

Issue 516

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1995

THE
PREVENTIVE
MAINTENANCE
MONTHLY

TB 43-PS-516

WINTER
ISSUE



ARE YOU PREPARED?

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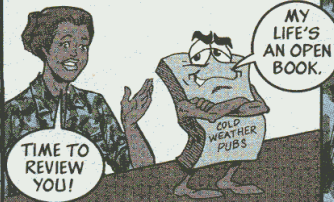
Surviving the Winter

HOW WILL I MAKE IT?

Soon it will be bone-chilling, teeth-chattering, nose-numbing, foot-freezing, cold. Cold that will stab at your lungs and rob you of breath. Cold that will make you think you'll never be warm again.

Make sure neither you nor your equipment are casualties this year by following these seven winter rules:

1 Know what your TMs say about cold-weather operation. Review both operator and unit maintenance TMs. Keep cold-weather pubs (see back cover) within reach for quick reference.



2 Protect yourself with layers of clothes. Covers will protect your equipment, too. Bring what you can inside, but what you can't, keep covered.



3 Feed your face, before you brave the cold. Keep that internal furnace burning. Feed your equipment with lubes and fluids. Know what your LO says about cold-weather lubrication.



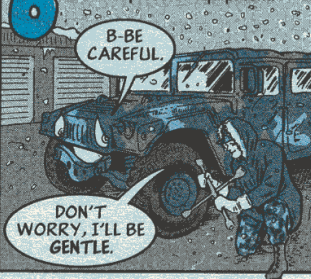
4 Check your winter clothes. What needs repair? What new ones do you need?



5 Take no shortcuts. The cold affects everything. Things that don't demand your attention regularly in warm weather, will demand it in the cold.



6 Be patient when working in the cold. Never force a cold, stiff or frozen piece of equipment.



7 When in doubt about whether winterization treatments and cold-weather precautions apply, check with someone who knows, like your LAR, OPW/DOL or direct support unit.



PS THE PREVENTIVE MAINTENANCE MONTHLY

TB 43-PS-516, 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, suggestions for articles, or comments on material published in PS. Just write to:

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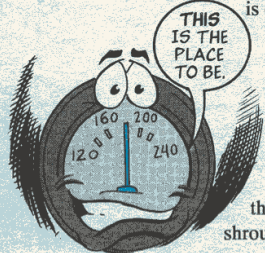
Stay Hot on Cooling PM



IT'S NOT TOO LATE TO WINTERIZE YOUR VEHICLE'S COOLING SYSTEM. BUT DO IT NOW... DON'T WAIT!

HERE'S WHY...

Kee p an eye on your engine's operating temperature. A cooling system should be able to reach 160° to 180° F no matter how cold it is outside.

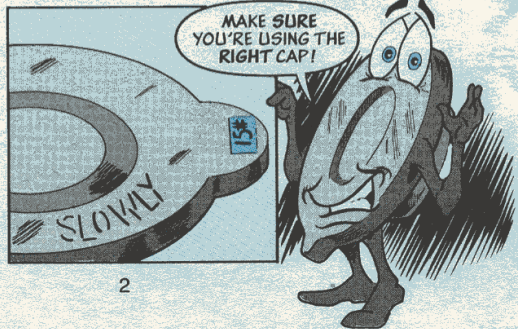


If yours won't, have the thermostat checked. It may be stuck open and need replacing.

Systems that always run at more than 200° F also need attention. A bad thermostat, a clogged radiator, a bad radiator cap or filthy coolant may be culprits. The air flow may even be blocked.

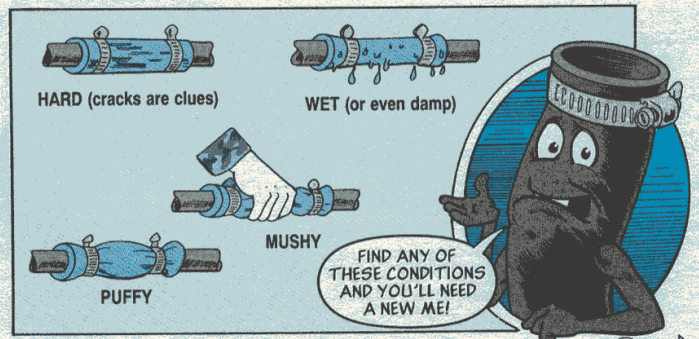
Air-cooled systems don't need much attention. All they need is a good flow of air—meaning all the airflow shrouds must be in place. To speed up heating in zero weather, you can partially cover the air intake grills with canvas when starting. Be sure to remove it after the engine reaches operating temperature.

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 cuts the boiling point of your coolant. Too high builds up pressure that'll pop radiator seams or blow hoses.

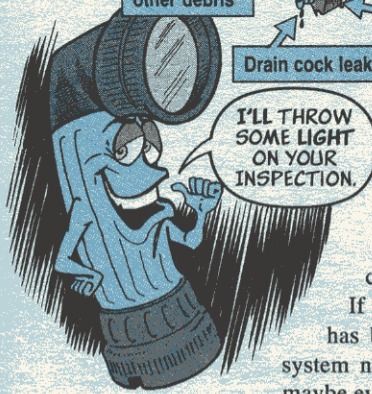
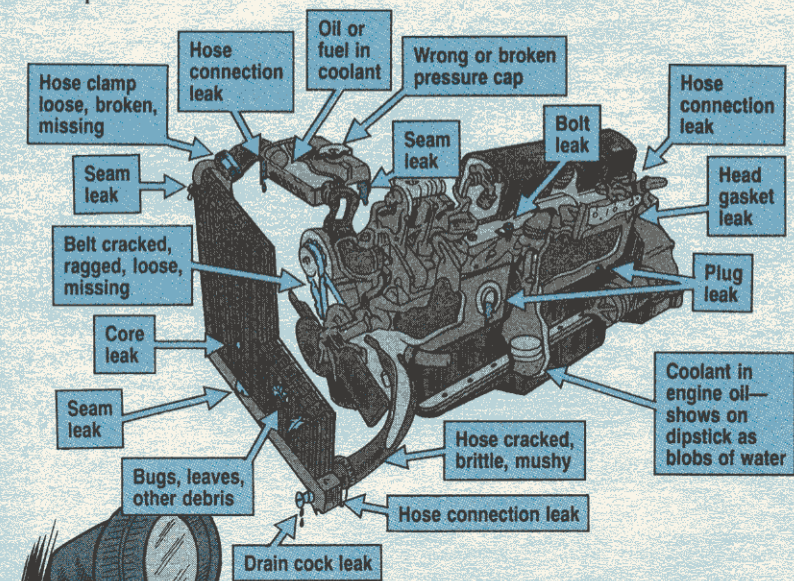


Hoses need to be touched as well as looked at. They must withstand heat, pressure and vibration. They're rubber, so they rot, harden and crack with age.

Report any bad hoses that you find. 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's cold. Look for rust or 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.

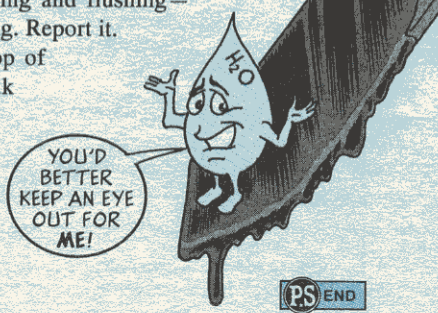


Finally, take the radiator cap off. If the cooling system is hot, open the filler cap slowly until all pressure is gone. Use a rag or glove to protect your bare hand from the hot cap.

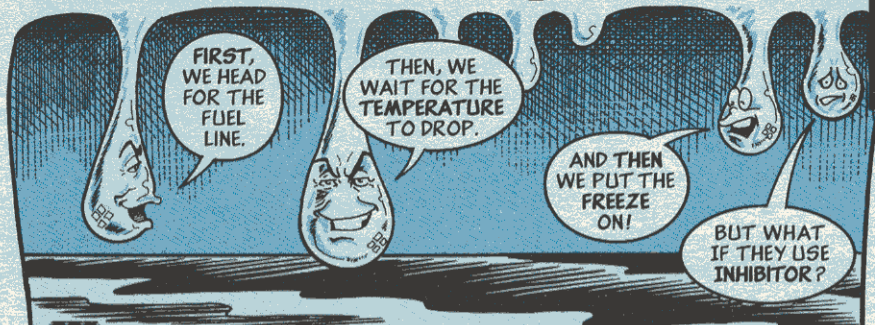
The coolant should be at least over the top of the core. It should be almost clear—it'll be colored by the antifreeze.

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 your 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.



No Water for Me, Thanks!

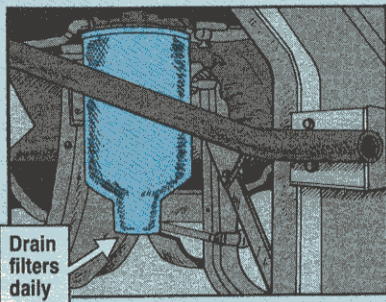


Water in a fuel line is bad news when temperatures drop below freezing. It turns to ice and stops your vehicle in its tracks.

Here's how to keep that show-stopper from stopping you:

Fill fuel tanks to within two inches of the bottom of the filler neck. When you fuel up 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 needed, add icing inhibitor to the fuel. Make sure it hasn't already been added, though. More than one pint per

40 gallons can cut performance or damage engines.

Add the inhibitor first, so it can mix properly. Use this much inhibitor:

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

Here's what 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

JP-8 jet fuel comes with an inhibitor, so don't add any. Jet A-1 fuel does not. Treat it like diesel fuel.

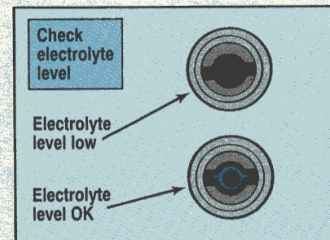


When cold weather turns your vehicle's battery from a live wire into a dead duck, don't rave, slave!

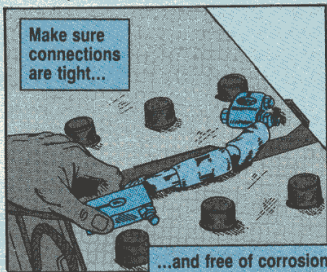
Battery slaving is the answer when your batteries are dead.

Make sure you slave the safe way by following these tips:

- ⊙ Read the slave-starting steps in your vehicle's operating instructions.
- ⊙ Never stand between vehicles being slaved or position them nose to nose.
- ⊙ Make sure the electrolyte in all battery cells is above the plates.



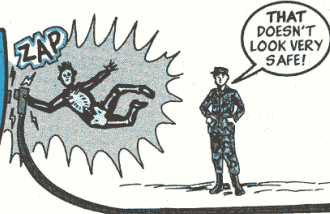
- ⊙ Make sure all cables and terminals on the dead vehicle are tight and free of corrosion.



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

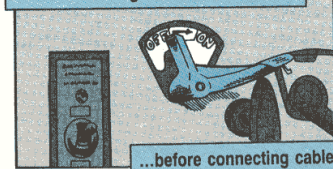


Safely

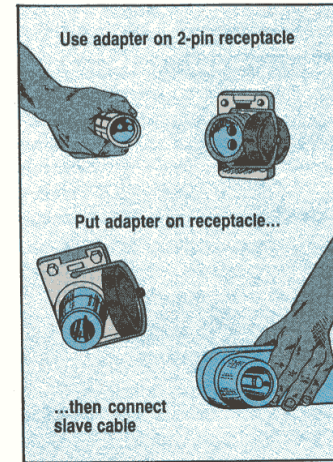


- ⊙ Connect the slave cable to the dead vehicle's slave receptacle. The connection should be tight.

Dead vehicle's ignition must be OFF...



- ⊙ If either vehicle has the old 2-pin slave receptacle, use the NATO adapter.



- ⊙ Push the slave cable connector into the slave receptacle on the live vehicle.

- ⊙ Wait at least one minute, but no more than three, before trying to start the dead vehicle.

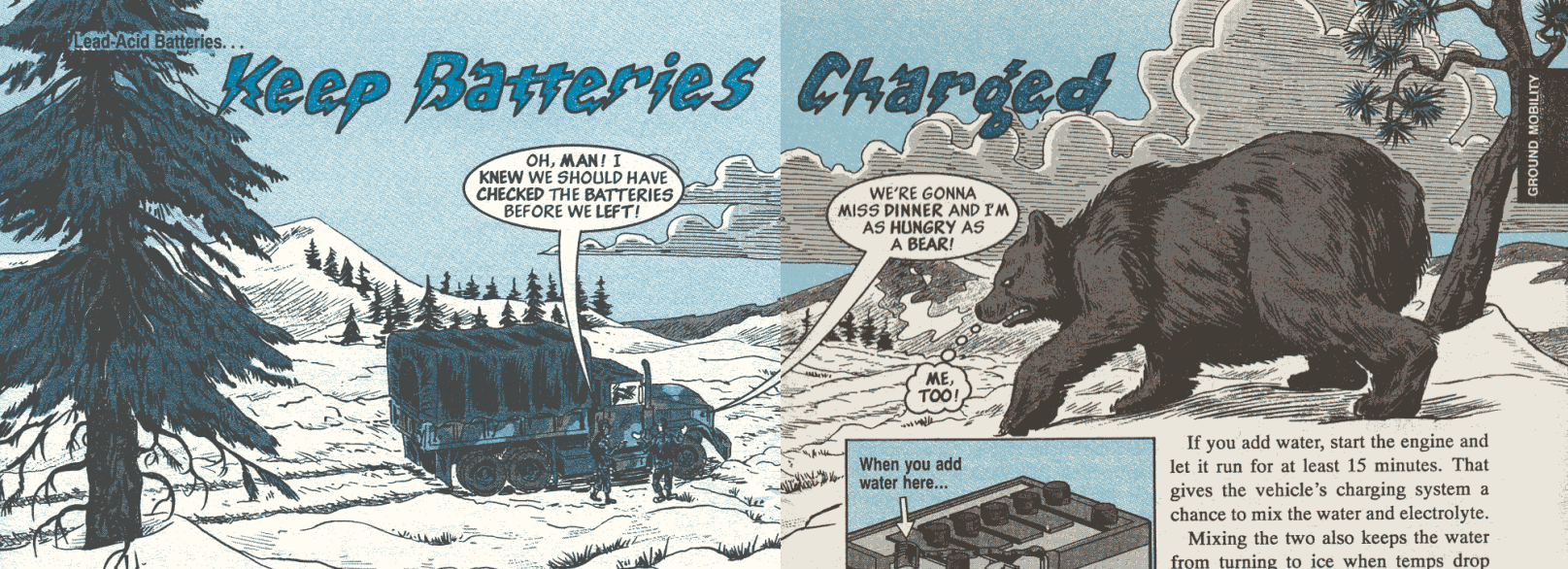
- ⊙ Try to start the dead vehicle. Step on the clutch if the vehicle has one. This cuts down on engine drag. Never run the starter for more than 30 seconds at a time. Let the starter cool off for two or three minutes between tries or you'll burn it up. If it won't start in three tries, give up. The vehicle has a bigger problem.



