 6850-00-880-7616.

Clean the mating surfaces inside and out before applying the lube.

Keep Bowl Dry

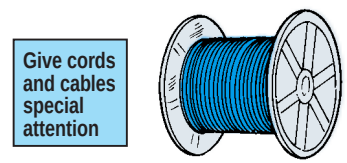
Water collects in ceramic bowls during warm weather. Come a cold snap and it turns to ice. That can crack the glass. Also, the freezing temperatures make the glass more brittle. So handle it carefully.



Once you've wiped the bowl clean and dry, reach for your tube of silicone again. Seal the insulator before you join the two halves.

Cable Care

Your RF cables need special handling during cold weather, too. Insulation becomes brittle and can break. That can damage delicate inside wiring and also let moisture in.



Protect the cable by taping it to the antenna. That keeps it from being whipped by the wind.

Normal tape loses some of its staying power in sub-freezing temperatures, so use cold-weather tape, NSN 5970-00-240-0620.

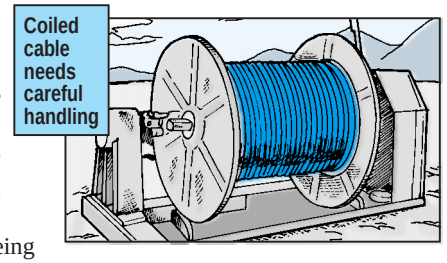
C-C-Conquer the C-C-Cold

Cables and wires need extra care when the temperature drops below freezing. Keep your commo on line with these lucky seven cold-weather PM tips:

1. The rubber insulation on cable and wire gets brittle in the cold, so store cable and wire inside a shelter, if possible. If you do store your wire and cable inside a shelter, you must take care not to damage your commo equipment. Stored wire and cable can easily knock off knobs and break connectors when it's being stored, removed or if the load shifts.

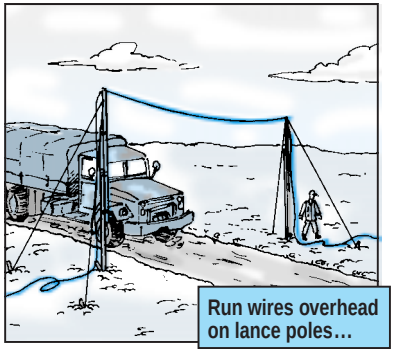
2. If you can't store your wire and cable inside a shelter, try to warm it in your shelter before you unroll it. Unrolling cable when it's too cold cracks the insulation. The inside wires could break, too.

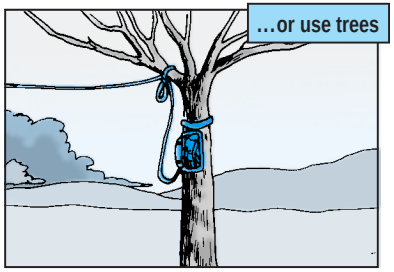
When you unroll your cable, watch for kinks and crimps. Those are the areas that will break. Gently straighten out the kinks and crimps, if you can. If they won't straighten easily, you should warm the cable before you complete the unrolling.



3. Keep an eye on splices as you lay your wire. Because of cold contraction, these areas can open and become vulnerable to water intrusion and freezing. Use cold-weather tape, NSN 5970-00-240-0620, when you have to splice or repair wire. It comes in a 30-ft roll.

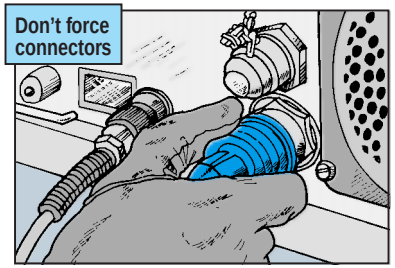
4. It's best to keep cable and wire off the ground and away from feet, vehicles and cargo areas. In fact, stringing them overhead gives you the added advantage of not letting wires and cables freeze to the ground. That creates a pain when you recover them.





5. Leave a little slack when you lay wire or cable. Metal and rubber shrink in the cold. The wire or cable can break if you pull it too tight.

6. The cold affects cable connections, too. Carefully connect and disconnect them. Rough stuff can break connectors and receptacles.

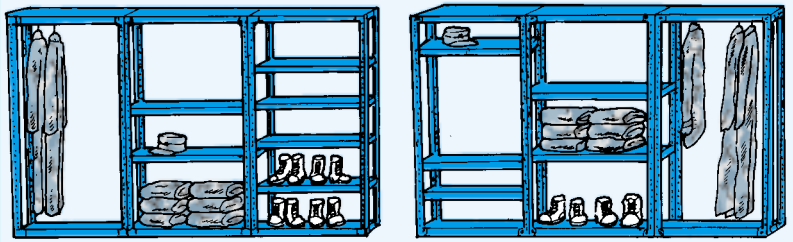


7. Finally, there is no substitute for patience in handling cable in the cold. Slow and easy is the way when you pay out, reel in or flex cable. Fast and rough cracks insulation.

