

Issue 323

PS

October
1979

THE PREVENTIVE MAINTENANCE MONTHLY



IT'S THE
WINTER
HAWK!!

QUICK!
ZAP HIM
WITH A
ROUND
OF COLD
WEATHER
PM!!

MURPHY
ANDERSON

Published by the Department of the Army for the information of all soldiers assigned to combat and combat support units, and all soldiers with organizational maintenance and supply duties.

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PS wants your ideas and contributions, and is glad to answer your questions. Name and address are kept in confidence. Just write to:

MSG Half-Mast
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Lexington, KY
40511

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Being Prepared's Surviving the WINTER



TB 750-651 (Nov 77) Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems
TC 21-3 (Sep 74) Individual Operations and Survival in Cold Weather Areas
SB 9-16 (Apr 77) Winterization Kits and Aids (authorization)
SB 11-576 (Apr 69) Cold Weather Batteries for AN/PRC Radio Sets
SB 38-100 (Mar 78) Preservation, Packing and Marking Supplies
FM 9-207 (Jan 78) Operation and Maintenance of Ordnance Materiel in Cold Weather.
FM 31-70 (Apr 68) w/Ch 1 Basic Cold Weather Manual
FM 31-71 (Jun 71) Northern Operations

TM 9-247 (Oct 60) Materials and Chemicals used for Cleaning, Preserving, Abrading and Cementing Ordnance Materiel
TM 9-6140-200-14 (Apr 78) Lead-acid Batteries
TM 9-8662 (Mar 54) Fuel Burning Heaters (vehicles)
TM 750-254 (Mar 72) w/Ch 2 Cooling Systems: Tactical Vehicles
TB Eng 347 (Dec 59) Winterization Techniques for Engineer Equipment
TB MED 81 (Sep 76) Cold Injury
TB MED 269 (May 68) Carbon Monoxide Symptoms, Treatment and Prevention of Overexposure
TB 9-2855-series Winterization Kits

This is the time of year when the Winter Hawk stretches his wings, making a couple of trial flights before swooping.

And as you've learned the last couple of winters, winter can dip his wing in unexpected places! Anybody from Fort Stewart to Fort Wainwright can wake up and find winter's landed overnight.

Unless you're planning to hibernate the winter away, now's the time to get ready.

Winter can be survived with ease—or with trouble—depending on you and the time and effort you take now.

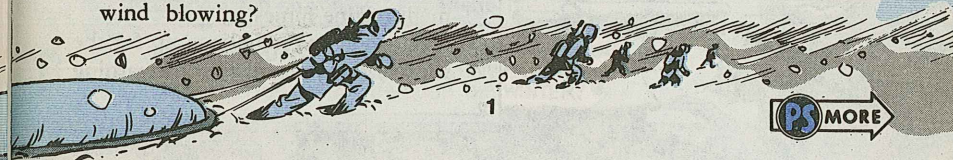
Also, tucked away in your regular TM's and LO's you'll discover operating and servicing info for winter.

Find any special lubes or winter items suggested or listed in your pubs? Make sure you've got all you need now while stocks are still available. It's a little rough trying to get special lubes, antifreeze or winter covers after the Winter Hawk lands.

Keep this in mind—everything you do in winter takes a little extra time and a little extra care. Simple PM becomes an exercise in frustration: Metals are cold and resistant, seals get stiff and brittle—and hands in gloves and mittens are clumsy.



But good PM—important any time—becomes essential in winter. Walking back from the boonies at 80°'s no picnic—but ever try it at -15° with a stiff wind blowing?



Rules for Survival

1. Know what your TM's say about winter operations.
2. Lube according to the temperature guide in your equipment's LO.
3. Have all the special lubes and winterization equipment you need and are authorized for the average temperature range in your area on hand before the Winter Hawk lands.
4. Protect delicate and vital parts of all equipment and keep electronic gear under cover or out of the weather altogether.
5. Cold is hard on you—it's hard on your equipment. Keep that in mind and give your equipment a little extra attention—and PATIENCE! Never force a cold, stiff or frozen item of equipment.
6. Brush snow or wipe water from the tops of fuel and lube containers and away from spouts and plugs.
7. Practice the buddy system. Since jobs take longer in the cold, a buddy speeds up the work. But a buddy also helps you guard against frostbite.

THE ONLY WAY TO FIGHT THE WINTER HAWK IS TO PLAN AHEAD!

EVERYTHING, BUT EVERYTHING, IS A LITTLE MORE TROUBLE IN THE WINTER...



When Winter's breathing down your neck, keep warm. But not so warm you won't be around next spring.

Closing all the doors and windows keeps the heat in. It also keeps in carbon monoxide and other equipment engine fumes.