- ⊙ 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 slave receptacles.

- ⊙ Let the engine run at fast idle after it starts. Once the slaved vehicle is started, pull the cable off that vehicle and then remove it from the other one.

Keep Batteries Charged



OH, MAN! I KNEW WE SHOULD HAVE CHECKED THE BATTERIES BEFORE WE LEFT!

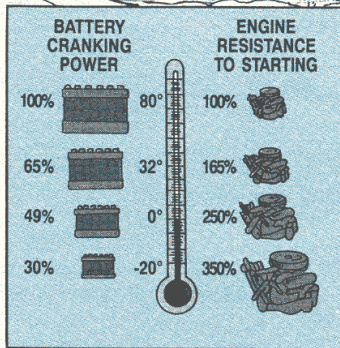
WE'RE GONNA MISS DINNER AND I'M AS HUNGRY AS A BEAR!

ME, TOO!

Cold weather's bad news for a weak battery. It's bad news for you, too, if you're sitting miles from nowhere when the battery conks out.

Even a fully charged battery loses a third of its cranking power at 32°F. At 0°F it has less than half its cranking power, and at -20 degrees, it has only 30 percent.

Cold temps work on engines, too. At -20°F it can be 3 1/2 times harder to start an engine than at 80°F. A weak

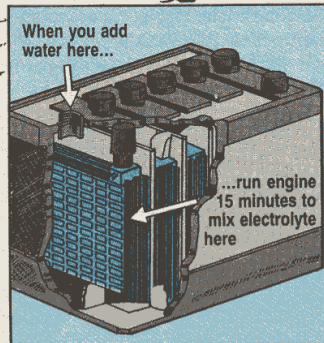


battery would probably be a goner.

Check your batteries now to make sure you both come back alive from the cold.

How you check batteries is important. You can't tell the condition of

a battery if you test only the water. That's what you do, though, if you add water and then test. The water is sitting on top of the cells.



If you add water, start the engine and let it run for at least 15 minutes. That gives the vehicle's charging system a chance to mix the water and electrolyte.

Mixing the two also keeps the water from turning to ice when temps drop below freezing. That'll keep it from cracking the battery case.

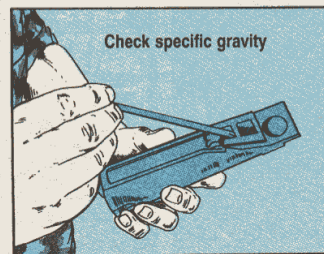
It's best to test the electrolyte right after you shut off the engine. All the how-to's you need to test and keep your batteries in full charge are in Chapter 3 of the battery pub, TM 9-6140-200-14.

Likewise, before you put a new battery on the job, mechanics, test its specific gravity. It tells you the battery's state of charge.

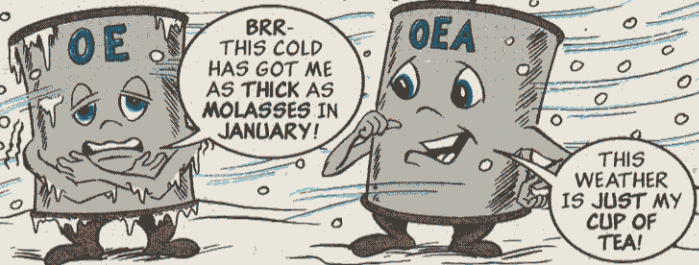
Checking specific gravity is no sweat. Use the optical battery/anti-freeze tester in your Common shop sets.

Then follow the procedures in Para 3-6 of the battery TM.

If the specific gravity is less than 1.045, or if the differences between cells is more than .025, turn in the battery.



OE vs OEA



Engineers figure that 90 percent of the engine damage done by starting a vehicle in extreme cold weather happens in the first 10 seconds.

OEA (oil, engine, arctic) will perform at -65°F in those terrible 10 seconds. OE will not. (At -65°F , OEA is fluid. OE is solid at -20°F .)

Engine damage caused in a cold start with a thick lube may not show up until later, when the engine's torn down after a shorter-than-usual work life.

Even using OEA, you've got to pay more attention to your oil level and its possible contamination. The best thing to do is follow your LO, and these tips:

Pull dipstick every hour or so. Carry enough oil with you so you can add some if oil level doesn't measure up.

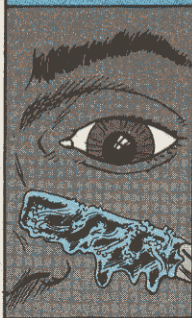


Then use your nose to smell for diesel fuel contamination in oil. Drain and refill if you even suspect contamination.



Use your eyes and fingers to look and feel for water.

Moisture (condensation) dilution of crankcase lube is hard to detect unless it's really bad. Suspect it all the time in extra cold weather.



A sure check, if you have time and suspect oil is bad, is to draw a sample and let it stand in a clear glass container. Water and oil will separate.



WATCH AIR FILTER INDICATORS

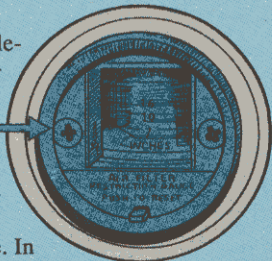


Ice and snow can plug up your vehicle's air filter as quickly as dirt. What's worse, they'll plug up a brand-new filter.

Moist air sucked into the filter can freeze on the element. Snow can do the same thing. Either way, air can't get through.

Keep an eye on the air restriction indicator in the cab of your vehicle. If red comes up, the air cleaner's plugged. Get the element cleaned, dried out or replaced.

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



HE'LL
BE JUST
FINE!



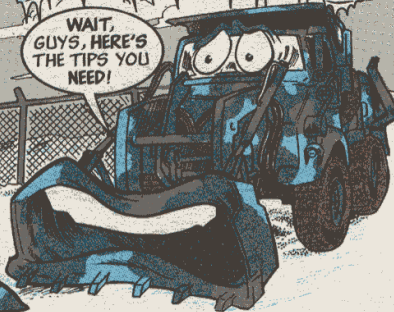
BUT ROUTINE
MAINTENANCE JUST
WON'T HACK IT FOR
A LONG WINTER!



SEE'ing Is

Believing

WAIT,
GUYS, HERE'S
THE TIPS YOU
NEED!



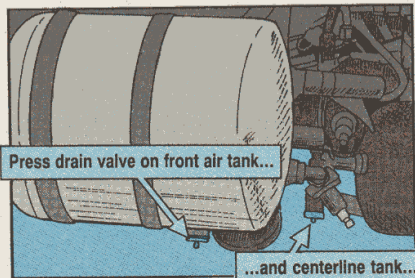
Old weather can play havoc with your SEE. Trying to get through winter by pulling routine maintenance just won't hack it.

Here are a few tips that will keep your vehicle in the running.

Water + 32° F or Less = Ice!

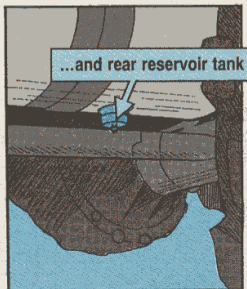
A drop in temperature increases condensation in the SEE's air brake system. That condensation leads to corrosion . . . and brake failure.

Get the water out by pressing the drain valves on the front air tank, the centerline tank and the rear reservoir tank.



Alcohol Reservoir Full?

Before the snow flies, make sure the SEE's compressed air system antifreeze unit is set for the season. The antifreeze unit injects ethyl alcohol into the air brake system to keep water from freezing in the brake lines. Eyeball the alcohol reservoir to make sure it's filled.



Set for Winter?

Keep the automatic defrosting pump setting in the number 1 (open) position for winter, or number 0 (closed) position for summer.

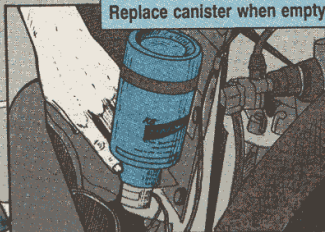
Make sure the reservoir is filled—even in summer—so dirt and dust cannot get in.



Rough Start?

Your SEE may be hard to start when the temperature drops below 32° F. The cold weather starter system has a fuel canister that automatically injects ether into the engine when you push the cold start button.

Replace canister when empty



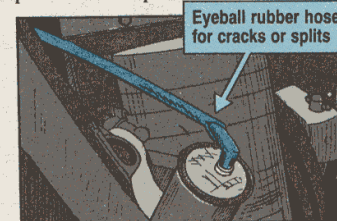
If your SEE's engine starts rough after pushing the button, chances are the ether canister is empty. Have your mechanic replace the canister.

No Washer Fluid?

The rubber hose that attaches to the washer fluid reservoir can crack or split from vehicle vibration and weathering. Then the windshield washer pump sucks in air instead of fluid . . . and you can't clean the windshield.

Your mechanic can fix the problem, like so:

Eyeball the hose where it attaches to the nipple on the windshield washer jar. That's where the hose usually splits. Snip off a half inch of the hose and push it back in place.



Warm in the winter, cool in the summer—those are the ideal conditions for the engines on your D7F and D8 tractors. And that's the reason they have reversible radiator fan blades.

Depending on which way they're turned, the blades will either pull air through the radiator or push air out through it. How you set 'em depends on the season.

For cold weather, turn the blades to pull air through the radiator. That blows warmed air back over the engine and helps keep it at operating temperature.

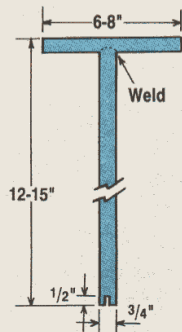
During hot weather, reverse the blades to push air out through the radiator and carry heat away from the engine.

Changing the fan is a simple matter of adjusting each blade. Here's how:

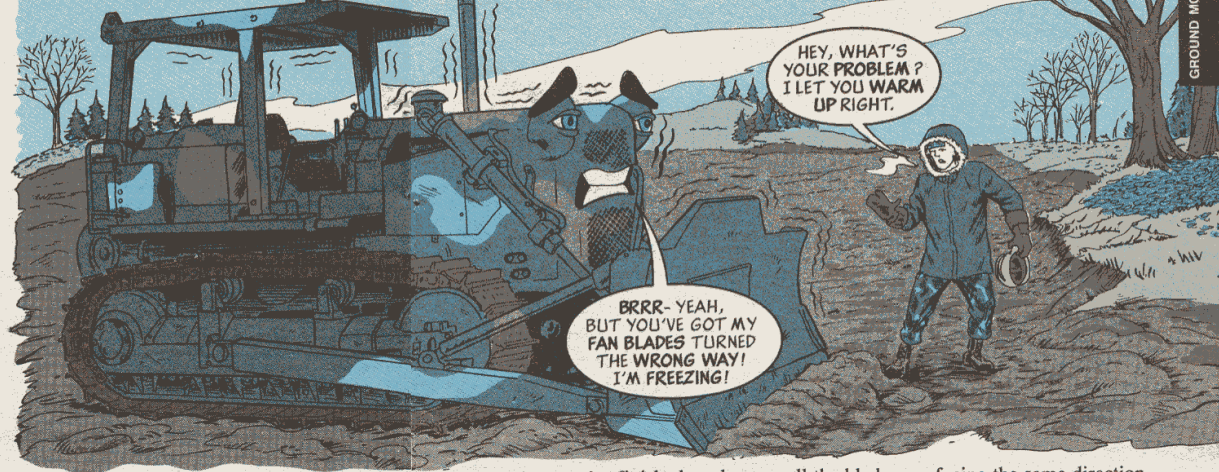
1. Push the blade in toward the hub.
2. Twist the blade to the opposite angle.
3. Let the blade spring back out and lock in position.

If a blade won't push and turn, stop. Trying to force it can bend the blade or shaft.

To reach the blades without removing the screen guards, make this tool from $\frac{3}{4}$ -in pipe.



Seasonal Flip-Flop



When you're finished, make sure all the blades are facing the same direction. Otherwise, you'll cut down air flow through the radiator and get vibration that damages the fan hub and bearings.

Hydraulic Fluid Overload

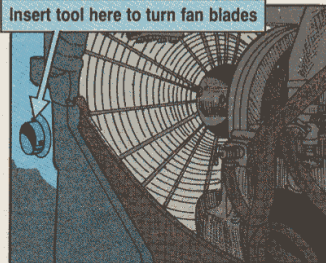
Your 621B scraper's TM 5-3805-248-14&P-1 tells you to eyeball the hydraulic oil level before startup. Do that, though, and it can read low. It'll also read low if the cylinders are extended.

Oil expands as it warms, and oil in the cylinders won't register on the gauge at all. Overfilling the oil tank just builds pressure that blows seals.

Play it safe. Make sure the scraper is in the parked position, with all cylinders retracted. Then, let it warm up a few minutes. The oil level should then be between the ADD and FULL marks.

Shut down the scraper before adding any hydraulic oil. If you accidentally overfill the reservoir, remove the excess with an AOP vampire pump.

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 process.

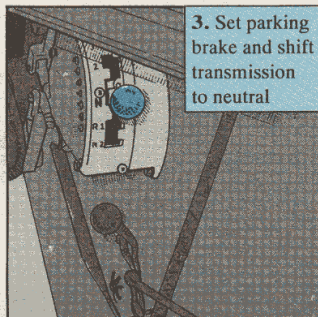


A HOT BEGINNING TO A COLD START

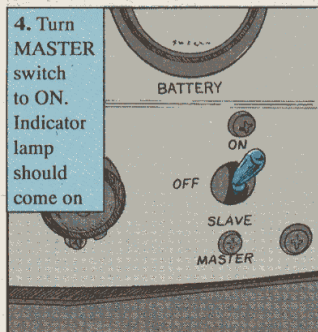
Drivers, you only have to try starting your M992 ammo carrier or M109 howitzer once in cold weather to see how frustrating it can be.