Storing Your ECWCS

Don't know what to do with your extended cold weather clothing system (ECWCS) when you come in from the cold? Here's one suggestion: Put them on storage shelving, NSN 7125-00-558-0011.

But first, you will have to modify the normal shelf assembly. Then you will be able to hang up coveralls, parkas and shirts. Place other cold weather gear, like boots and gloves, on the shelves.



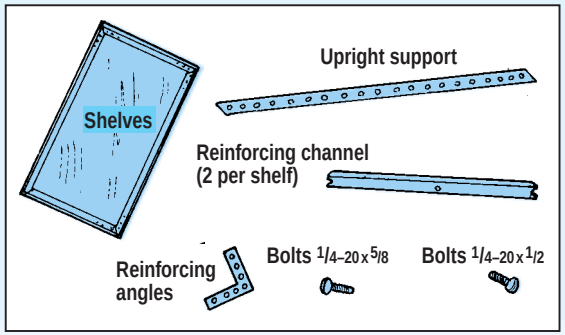
Depending on the manufacturer, the shelving organizer might vary, but you should be able to put it together like one of these. Units come with all the necessary hardware.

Here's what to do:

1. Connect a top and bottom shelf with four upright support posts, bolting the shelves and posts together.
2. Bolt in angles at all four outside corners of each shelf to keep it from wobbling.
3. Attach a reinforcing angle channel under the top shelf using the four pre-drilled holes in the shelf.

The reinforcing channel becomes a bar to hang clothes.

Use bottom shelves to hold folded clothing and other cold-weather gear.



Grease and Acid Ruin Parkas

Never wear your extended cold weather parka when working in the motor pool. Grease or acid will ruin it.

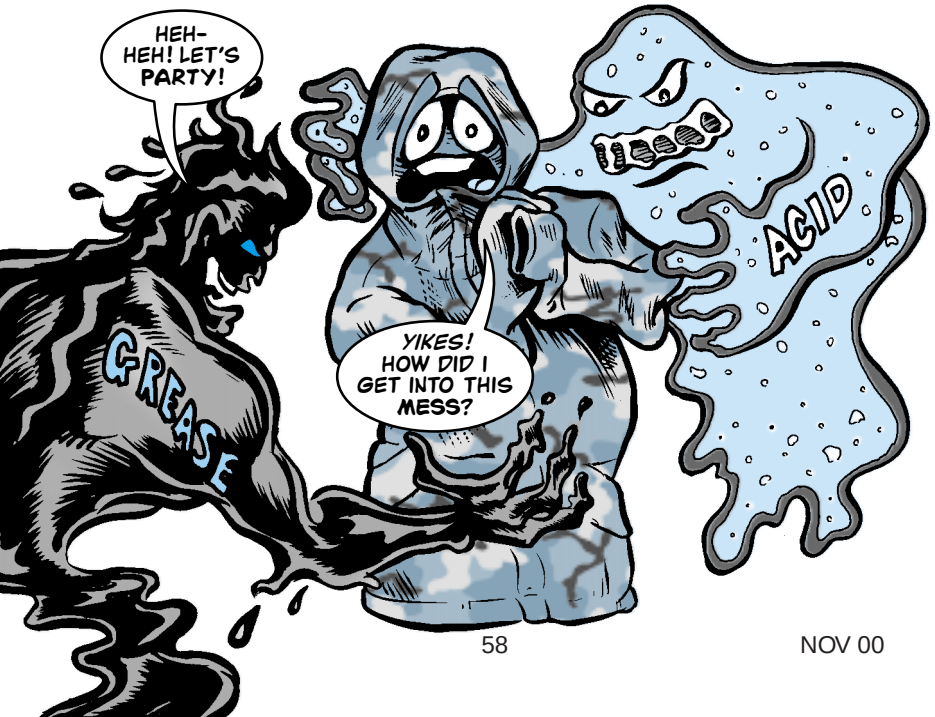
Battery acid eats away at the fabric. And, once it starts, there's no way to stop it. You'll have to get a new parka.