To get the best starts, follow these instructions:

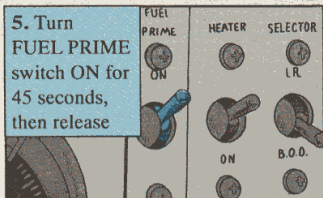
1. Secure the winterization kit and shut off the COOLANT HEATER switch.
2. Make sure the battery indicator gauge is in the green range.



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

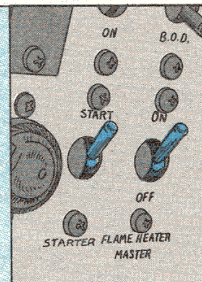
6. Set the hand throttle to IDLE. Do not use the foot throttle.



Now you're ready to start the vehicle:

1. Pull out and hold the FUEL SHUTOFF handle.

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



3. Keep cranking the engine while setting the FLAME HEATER switch ON one second and OFF one 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

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 two minutes, or you may burn up the starter. Wait at least two minutes, then start over with step one. If the engine still won't start or doesn't reach 100 RPM or more after 15 seconds, get your mechanic.
6. Release the starter switch after the engine starts and follow the engine warm-up 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 okay, 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 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 nosedive, have your mechanic install cold start enhancement kit, NSN 2990-01-342-7944.

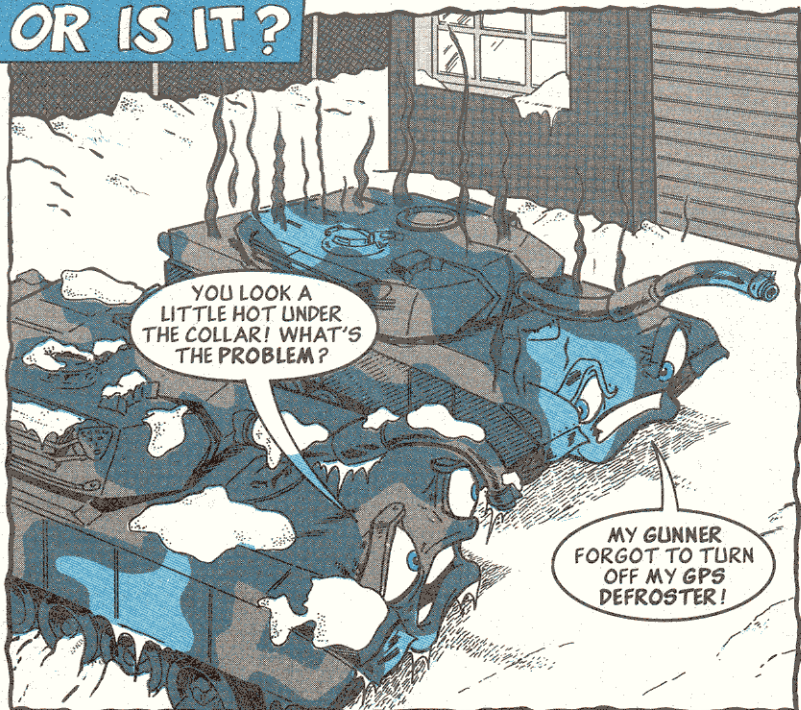
The kit maintains 1 1/2 PSI of positive pressure in the fuel lines. That prevents loss of prime in the flame heater fuel supply line when the engine is not running.

Make a note until the parts manuals are updated. The kit will only work with the M992 ammo carrier and M109A2/A3/A4 howitzers.

Defrost Problem Solved?

Gunners, it's a no-brainer to figure out what to do when frost forms on the day window of the gunner's primary sight (GPS). You just flip on the GPS defroster. In a few minutes the frost is gone and your problem is all cleared up.

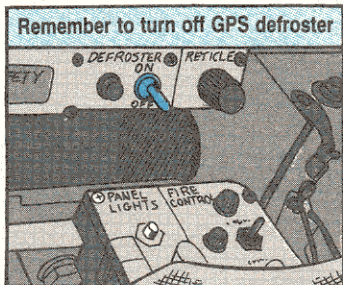
OR IS IT?



The defroster doesn't turn itself off when the frost is gone. So if you forget, the defroster keeps right on running.

Leaving the defroster on may or may not cause a problem. It depends on how well the GPS day window was installed. The excessive heat can cause an improperly installed window to crack.

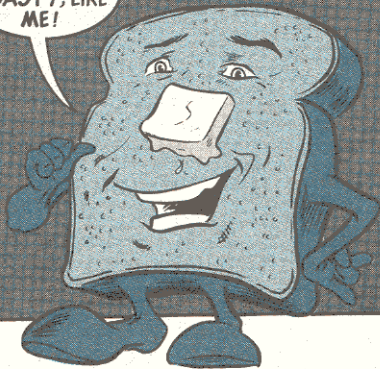
Better safe than sorry. When the frost is gone, turn off the defroster.



Combat Vehicles ...

MAKE YOUR PLUGS GLOW

BE WARM AND TOASTY, LIKE ME!



FIREPOWER

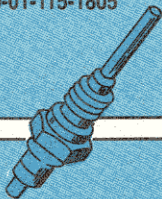
The number one problem with combat vehicle personnel heaters is bad igniters or glow plugs. Replace the bad ones now and you'll be warm and toasty this winter.

Here's a handy cross reference of igniter-to-heater and glow plug-to-heater models:

Stewart-Warner 10560C,
10560G, 10560M,
10560M24B1, NSN
4520-00-217-5782

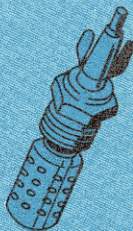


Hupp MF510B, NSN
2540-01-115-1805



Hupp MF60A-24V,
MF60B-24V, MF510C,
NSN 2540-01-167-7248

ESPAR V7S, NSN
2540-12-167-3599



M1A1 Switches to OEA

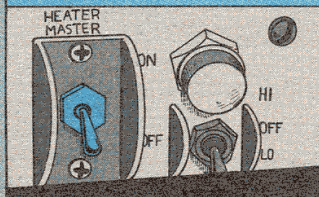
The M1A1 tank's traversing mechanism manual drive now takes OEA, not Dexron II, per LO 9-2350-264-12 (Jun 92). Don't dump the Dexron, though. Just top off with OEA, NSN 9150-01-330-0692, semiannually when you check the fluid level. Then switch to OEA the next time you're required to drain the traversing mechanism.

PERSONNEL HEATER TIPS

Winter's just around the corner. So if you haven't already checked out your vehicle's personnel heater, now's the time to do it.

If you have a Stewart-Warner heater, Model 10560G, C or M, and it doesn't work, cycle the start switch two minutes on, 10 seconds off. This keeps the ignition control from getting too hot.

If heater doesn't start, try a second and third time by cycling heater master switch one minute ON, 10 seconds OFF



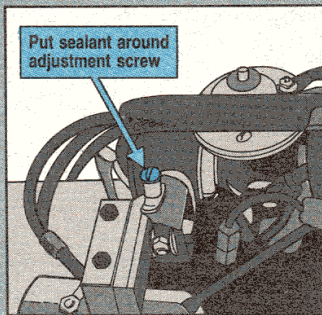
If the heater won't start after the third try, go through the troubleshooting procedures in your -10 TM. Still won't start? Have your mechanic take a look at it.

Mechanics, voltage to the igniter is very important. It should register 10 volts. Visible hot spots and uneven coil spacing are signs of a defective igniter. Replace it. If you still don't get the required 10 volts, let support check it out.

While the cover is off, check the flame detector switch. On newly installed Stewart-Warner heaters, the flame detector switch may need adjusting.

Make sure the heater is off and cool, then turn the adjustment screw coun-

terclockwise part way. Slowly turn in until the switch clicks. When you hear the click, turn the screw 1/2 turn clockwise. Apply sealant, NSN 8040-00-225-4548, around the screw head to keep it from moving.



Hupp Heaters

Your Hupp MF510B, MF510C, MF60A-24V and MF60B-24V heaters start differently.

Let the heater stay in the start mode for four minutes. That's how long it takes a Hupp igniter to get hot.

If the heater doesn't start right off, wait 15 minutes before trying a restart. That's a long time to wait when you're cold, but any sooner and you risk flooding the heater.

If the heater still refuses to start, get your mechanic to check the incoming voltage. It should read between 24-28 volts.

Heater Shutdown

Take the time to shut down your heater right, or the next time you need it you'll be left out in the cold.

Once you've got the heater started, let it run for at least five minutes or the heater may flood. Then you won't be able to start it again for a long time.

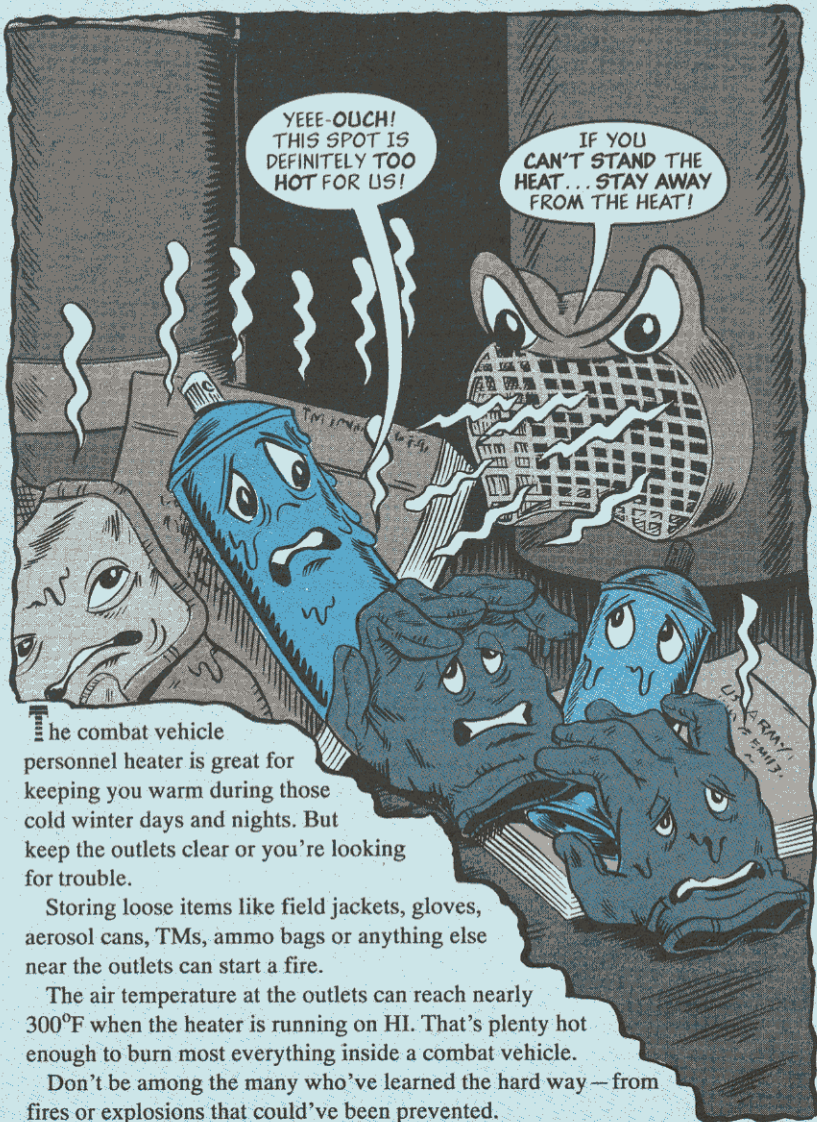
Give your heater a chance to purge itself at shutdown. Some vehicles have electrical circuitry that lets the heaters run and purge themselves even with the master switch off. Others have to run until purging is finished before you hit the master switch.

Guessing will only get you into trouble, so check out your vehicle's -10 TM and follow instructions.

For more information on personnel heaters, check out TM 9-2540-205-24&P.



Make It a Non-Flammable Winter



The combat vehicle personnel heater is great for keeping you warm during those cold winter days and nights. But keep the outlets clear or you're looking for trouble.

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

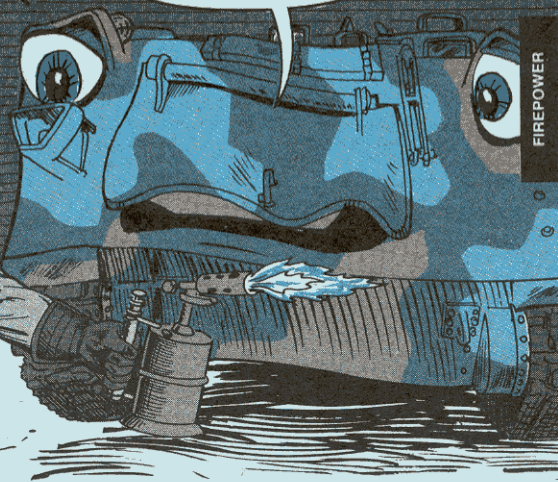
The air temperature at the outlets can reach nearly 300°F when the heater is running on HI. That's plenty hot enough to burn most everything inside a combat vehicle.

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

Look for Missing Gasket

I KNOW HOW TO TAKE CARE OF FROZEN STARTERS.

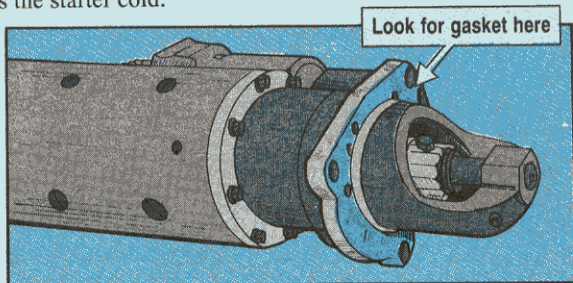
YIPES!
ALL I REALLY NEED IS A STARTER GASKET!



Mechanics, are you getting complaints of frozen starters on M113-series carriers, M109-series or M110A2 SP howitzers, M992 ammo carriers or M578 recovery vehicles? The culprit is probably a missing gasket.

Water gets inside the starter when there's no gasket to stop it. That water freezes solid and stops the starter cold.

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



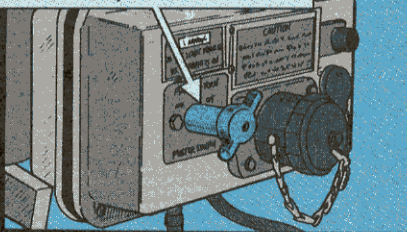
AVOID SOLENOID BURNOUT

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.

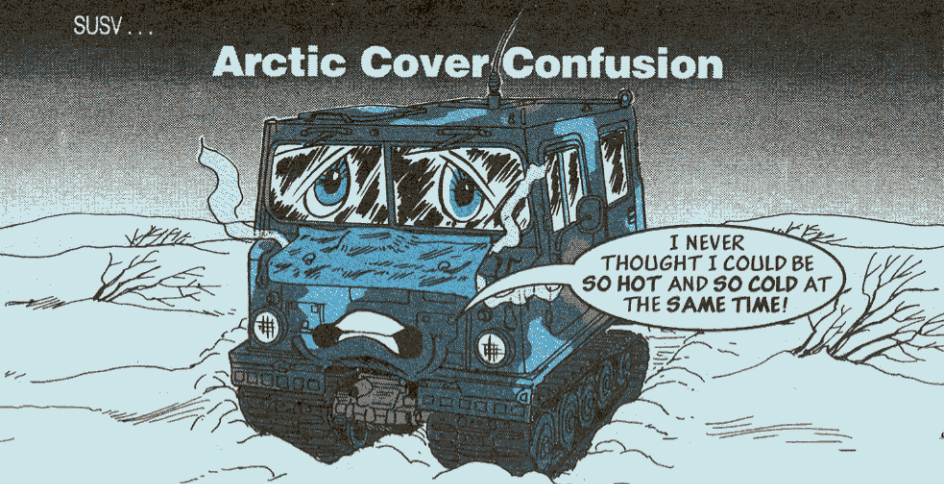
Just make sure you remember to turn the radio OFF when you finish. If it's still ON when you start the engine, you'll end up with a fried radio.

MASTER SWITCH does not have to be ON to operate radio or heater



SUSV . . .

Arctic Cover Confusion



Drivers, deciding whether or not to use the arctic cover on your SUSV's radiator is not too hard. The question is, should you leave it in place or remove it while letting the vehicle warm up?

If the outside air's too warm, the cover causes the radiator to overheat. If it's too cold, though, leaving the cover off lets the radiator freeze.

Take all the guesswork out. Take the cover off before startup when the temperature is above -15°F . When it's colder than that, leave the cover on.

Just make sure you remove the cover before operation.

SUSV...

PUT THE BRAKES ON BURNOUT



FIREPOWER

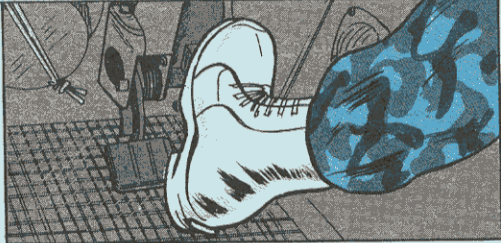
Drivers, wearing extreme cold weather boots while operating your SUSV can be a brake killer.

Because the accelerator and brake are so close together—especially on the 5-cylinder model—it's easy to press down on both pedals when you're wearing those thickly padded boots.

Since you can't do away with the boots—at least not unless you're partial to frostbite—pay close attention to where you put your feet when driving the vehicle.

Keep your foot straight up and down on the accelerator, not at an angle. That keeps those big boots off the brake pedal—and brakes on-line when you need 'em.

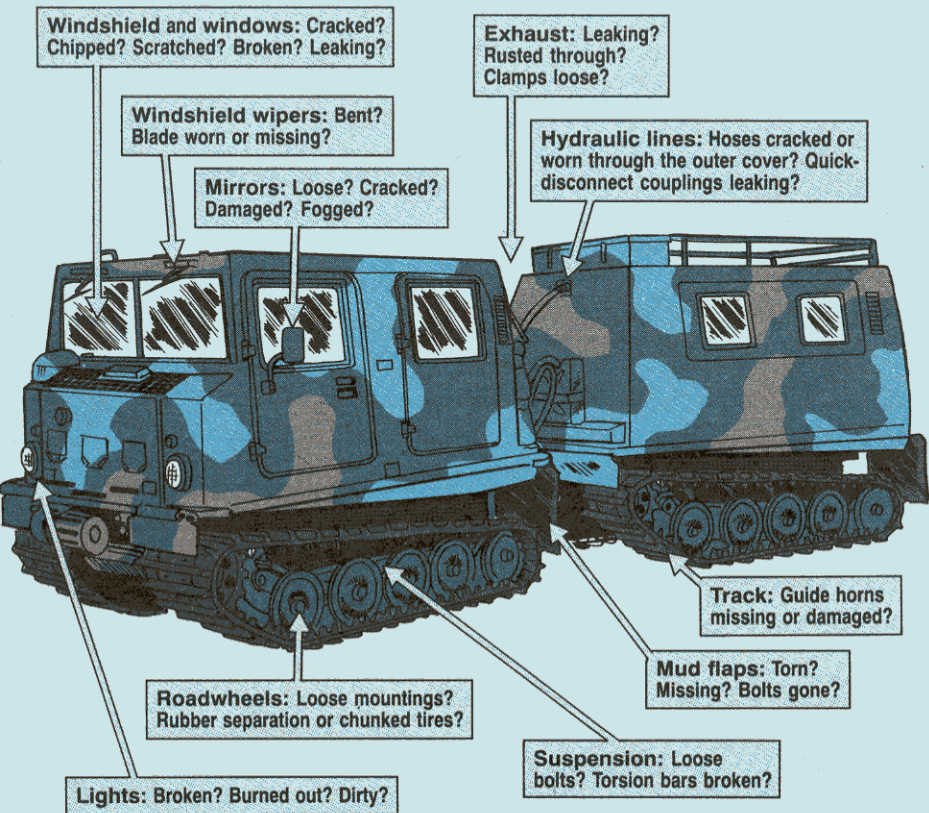
Brake pedal and accelerator are so close together that a boot can press against both



BE YOUR OWN INSPECTOR

As a SUSV operator, it's your job to make sure your vehicle's ready to go even when it's cold enough to freeze a thermometer.

But your job will become mission impossible if you don't keep everything in good working order. That means taking a slow walk around your vehicle before starting each day's run. Here's what to look for:

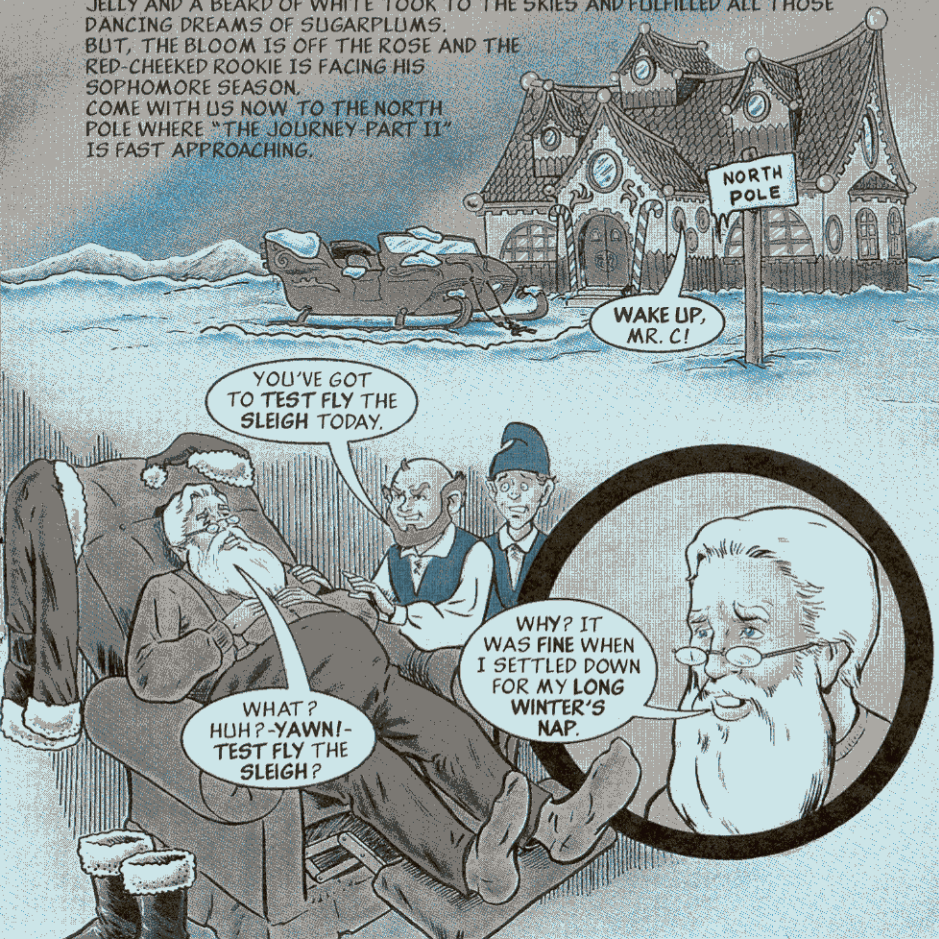


If you find anything you can't fix yourself, jot it down on your Equipment Inspection and Maintenance Worksheet. Get it checked out before you go.

THE SANTA CLAUSE:

THE SECOND YEAR

IT WAS JUST A SHORT YEAR AGO WHEN A SLIPPERY SLOPE AND A LEGAL LOOPHOLE MADE A COMMONER A KING. A NEW MAN IN RED WITH A BELLY OF JELLY AND A BEARD OF WHITE TOOK TO THE SKIES AND FULFILLED ALL THOSE DANCING DREAMS OF SUGARPLUMS. BUT, THE BLOOM IS OFF THE ROSE AND THE RED-CHEEKED ROOKIE IS FACING HIS SOPHOMORE SEASON. COME WITH US NOW TO THE NORTH POLE WHERE "THE JOURNEY-PART II" IS FAST APPROACHING.



WAKE UP,
MR. C!

YOU'VE GOT
TO TEST FLY THE
SLEIGH TODAY.

WHAT?
HUH?-YAWN!
TEST FLY THE
SLEIGH?

WHY? IT
WAS FINE WHEN
I SETTLED DOWN
FOR MY LONG
WINTER'S
NAP.



YEAH, BUT YOU'VE BEEN
NAPPING FOR 11 MONTHS AND
THE SLEIGH'S BEEN OUTSIDE.

ALL RIGHT,
SHORT STUFF,
DON'T GET YOUR
KNICKERS IN A KNOT.
LET'S TAKE A
LOOK.



LOOKS
A-OK TO ME!
BACK TO
BED.

BETTER
GET NEW GLASSES,
CHUBBY.



COME
OUTSIDE
AND TAKE A
CLOSER
LOOK.

OK, OK,
LET ME GET
DRESSED.

MOMENTS
LATER ...

I'LL
SHOW YOU
WHAT I
MEAN.

LOOK AT THIS LUBE—
STIFF AND THICK. NO
WAY IT WILL GREASE
THE SKIDS.

HM-M-M, I GUESS ALL FLUIDS ARE
AFFECTED BY THE COLD. WITHOUT
LUBE, I'LL HAVE A SHORT SLIDE
ON A LONG ROOF.

AND LOOK AT
THIS LINKAGE—FROZEN
SOLID. YOU WON'T BE ABLE TO
REIN IN THE REINDEER.

NOSEDIVE
CITY, HUH?



YEP! AND THIS PAINT JOB IS SHOT. PAINT BECOMES BRITTLE AND CRACKS IN THE COLD.

I GET THE PICTURE. NO PAINT MEANS CORROSION. SOON MY SLEIGH FULL OF TOYS WILL BE A BUCKET OF RUST.

HERE'S ANOTHER PROBLEM. YOUR VENTS ARE CLOGGED WITH FROZEN SLUSH. CLOGGED VENTS MEAN NO HEAT!

OUCH! JACK FROST WILL BE NIPPING AT MY NOSE!



TAKE A GANDER AT THESE GAUGES. THE COLD HAS CRACKED THE GLASS AND THE INDICATORS ARE FROZEN!

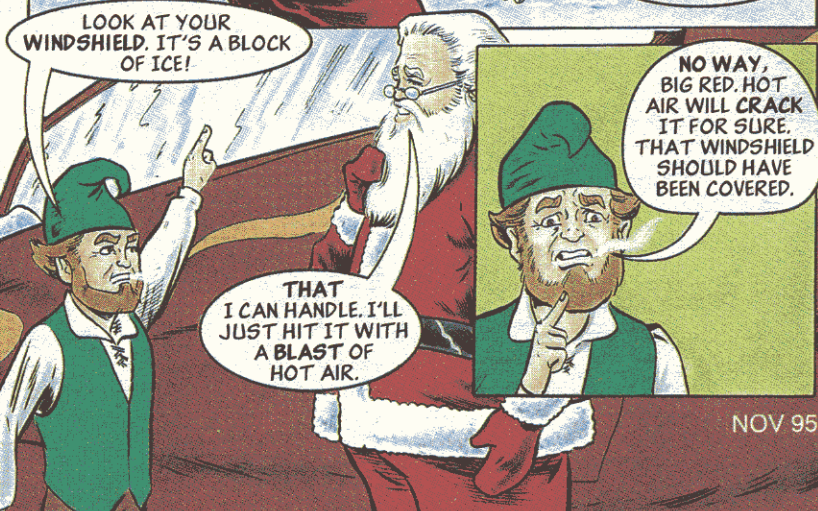
I'LL GET LOST WITHOUT MY COMPASS! WITHOUT MY BEARINGS, I'LL BE LEAVING SNOWSHOES UNDER PALM TREES IN HAWAII.

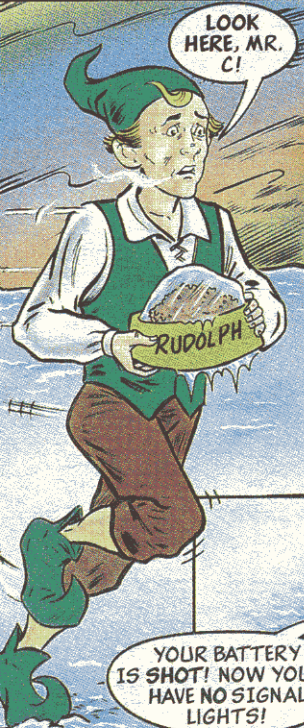
HEY! WHERE'D YOU GO?

YAAAA!

YOUR SACK'S SUPPOSED TO GO WHERE THIS BIG HOLE IS, ISN'T IT?

YIKES! THE COLD MADE THE PLASTIC BRITTLE. NO WAY IT WILL HOLD MY SACK AND WITHOUT MY SACK THE TRIP LOSES SOME OF ITS MEANING.





LOOK HERE, MR. C!