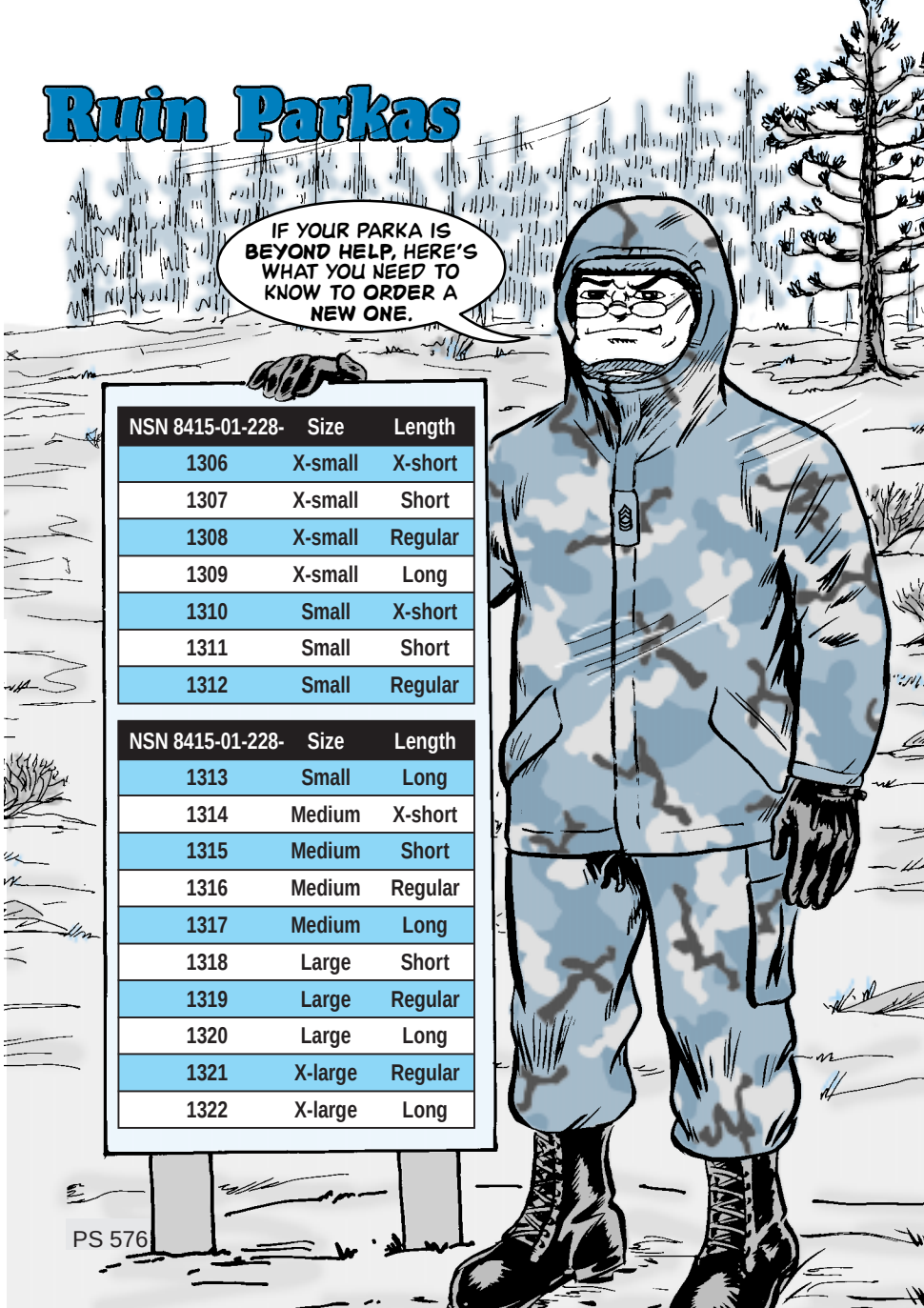
Grease is just as bad. Once it gets on your parka, it won't come out because the parka can't be washed at temperatures hot enough to dissolve the grease. Heat can loosen seam tape inside the parka, which helps keep it waterproof.

If your parka gets dirty from substances other than acid or grease, refer to the laundering instructions on the care label attached to the garment.

Here's how to wash it safely:

- Use warm water and detergent.
- In the washing machine, use the permanent press cycle.
- Rinse thoroughly in clean, warm water.
- When hand washing and rinsing, do not wring or twist the garment. That rough treatment can make holes in the waterproof barrier.
- Do not use bleach or starch.
- Tumble dry on a delicate low heat setting (do not exceed 90°F) **or** hang it to air dry on a rustproof hanger. That way, rust won't stain the parka.