WATER'S GOTTEN INTO THE REINDEER FOOD! THEIR PROTEIN PELLETS ARE FROZEN. THEIR FOOD IS THEIR FUEL.

NO FUEL—NO FLY!

BUFFALO WINGS, MAYBE!



YOUR BATTERY IS SHOT! NOW YOU'LL HAVE NO SIGNAL LIGHTS!


-GULP!- I'LL BE A HOOD ORNAMENT ON A 747!



MORE PROBLEMS—THE BRAKES ARE FROZEN.

NO SCREECHING HALTS FOR ME.

THOSE BABIES WILL BURN UP BEFORE YOUR FIRST LANDING.



OK, I GET THE MESSAGE.
MY FIRST MISTAKE WAS LEAVING THE SLEIGH
IN THE COLD WITHOUT PREPARING IT FOR WINTER.
MY NEXT MISTAKE WAS THINKING WINTER
PROBLEMS WOULD TAKE CARE
OF THEMSELVES.

NOW YOU'RE
CATCHING ON. YOU
JUST MOVED FROM MY
NAUGHTY TO MY
NICE LIST.

Watch the Temperature



Temperature changes of more than 50° F make a difference in how your M901's hydraulic accumulator works. If you don't lower the accumulator's pressure when temperatures drop, its pump works too hard and wears out.

Adjust the accumulator's pressure according to the chart below, which is an update to the one in TM 9-2350-259-20:

Temp (°F)	Pressure (PSIG)
Below 0	825
0-39	900
40-79	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 the desiccant.

Use this chart — also an update to the TM — to adjust the ITA's pressure:

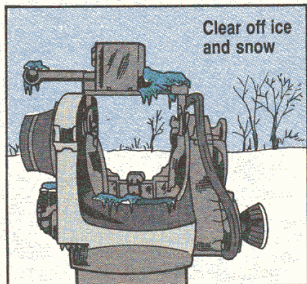
Temp (°F)	Pressure (PSIG)
Below 5	0
5-29	.5
30-54	1
55-84	2
85-110	3
Above 110	4

Before you charge either the hydraulic accumulator or ITA, purge the charging lines by blowing pressurized nitrogen through them. The procedures for the accumulator are on Page 3-15 of TM 9-2350-259-20. They're on Page 5-186 for the ITA. That removes any contamination in the lines.

TOW WARMERS

Cold weather can cripple your TOW if you don't warm up to PM. Include these TOW warmers in your PMCS:

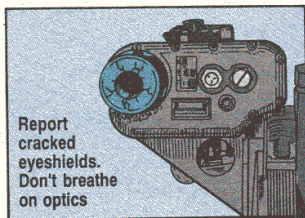
Keep ice and snow off clamping surfaces on the traversing unit, sights, and the missile. They prevent a good electrical connection.



Clear off ice and snow

Rubber eyeshields on the optical and night sights freeze, collect ice and eventually crack. That leaves the delicate optics vulnerable to ice and snow. Report cracked eyeshields, NSN 5855-01-070-4072.

Do not breathe on optics in cold weather, either. That will fog and ice them.



Report cracked eyeshields. Don't breathe on optics

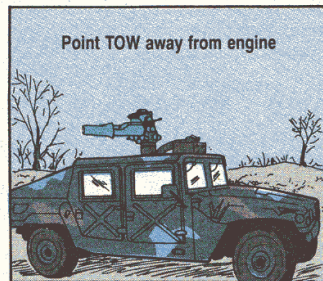


DON'T LET ICE AND SNOW GIVE YOUR TOWS A CASE OF FROSTBITE!

CHATTER CHATTER

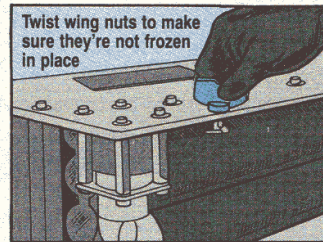
Y-YOU T-TELL 'EM, CONNIE! -BRRR-

When extremely cold air hits the heat rising from the vehicle engine on mounted TOWs, the night sight's vision is distorted. Beat distortion by parking your vehicle so you're aiming away from the engine.



Point TOW away from engine

The wing nuts on the battery of the missile guidance set (MGS) freeze solid and then pop off when the battery's loaded. If there are fewer than four wing nuts, your MGS is NMC. Prevent seized nuts by twisting each one before you load the battery.

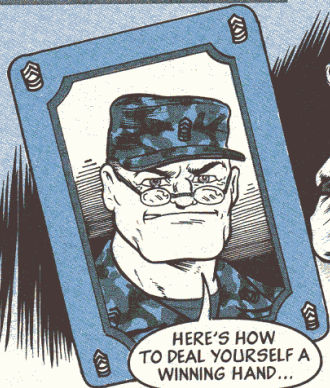


Twist wing nuts to make sure they're not frozen in place

Your repairman can order extra wing nuts, NSN 5325-01-148-8601, and retainer rings, NSN 5365-00-298-6564.

A Good Deal in Cold Weather

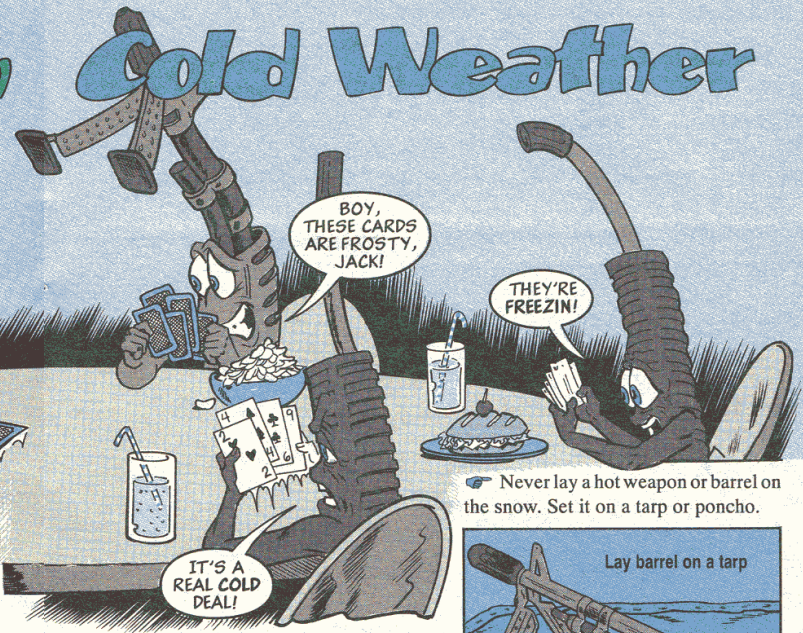
THE COLD WILL GIVE YOUR RIFLE OR MACHINE GUN A BAD DEAL IF YOU IGNORE COLD WEATHER P.M.



HERE'S HOW TO DEAL YOURSELF A WINNING HAND...



ANTE UP!



BOY, THESE CARDS ARE FROSTY, JACK!

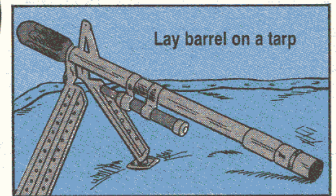
THEY'RE FREEZIN'!

IT'S A REAL COLD DEAL!

☛ Prevent condensation from forming inside weapons by keeping them covered when you move from cold to warmth. That lets the weapon warm gradually.

☛ Hand function the weapon every 30 minutes to keep parts from freezing solid. If parts do freeze, move them slowly and easily until they move smoothly again. Forcing things breaks parts.

☛ Never lay a hot weapon or barrel on the snow. Set it on a tarp or poncho.



Lay barrel on a tarp

☛ 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 slide better in cold than CLP or LSA. (The exception is the M249 machine gun. It needs CLP in all weather.)

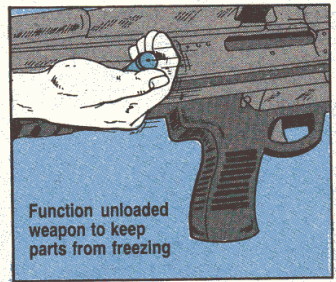
☛ Keep ammo dry. If necessary, wipe ammo and the insides of magazine dry before firing. That wipes out moisture that will freeze and jam your weapon.

☛ 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.

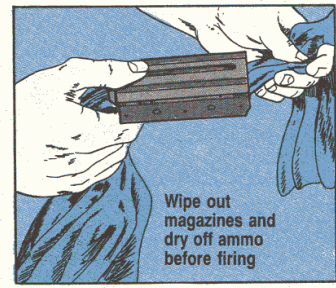
☛ Wait until a weapon warms to room temperature before cleaning it. A cold weapon will sweat with condensation. If you clean and lube the weapon before it quits sweating, the sweat freezes when you take it back outside.



LAW's the thing for cold weather lubing



Function unloaded weapon to keep parts from freezing



Wipe out magazines and dry off ammo before firing

Cold Weather Crackup



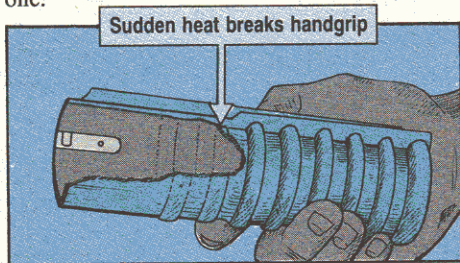
When it's really cold outside, about all you can think of is getting inside where it's nice and warm.

Forget about the handgrip on your M203 grenade launcher, though, and you'll have to think about getting a new one.

The handgrip is plastic, so cold weather makes it contract. Sudden changes in temperature—like bringing it into a heated tent—make the handgrip crack and break. The problem is especially bad in sub-zero temperatures.

You can prevent that problem by wrapping the weapon in a poncho or blanket before bringing it inside. That lets the handgrip warm up gradually and prevents cracks.

It also reduces the condensation that forms on metal parts. That keeps corrosion from getting a foothold.



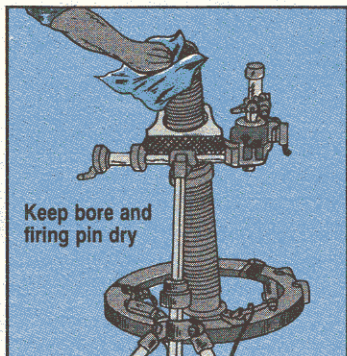
Mortars ...

PM Thaws Cold Problems

Cold can KO your mortar when it comes to firing...unless you counter-punch with PM.

Lube with LAW instead of GPL when the temperature drops below 10 °F. LAW won't get as stiff as GPL in cold weather.

Wipe dry inside of the bore before you go into the cold. That helps prevent ice from forming.



Keep bore and firing pin dry

Cover cartridges until they're ready to be fired. That stops ice from coating them.

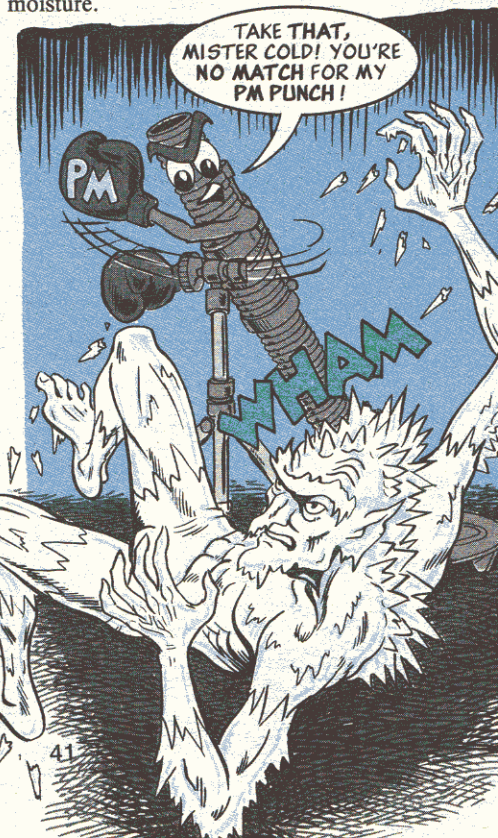
Keep fire control instruments in their cases. The cases cushion the instruments' delicate optics against the shock of the cold.



Keep fire control instruments in cases

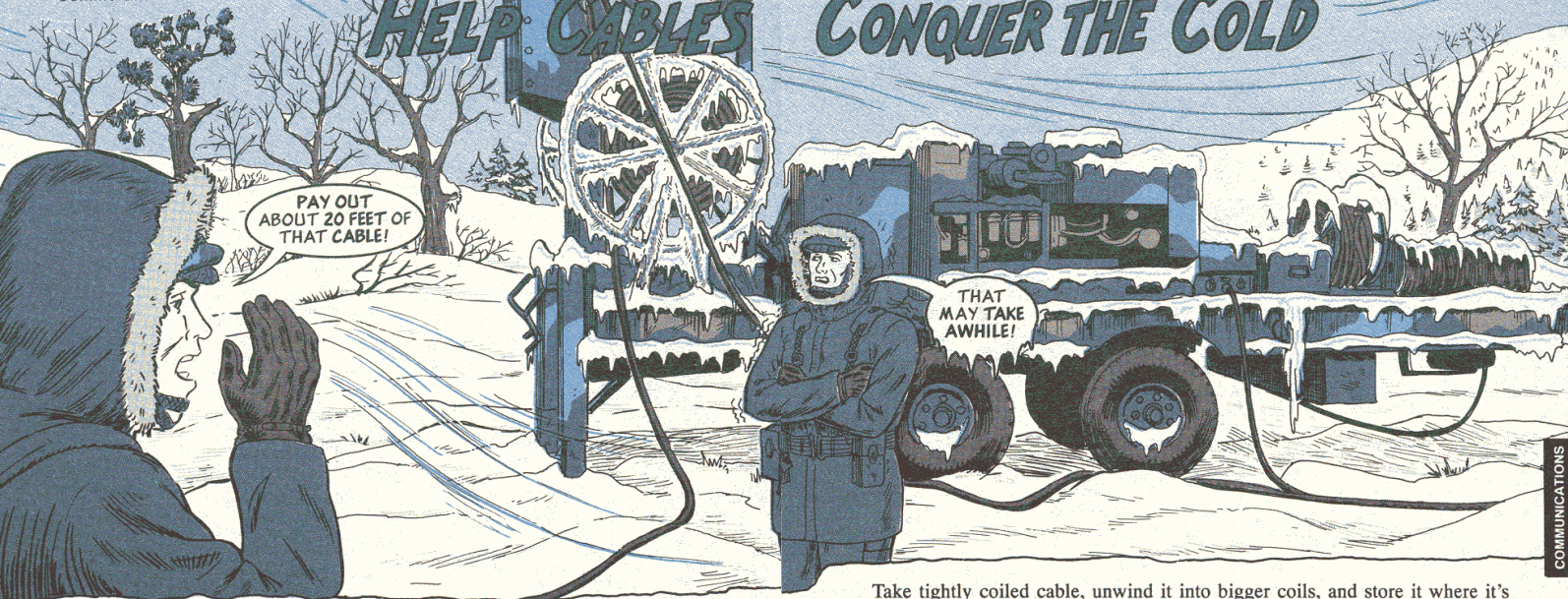
Never bring fire control instruments directly from the cold into a warm place. The sudden change in temperature cracks optics and lets condensation form inside the instruments. Leave the instruments some place sheltered—but unheated—where they can gradually warm before you bring them inside.

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.



HELP CABLES

CONQUER THE COLD



Extrême cold is brutal on field and telephone cable. Insulation turns stiff and brittle. It cracks and breaks open if cable's handled too roughly. Once that happens, moisture seeps into the wire conductors and causes a short.

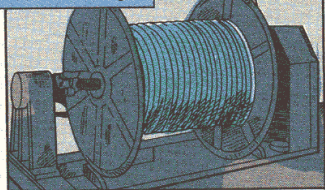
Certain places on a cable are especially vulnerable to cracking in the cold. These include field ties and splices, and kinks and crimps in the line.

Low temperatures also shrink and stiffen wire conductors, making them more liable to break.

Not only is cold cable more likely to crack, it's also stiff and harder to handle. A reel of cable may even freeze into its coiled shape.

The remedy for cold cable is a warm shelter and careful handling. Together they protect cable from damage and make it easier to control.

Coiled cable needs careful handling!



Take tightly coiled cable, unwind it into bigger coils, and store it where it's warm before taking it out in the cold. That'll reduce the risk of a pinch or break.

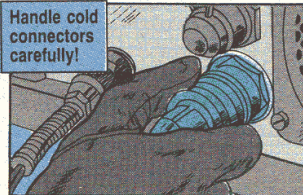
The same principle goes for cold, stiff cable, too. Before coiling it, warm it up, if possible.

And don't forget to handle cold cable carefully. Slow and easy is the way when you pay out, reel in or flex cable. That helps to avoid cracking the insulation.

If you have to splice or repair cable, use TL-600 cold weather tape, NSN 5970-00-240-0620, which comes in a 30-ft roll. This tape holds fast in cold weather and can be used without being warmed up. Most other friction and rubber tapes don't hold as well in extreme cold.

One more reminder: Metal connectors and receptacles shrink in the cold, making cable connections stubborn. Here again, take care when you hook up or unhook cables. Rough stuff just invites damage.

Handle cold connectors carefully!



Winter Weakens Batteries

Winter weather turns dry cell batteries cold. And cold batteries may not deliver the power your commo gear needs.

That's why you should know about cold-resistant batteries and cold weather battery care.

Cold-Resistant Batteries

Look at your equipment's TM and SB 11-6 for specific information on batteries for cold-weather operation.

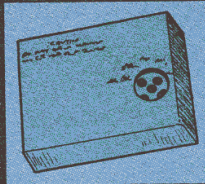
A new edition of SB 11-6 (Apr 93) supersedes the one dated Dec 87. Both list primary battery-using equipment, battery type numbers, descriptions, storage temperatures and NSNs. Follow your bulletin's advice on using cold-weather batteries.

Here are a few batteries specially made to withstand freezing temperatures:

➔ The BA-5372 lithium fill battery, NSN 6135-01-214-6441, used in MSE, SINCGARS and the KY-57, lasts longer at sub-zero temperatures than the mercury batteries it replaced.



➔ The BA-5598 lithium battery, NSN 6135-01-034-2239, gives your AN/PRC-77 radio longer-lasting power when it's bitter cold.



➔ And there's the BA-5567 lithium battery, NSN 6135-01-090-5365, used in night vision goggles. In cold weather it lasts longer than AA alkaline batteries.



Even cold-weather batteries need to be treated right. That means storing them as described in SB 11-6.

Battery Care

When temperatures plunge, batteries need extra care. Keep them stored until you're ready to move out. Then warm up only as many spares as you'll need. Lithium batteries won't need warming up unless they've been in temperatures below -20°F .

Protect dry cells by keeping them out of the cold and wind. Cover them with your clothing. Put them in a vehicle or commo shelter when possible. Sheltering batteries behind a wind break is better than leaving them out in the open. Putting them next to your body is best of all.

Never stow batteries next to a heater or stove. That's too much warmth for most dry cells, and they could vent or rupture.

Keep spare batteries handy so you can make a switch when the ones in your gear start to fade. When you remove batteries from your gear, put them in an inside shirt pocket to warm up. After a while, they'll regain their punch.

Never store a lithium battery in your clothing after the Complete

Discharge Device has been activated. The battery could vent harmful gas.

If you won't be using your gear right away, don't install the batteries. Keep them warm as long as you can.

If you warm batteries in a heated place, watch for sweating. Wipe off any moisture or it'll freeze.

Finally, if your gear has plastic pins in the battery compartment, take care when installing the battery. Cold pins become brittle. They'll break if handled too roughly.

Cold pins can break when mated

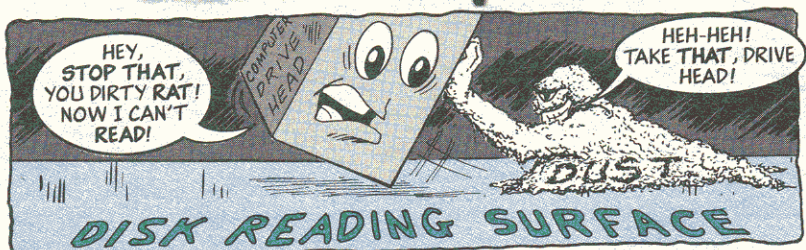


WHAT ARE YOU GOING TO DO WITH HIM?

I'M GOING TO WARM HIM UP 'TIL HE GETS BACK HIS PUNCH.

I COULD USE THE REST.

Dust Off Computer PM



Believe it or not, cold weather opens the door to two of the biggest enemies of your AN/TYQ-33(V) Tactical Army Combat Service Support Computer System (TACCS) — dust and heat.

That's because cold weather results in a lack of airflow. As the thermometer drops, doors and windows get shut. Turning on the heater doesn't help, either, because no fresh air comes in from the outside. In fact, heaters tend to stir up even more dust.

With nowhere else to go, airborne dust gets sucked into the TACCS' filters — clogging all three.

If the buildup gets thick enough, the filters choke off air circulation. The heat buildup makes your TACCS conk out.

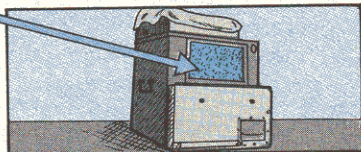
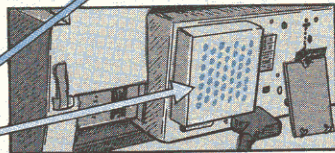
As if that weren't bad enough, some of that dust seeps past the filter. It settles between the drive heads and on the reading surface. Enough dust will force the drive heads off center. When that happens, the computer can't read the disk and you're off line.

Prevent all those problems by checking the filters daily for dust buildup. If the filters are damaged, get new ones for each component with these NSNs:

Component	Filter NSNs
Logic module	4130-01-271-2890
Printer	4460-01-264-4035
Remote logic module	4130-01-271-1966

If you're in a real pinch, a used filter can be rinsed out in clean water, dried and reused. Just make sure the filter is completely dry before you use it again.

Eyeball these filters daily:



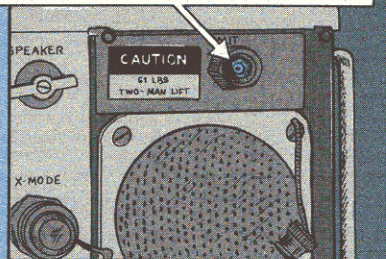
Keep Pin Bends on the Mend

Operators, your fingers and toes aren't the only things that get cold during winter. So does the connector pin on your RT-524 receiver-transmitter's antenna cable.

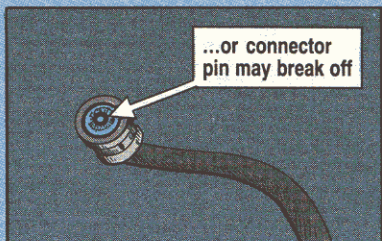
When temperatures drop below freezing, that metal pin loses some of

its flexibility. If it's the slightest bit off center, the pin will snap off when you plug it into the antenna receptacle. Your RT's not much good without an antenna.

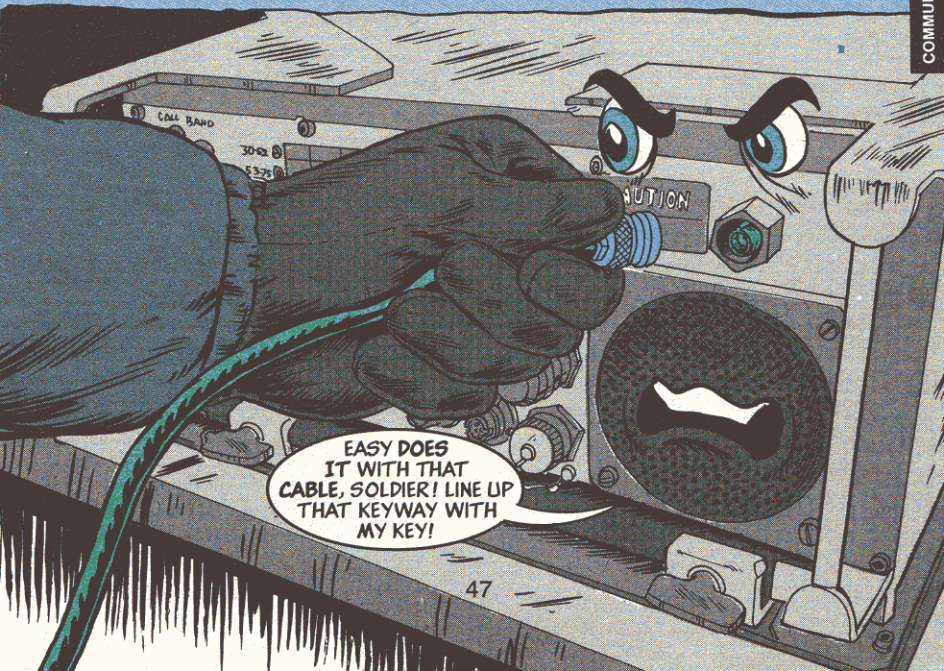
Take care when plugging cable in here...



...or connector pin may break off



Take care when you plug in the cable. Make sure you line up the key and keyway for a proper fit. A slow, sure hand is the best way to head off damage.



JUST SAY NO TO FROST AND SNOW

Aircraft are not like cars. You can't just scrape the windshield and take off. Aircraft have to be free of frost, ice and snow before they're good to go.

When your weatherman predicts ice or frost:

* Coat your aircraft with anti-icing, deicing, and defrosting fluid. NSN 6850-01-039-3841 brings a 55-gal drum; NSN 6850-00-901-0591 gets five gallons. Coat aircraft late in the day...the closer to midnight, the better. If it rains, coat again. Rain washes the anti-icing fluid off.

* Coat the aircraft even if you're using covers. The coating will prevent covers from sticking to the aircraft.

* When the weatherman says snow, your only real protection is to cover the aircraft. If you can't, grab a broom and sweep the aircraft during the snowfall.

Never use anti-icing fluid to protect against snow. The fluid is diluted by melting snow. This diluted solution forms a slush that freezes into a hard coating. Even worse, the slush can ooze down into controls. If you've missed the weather report and your aircraft is covered with ice or frost:

* Spray the aircraft with anti-icing fluid. If you can, dilute and heat the fluid. Heated fluid makes ice removal faster. Diluted fluid saves bucks. Table 3-2 of TM 1-1500-344-23 gives dilution percentages.

Para 3-5.3.7C and 3-5.3.7F give heating instructions. Also, section 1-86 of TM 55-1520-240-23 gives deicing fluid and heating instructions.

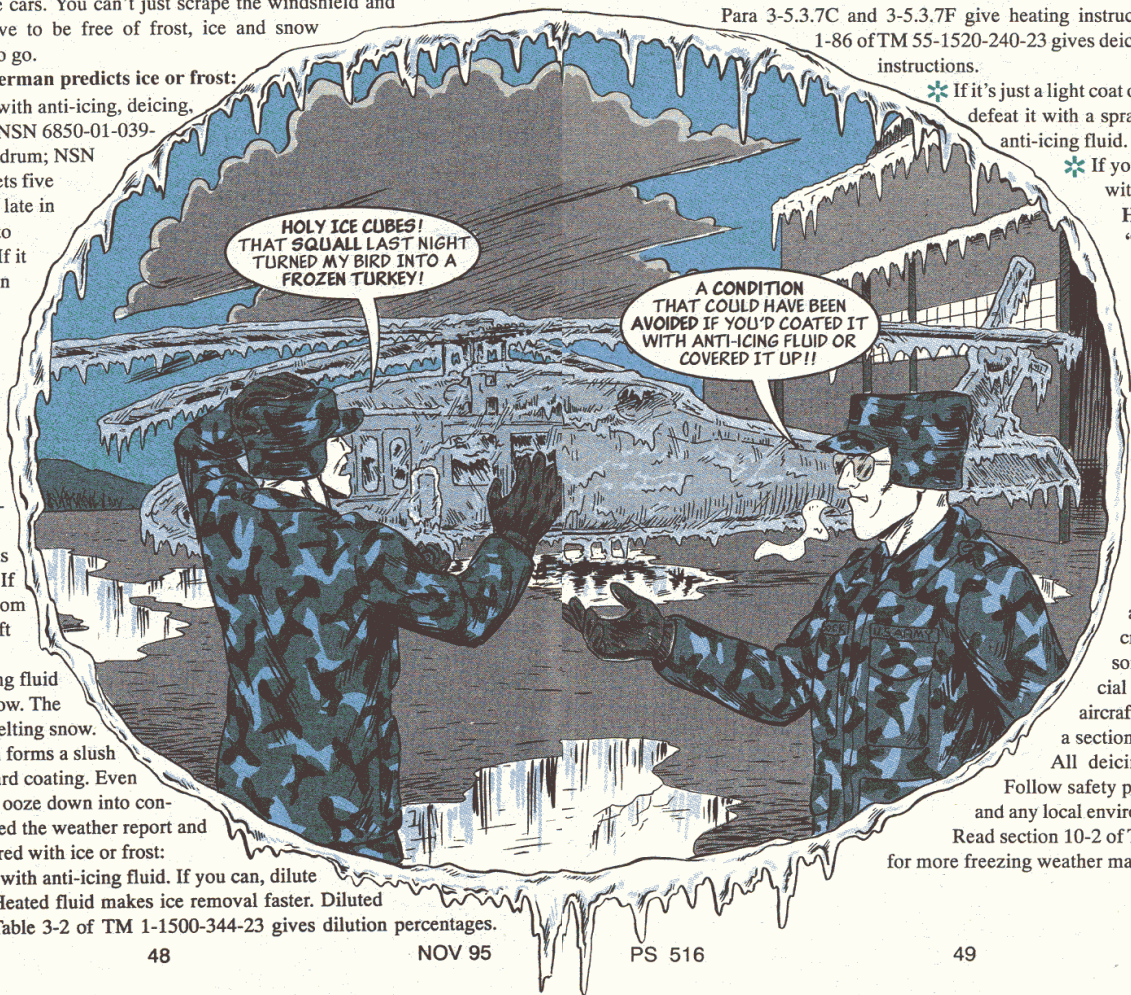
* If it's just a light coat of frost you're facing, defeat it with a spray of cold, undiluted anti-icing fluid.