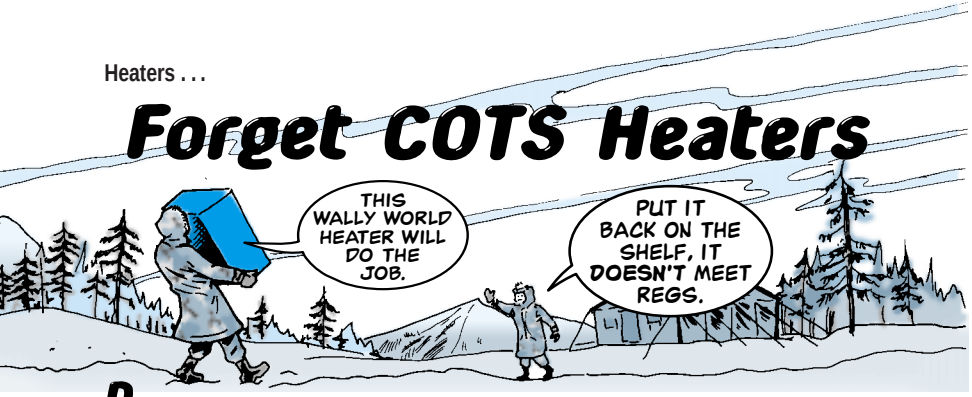


NSN 8415-01-228-	Size	Length
1306	X-small	X-short
1307	X-small	Short
1308	X-small	Regular
1309	X-small	Long
1310	Small	X-short
1311	Small	Short
1312	Small	Regular

NSN 8415-01-228-	Size	Length
1313	Small	Long
1314	Medium	X-short
1315	Medium	Short
1316	Medium	Regular
1317	Medium	Long
1318	Large	Short
1319	Large	Regular
1320	Large	Long
1321	X-large	Regular
1322	X-large	Long

Heaters . . .

Forget COTS Heaters

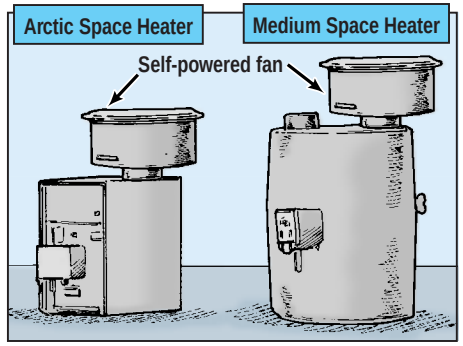


Don't try to stay warm in your tent with a commercial off-the-shelf (COTS) heater. Unvented commercial kerosene heaters put out dangerous gases and are a serious health hazard.

There are no COTS heaters that meet the Army's requirements for field environments. To stay warm—and alive—use one of these tent heaters:

H-45 medium space heater, NSN 4520-01-329-3451, which replaces the old potbelly M41 in GP series tents.

Arctic space heater, NSN 4520-01-444 -2375, which replaces the M1950 Yukon heater, for 5-man and 10-man arctic tents.



The self-powered fan, NSN 4140-01-457-2790, can be used on either heater. The fan uses some of the heat from the heaters to turn the fan blades, which circulate heated air, improve comfort and save fuel.

Arctic Mitten Set . . .

Line Up with Liners

The nylon liners in your arctic mittens, NSN 8415-00-782-6715 through -6717, may wear out before the mittens.

So don't get new mittens when all you need are the liners. Order new liners with these NSNs:

NSN 8415-01-323-	Size
2174	Small
2175	Medium
2176	Large

Need a new drawstring harness for your mittens? Order it with NSN 8415-01-323-2177.

Connie's Post Scripts

M919 Solenoid Valve

NSN 4810-01-414-3138-gets the solenoid override valve for the fan clutch actuator assembly on the M919 concrete-mobile mixer. The NSN for Item 13 in Fig 30 of TM 9-2320-273-24P is wrong.

PLGR Connector Covers

Order the J2/J3 connector cover for your AN/PSN-11 precision lightweight GPS receiver (PLGR) with NSN 5340-01-449-1045. Order the J4 cover with NSN 5340-01-449-1036.

MW24C Defroster Switch

NSN 5930-01-177-9532 gets the rotary switch for the MW24C scoop loader's defroster fan. The switch is missing from Fig 124 of TM 5-3805-262-24P.

AMCOM Hotline

The Army Aviation and Missile Command (AMCOM) now has a toll-free number for customer service, and high priority requisitions. The hotline is staffed 24 hours a day, 7 days a week. Call toll-free 866-GOAMCOM ((866) 462-6266), DSN 897-2066 or (256) 313-2066. You can also e-mail for help:

amsamcoc@exhange1.redstone.army.mil

Dexron III for All Vehicles

Use Dexron III in all wheeled vehicle automatic transmissions where Dexron II is called for. It does a better job. Get a 1-qt bottle of Dexron III with NSN 9150-00-698-2382 and a 55-gal drum with NSN 9150-01-114-9968.

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NOW, HOW DO YOU LIKE BEING LEFT UNPROTECTED OUT HERE IN THE COLD?

KNOK KNOK

COLD WEATHER ISSUE

Left Out in the Cold . . . See Page 27