* If your aircraft is covered with snow, sweep it off. Here are a few more "Just Say No!" tips:

Never use scrapers, picks or other sharp objects. You'll poke holes in your aircraft's skin.

* Never use water—hot or cold—to clean a windshield. Hot water will crack a windshield. Cold water will freeze. Not all anti-icing and deicing fluids are good for all aircraft. Some areas on some aircraft need special treatment. Read your aircraft TM. Each one has a section on deicing.

All deicing fluids are toxic. Follow safety precautions in the TM and any local environmental restrictions. Read section 10-2 of TM 1-1500-204-23-1 for more freezing weather maintenance info.



THE HARD, COLD FACTS



Bone-chilling, knee-knocking cold is headed your way. It will cripple your mission if you're not prepared. Top-notch preventive maintenance is critical.

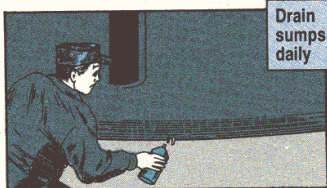
Start your maintenance procedures by moving your aircraft inside. If you can't move inside, and you're faced with some extended maintenance, use a maintenance shelter or rig a temporary shelter out of tentage, other canvas or a salvaged cargo parachute canopy. Warm your shelter with a ground heater. A warm, ventilated area will also let you work without bulky clothing and heavy gloves.

Be careful when you work on cold-soaked birds. The cold makes plastic and metal parts brittle and weaker.

Here are some other maintenance areas you should concentrate on:

FUEL: Water in fuel can turn to ice that blocks fuel lines. Keep your tanks topped off. The gap between the top of the tank and fuel is full of cold moist

air. That air causes condensation. Condensation drips into the fuel. When you take fuel samples, drain enough fuel to get rid of all the water.



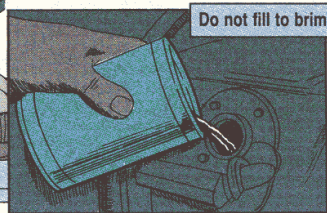
When you refuel outside in subzero temperatures, always check the fuel level outside. When a full aircraft is moved into the hangar, fuel will expand with the higher temperature. Opening the filler cap will give you a fuel spill to clean up.

The dangers of explosion from static electricity increase in cold weather, so be extra careful during refueling. The colder it is, the drier the air. The drier the air, the more static electricity becomes a hazard.

IT'S A FACT!
COLD WEATHER
CAN AFFECT ALL OF
THESE ITEMS.

Drain
sumps
daily

brim. Otherwise, when the oil heats up, the tank will overflow.



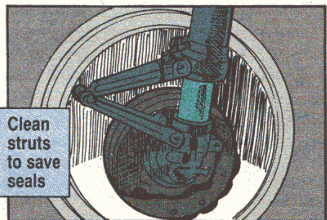
Do not fill to brim

Oil leaks are a chronic problem in cold weather. Check connections, joints and seals regularly.

SEALS: Cold weather is hard on gaskets and seals. They contract and that leads to leaks. Moisture can seep in around seals and freeze. The ice that forms can 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.

A good place to start is with landing gear. Dirty ice finds a home on struts and pistons. Check them often and use a clean rag dampened with hydraulic fluid to remove ice, dirt and grit from struts and pistons.



Clean
struts
to save
seals

Fuel flowing through the filler neck can generate the spark that ignites fuel. So always ground your aircraft before refueling. Also make sure the aircraft is bonded to the fuel tanker, and the nozzle is bonded to the bird before you remove the fuel cap. Follow all grounding procedures and take no shortcuts.

If you're not using a closed circuit fueling nozzle, put the regular nozzle in all the way. That'll hold down static and lessen the chance for a fuel spill.

Use extra care if you have to take fuel out of an aircraft. Spilled fuel on your hands can cause instant frostbite.

OIL and GREASE: Fuel is not the only fluid affected by the cold. Most fluids get stiffer as temperatures fall. Oil thickens, fuel's harder to ignite, and grease gels. You must use the right lube for cold weather. The lube chart in your TM lists the oil and grease to use.

When you service an oil tank on a cold-soaked bird, never fill it to the

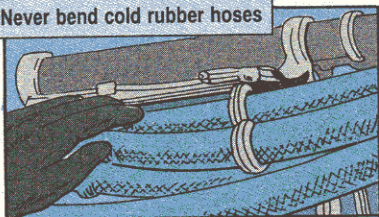
TIRES: Air pressure drops with temperature, so check your bird's tire pressure often.

Tires frozen to the ground can be freed with liquid deicer. Move the aircraft immediately to keep it from freezing down again as the slush formed by the deicer refreezes.

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

RUBBER HOSES and RUBBER COVERED WIRES: Never bend them when they are cold-soaked. Rubber gets brittle and stiff and can crack.

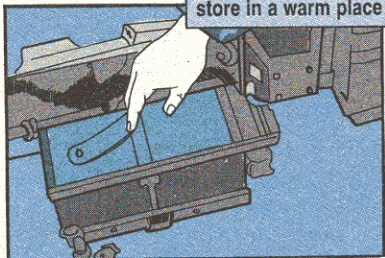
Never bend cold rubber hoses



BATTERIES: Unless you're in the deep freeze for a long string of days, your nickel-cadmium batteries will do their job well in cold weather without too much extra effort on your part. However, every cold start shortens their life. So, if possible, bring your

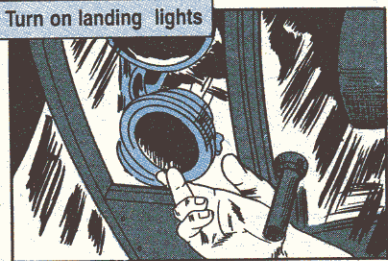
batteries indoors when the weatherman predicts several days of sub-freezing temperatures.

Remove batteries and store in a warm place



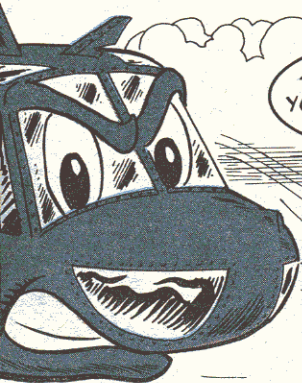
If that's not possible for the Cobra and Huey, turn on the landing lights, searchlight or other equipment for 30 seconds before an engine start. That "load" will warm up the battery a bit. The OH-58A/C has an internal battery heater for cold weather starting.

Turn on landing lights



Always use an auxiliary power unit on the first start of the day. It saves a lot of drain on cold batteries.

DON'T LET LOW TEMPERATURES PUT YOUR BIRD'S READINESS IN THE DEEP FREEZE.



ECWCS...

REPELLENCY RESTORATION REQUIRED



When you wash the parka and trousers of your extended cold weather clothing system (ECWCS), more than dirt slips down the drain. You also lose water repellency.

An ECWCS that does not repel water will not protect you from hypothermia.

If you feel like your ECWCS no longer repels water like it should, here's how to restore protection:

1. Wash the ECWCS in your washing machine like it says on the care label on the clothing.
2. When you're done with the wash, turn back to the last rinse cycle and fill the machine with water.
3. Add the water-repellent laundry additive following the directions on the bottle. Your unit can order a box of 24 8-oz bottles of water repellent laundry additive with NSN 8030-01-408-9446. You can take a bottle home and treat your ECWCS. Don't worry if your wet clothes have a white film; it will not show after drying.
4. Tumble dry the clothes on permanent press and medium heat until completely dry.

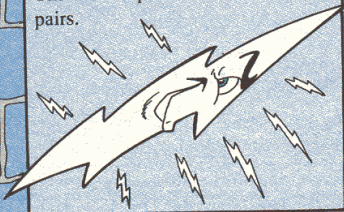
A field or post laundry can get five gallons of the additive with NSN 8030-01-408-9444, or 55 gallons with NSN 8030-01-408-9445.

If protecting your ECWCS is your responsibility alone, head for your PX and buy a bottle of additive. There are three brands of additive in the exchange system that will do a good job. They are Protex 2000, X-PEL and STORMSHED.

The Melted, the Holey and the Greasy

WHEN YOU WORK AROUND EQUIPMENT THAT PRODUCES SPARKS, GREASE OR BATTERY ACID, ALWAYS WEAR COVERALLS INSTEAD OF YOUR EXTENDED COLD WEATHER CLOTHING SYSTEM, OR ECWCS. HERE'S WHY...

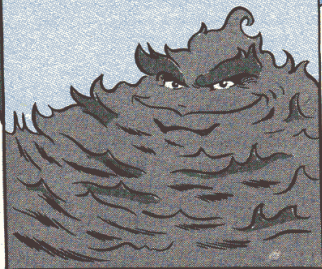
Sparks melt holes in your cold weather clothing. They won't keep out the cold again until you take them to the DS clothing shop for repair. The DS shop does all ECWCS repairs.



Battery acid is even worse than sparks because acid damage can't be repaired. The acid continues to eat the material in your clothing. The only thing you can do is get new clothes. Use NSNs 8415-01-228-1306 to 1322 for parkas, and NSNs 8415-01-228-1336 to 1352 for trousers. TM 10-8400-201-23 has size charts.



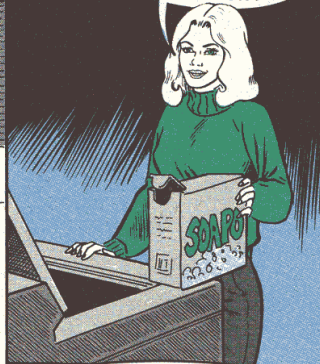
Grease is another cold weather clothing killer. Once grease gets on your cold weather clothes, it won't come off because the clothing cannot be washed at a high enough temperature to dissolve the grease.



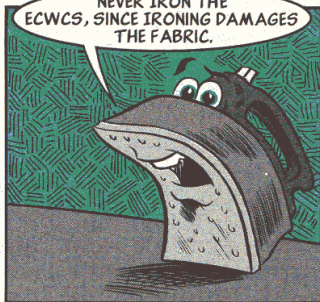
KEEP THEM AWAY FROM US!



WHEN YOU WASH YOUR ECWCS, USE POWDERED DETERGENT SO THE PORES OF THE CLOTH DON'T GET CLOGGED.



NEVER IRON THE ECWCS, SINCE IRONING DAMAGES THE FABRIC.



IT IS BEST TO HANG THE ECWCS TO DRY. IF YOU USE A DRYER, THE TEMP SHOULD BE NO HIGHER THAN 90°F.



Remember, cold weather clothes protect you from the cold only if you protect them from damage. For maintenance or cleaning, put on coveralls.

TM 10-8400-201-23 has the complete scoop on the care, cleaning and repair of your ECWCS.

Toasty Toes

Anyone can get cold feet on the battlefield—if they don't take good care of their cold-weather or extreme cold weather boots, that is.

Keep your toes warm and toasty by following these PM tips:

Watch Your Step

Puncturing a boot can put it out of action for good. That lets water get in the layer of insulation that's sealed inside. Wet insulation lets the cold through, and your feet get frostbitten.

Patch holes as soon as you find them using the cold-weather maintenance kit, NSN 8465-00-753-6335. Put the adhesive on both the boot and the patch.

Never expect the patches to hold up long in the field, though. They're good only for emergencies. When you come back in from the field, turn the boots in for testing.

Keep the air pressure relief valve closed unless you're flying in an aircraft. If it's open, it lets in almost as much moisture as a puncture. Make sure to close it once you land.

Squeaky Clean

Clean your boots by washing them with a mild detergent and water. Wash the insides at least once a month. Take the laces out

and clean between the tongue and the eyelets. Dirt or grit there can wear a hole in the boots.

For stubborn stains, use a spray-on general purpose detergent, NSN 7930-00-357-7386.

Never use paint or shoe polish to cover scratches or scuffs on your boots. They break down the rubber coating. Soon you'll have to get a new pair.

Put a Sock in It

Putting on damp boots is not much different than going barefoot. Either way, your feet will be very, very cold.

When you're in the field, carry extra pairs of socks and change often. That'll keep moisture to a minimum.

Never place your boots next to a heat source—like a Yukon stove—at the end of the day. Your boots will be nice and dry the next morning, but you'll have to scrape them off the floor.

When you're in the field, try hanging your boots up high from the center of the tent. The heat from the space heater rises and dries your boots without melting them.

Lace 'em Up

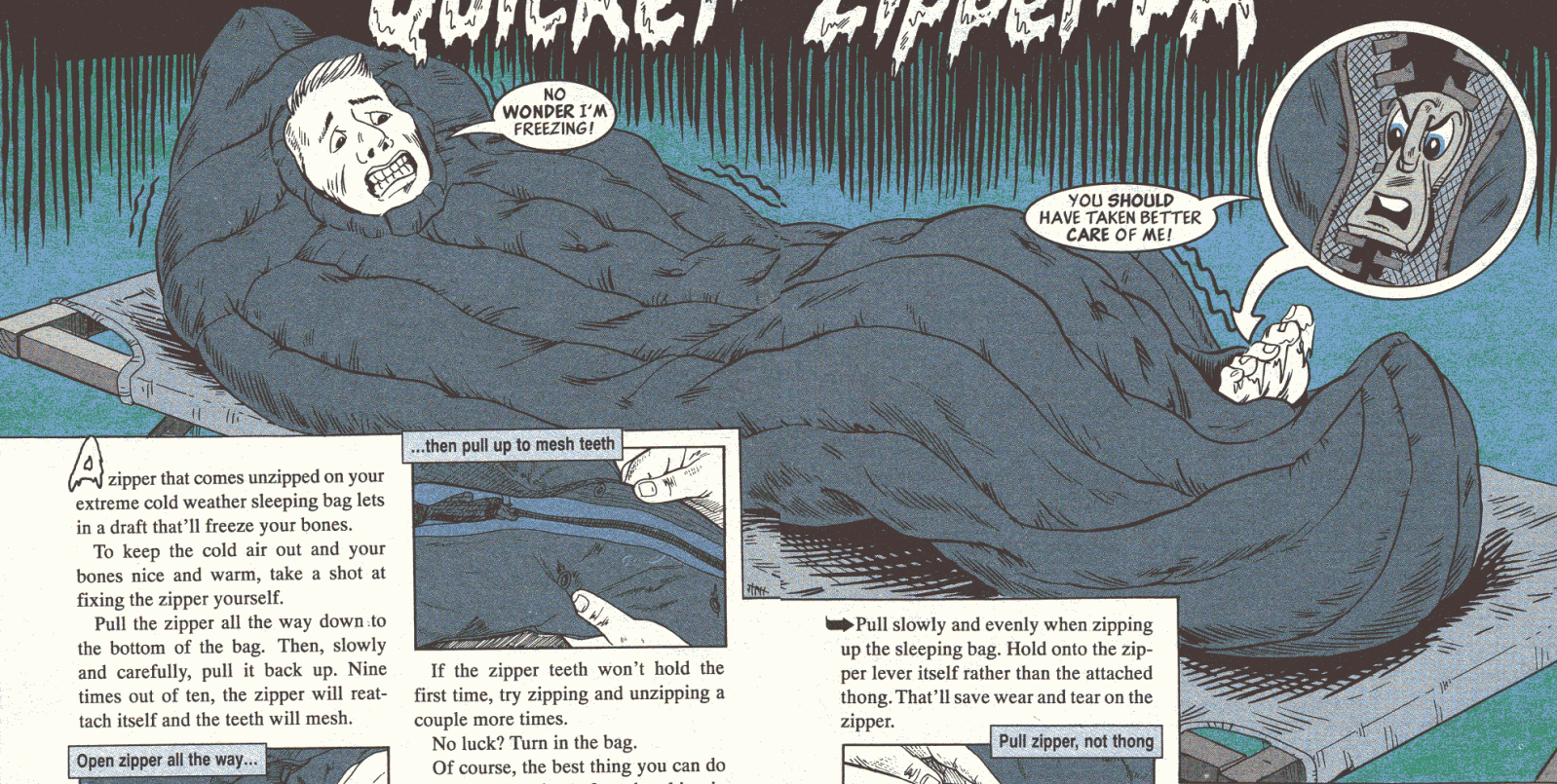
Get replacement white laces for your extreme cold-weather boots with NSN 8335-00-131-6538. Use NSN 8335-00-945-3969 to get black laces for your cold-weather boots.

I TOLD YOU TO DRY OUT THOSE BOOTS!

H-HEY! WAIT UP! M-MY FEET ARE F-FREEZIN'!

CLUMP
CLOMP

Quicker Zipper PM



NO WONDER I'M FREEZING!

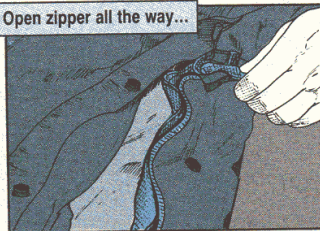
YOU SHOULD HAVE TAKEN BETTER CARE OF ME!

A zipper that comes unzipped on your extreme cold weather sleeping bag lets in a draft that'll freeze your bones.

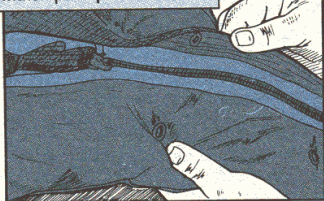
To keep the cold air out and your bones nice and warm, take a shot at fixing the zipper yourself.

Pull the zipper all the way down to the bottom of the bag. Then, slowly and carefully, pull it back up. Nine times out of ten, the zipper will reattach itself and the teeth will mesh.

Open zipper all the way...



...then pull up to mesh teeth



If the zipper teeth won't hold the first time, try zipping and unzipping a couple more times.

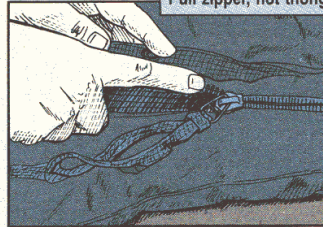
No luck? Turn in the bag.

Of course, the best thing you can do is prevent the zipper from breaking in the first place. Follow these PM tips and you'll always have a sleeping bag you can count on:

➔ Brush off any dirt or debris that's on the sleeping bag. That keeps grit from getting caught in the teeth when you zip the bag up.

➔ Pull slowly and evenly when zipping up the sleeping bag. Hold onto the zipper lever itself rather than the attached thong. That'll save wear and tear on the zipper.

Pull zipper, not thong

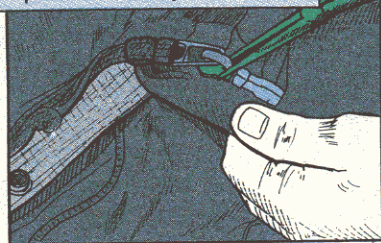


➔ Use zipper lube, NSN 9150-01-112-9412, on new zippers and whenever the zipper starts sticking or gets hard to pull. With the zipper closed, rub a few drops of the lube over the zipper teeth. Then work the zipper up and down a few times until it moves easily.

A bar of soap or candle works well in a pinch. Just run either one up and down the teeth. Then open and close the zipper several times to spread the soap or wax.

- Never run your sleeping bag through the pressure wringer of a wringer-type washing machine to squeeze out excess water. Your bag will be drier, but you'll have to replace the flattened zipper.
- If the teeth continue to separate, use a pair of needlenose pliers to gently squeeze down the flat portion of the

Squeeze slider body to mesh teeth



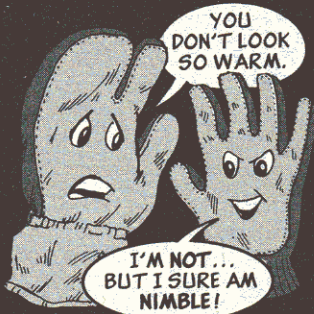
slider body. Hard pulls and continued use cause the slider body to open just a bit. Then the teeth don't mesh properly and come apart.



PS END

Cold Weather Gloves . . .

Skin Savers



Icy-cold metal can freeze to your skin the instant you touch it. But cold-weather mittens or gloves are too bulky to do much more than hold and fire a rifle. So what's a soldier to do?

Thin, anti-contact gloves are the answer for short term use. These cotton gloves are lined with deerskin palms to keep your hands from sticking to metal in temperatures as low as -60°F . Here's what's available:

NSN 8415-00-227-	Size
1220	Small
1221	Medium
1222	Large

Never wear the gloves longer than you have to. They won't protect your hands for very long. Replace 'em when they get frayed, worn or torn.

PS Index on WWW

PS Magazine's five-year subject index is now on Internet's World Wide Web (WWW). You can download and print it from there. To access the index, use either of these addresses:

<http://wwwlogsa.army.mil>
<http://136.205.104.4/psmag/psindex.html>

2 1/2-Ton Truck Pintle Nut

NSN 5310-00-050-3520 gets the slotted nut for an M44-series truck's pintle hook assembly. The NSN for Item 6 in Fig 119 of TM 9-2320-361-20P is wrong.

HEMTT Fuel Filter

NSN 2910-01-022-8183 gets the HEMTT's secondary fuel filter element. The NSN shown in TM 9-2320-279-20P is wrong.

M915A1 Slack Adjuster

If you need a brake slack adjuster for your M915A1 truck, just requesting NSN 2530-01-148-5046 is not enough. There are two adjusters with that NSN, and one won't work. Use advice code 2B in card columns 65-66 of your request and write "Order PN 102972" in the remarks block to get the right one.

15- and 30- KW ASK Parts

Need parts NSNs for the acoustic suppression kit on your 15-KW or 30-KW DED generator? ATCOM has them. Here's where to write or call for a list:

US Army Aviation-Troop Command
Attn: AMSAT-I-MPTP
4300 Goodfellow Blvd
St. Louis, MO 63120
DSN 693-9235
Commercial (314) 263-9235

New MLRS Fire Control

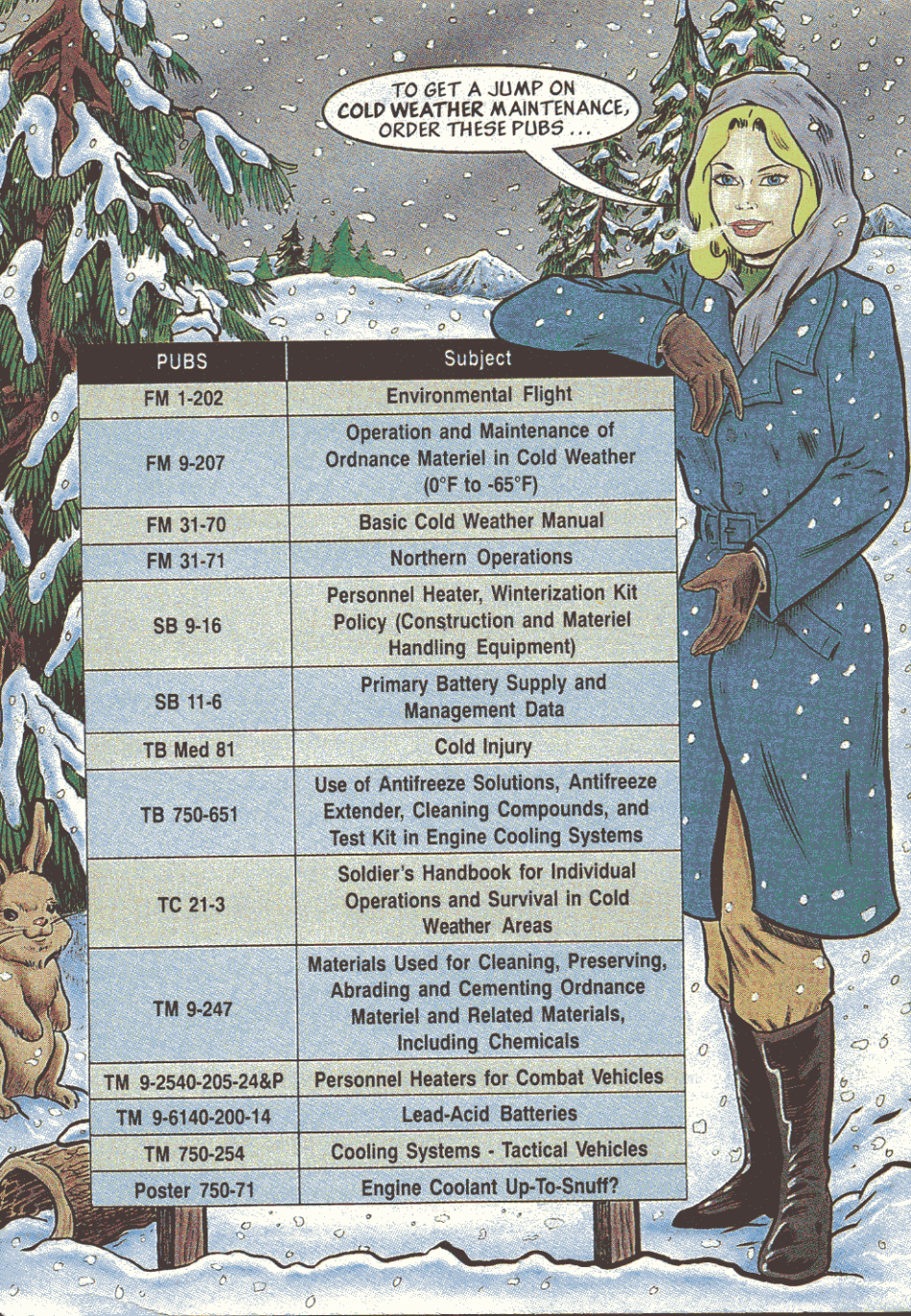
Once your MLRS unit has the new fire control panel assemblies (NSN 1055-01-389-7158) stop using the old front panel assembly and harness assembly as replacement parts. Mixing old and new assemblies causes faults during the pre-firing self-tests. Use only the new front panel (NSN 1055-01-390-0732, P/N 13209113) and harness assembly (NSN 5995-01-393-2583, P/N 13209115).

Seat Cover Tension Clips

When you order new covers for your CUCV seat, the tension clips, or "hog rings" that hold the seat cover on don't come with the cover. Get the clips with NSN 5340-01-159-3880.

Distribution: To be distributed in accordance with DA Form 12-34-C-R, for TB-43-series.

Would You Stake Your Life *right now* on
the Condition of Your Equipment?



TO GET A JUMP ON
COLD WEATHER MAINTENANCE,
ORDER THESE PUBS ...

PUBS	Subject
FM 1-202	Environmental Flight
FM 9-207	Operation and Maintenance of Ordnance Materiel in Cold Weather (0°F to -65°F)
FM 31-70	Basic Cold Weather Manual
FM 31-71	Northern Operations
SB 9-16	Personnel Heater, Winterization Kit Policy (Construction and Materiel Handling Equipment)
SB 11-6	Primary Battery Supply and Management Data
TB Med 81	Cold Injury
TB 750-651	Use of Antifreeze Solutions, Antifreeze Extender, Cleaning Compounds, and Test Kit in Engine Cooling Systems
TC 21-3	Soldier's Handbook for Individual Operations and Survival in Cold Weather Areas
TM 9-247	Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Materiel and Related Materials, Including Chemicals
TM 9-2540-205-24&P	Personnel Heaters for Combat Vehicles
TM 9-6140-200-14	Lead-Acid Batteries
TM 750-254	Cooling Systems - Tactical Vehicles
Poster 750-71	Engine Coolant Up-To-Snuff?