So when you're holing up for the winter, give yourself a little breathing

Winter Problems

- Lubes get thick and hard to use.
- Metals contract. With different metals, you get different rates of contraction so parts that usually slide smoothly begin to bind and rub together.
- Plastic and rubber get stiff and brittle. Even a slammed door on a truck can shatter a door seal. A sharp bend may snap a cable.
- Gages and dials stick and give bum readings. A gentle tap usually frees 'em tho.
- Water collecting in tanks, filters and lines may freeze. That goes for engines and components turned in for repair, too. Water left in a turned-in engine may freeze and bust the block. Remember, fiberboard boxes and plastic foam packing are not waterproof. In fact, they hold water.
- Linkages stiffen and slow the equipment's response.
- Paint becomes brittle and cracks easily.
- Battery efficiency drops.
- Engines are hard to start. Check your TM for ways to avoid hydrostatic lock.
- Drain cocks and plugs freeze tight so draining becomes a real chore. Keep at it, anyway—putting that job off just makes it tougher.
- Snow and slush clog breathers and vents.
- Windshields crack easily from a sharp blow or blast of hot air.
- Frigid blasts of air slow people down to a crawl. Nearly every job takes twice as long—so leave plenty of time to do those jobs right!
- Tools and parts dropped into the snow can stay lost until spring. Tools can also slip from a mittened or numb hand and add to a repair job—on your equipment or you!



Keep Breathing

space. Leave a vehicle window or hatch cracked open—at least an inch or 2. Never, never take a nap while a vehicle heater or engine is running—even with a cracked window.

When operating equipment inside, always pipe the exhaust to the outside or keep doors in work bays or shops wide open.

Test fuel-burning heater exhausts and couplings for leaks.

You can't see or smell carbon monoxide—but it'll still do a job on you. A permanent job!

THE RIGHT PUBS, A LITTLE CARE AND OLD-FASHIONED HORSESENSE WILL GET YOU AND YOUR GEAR THROUGH THE WINTER!



GROUND MOBILITY

Engine
Starting
System...

KICK the

CRUTCH!

Use this same common sense with your engine starting and charging systems. It'll save you a lot of pain during cold weather. When something's wrong, get it fixed. When the trouble's caused by some other trouble, dig down to the root of it. Get it fixed.

YOU'RE THE EQUIPMENT OPERATOR. NOBODY KNOWS BETTER THAN YOU WHEN SOMETHING'S WRONG.

AND NOBODY'S GOING TO FIX IT FOR YOU UNTIL YOU REPORT IT!

TH' FIRST TIME HE'S OPENED HIS -10 TM!

AND-- WOULDN'T YOU KNOW IT-- HE TEARS OUT TH' PMCS PAGES!

DURN BOOT!

MEBBE IF I STUFF SOME PAPER IN HERE...

'Easy' Way's the Hard Way

Using a slave cable or jumper cables to start your engine is like a crutch. True, it's mighty handy—a life-saver—in a pinch. But it won't solve the real problem. You may get your engine started today, but you'll have the same trouble all over tomorrow.

FORGET TH' JUMPER CABLES!

YER STARTING TROUBLE'S JUST A LOOSE CABLE HOOKUP ON TH' BATTERY POST!

NOW WHY DIDN'T I THINK O' THAT?

WHEW-- THAT WAS CLOSE! LAST TIME HE BLEW UP MY ALTERNATOR WHEN HE HOOKED UP THE JUMPER CABLES WRONG!

What seems like a shortcut—slaving or jumping instead of fixing—is not the easiest, fastest and best way.

Think about it. Do you enjoy wrasslin' with those cables? Wouldn't you rather just hit the starter button to get your engine going?

Think about this, too—the trouble that can come from slave-starting and jump-starting. Like alternator damage from reverse polarity—because jumper cables sometimes get hooked up wrong. Slave cable connectors and slave receptacles burned out—because of unhooking while the starter's turning over.

RIGHT, THESE GOOFS SHOULDN'T HAPPEN ...

BUT THEY DO!

Not Guilty!

You can't blame your engine when it fails to start. Everything needed to get it started and keep it running is designed into it.

But your equipment can't defend itself against a poor operator—or even against "fair wear and tear"—heat, cold, friction, vibration. It may start out in perfect shape, but parts are bound to weaken and wear out.

C'MON, OL' BUDDY-- I KNOW YER HIDIN' 'ROUND HERE SOMEWHERE!

I'M GONNA TIGHTEN YER BATTERY CABLES!

OH, M'GOSH-- FROM BAD TO WORSE! HE NEVER LEARNS 'BOUT USING RIGHT-SIZE WRENCHES FOR TIGHTENING BATTERY CABLES--AND I WIND UP WITH A BUSTED BATTERY!

Since your equipment can't repair itself, it's up to you to spot trouble in the making and get it fixed.

That's Preventive Maintenance—correcting small problems before they become big problems.

Suffering in Silence

Most engine starting problems start with the batteries—because that's where your starting system starts.

Believe it! In almost every case, you'll find the batteries are not up to full charge. Or there're poor electrical connections—loose battery cables or dirt 'n' corrosion between the cable clamps and the battery posts.

Trouble is, your battery's not a wheel—it can't squeak and "get the grease." There're no moving parts in a battery. It works in silence. It also weakens and dies in silence—usually before its time.

That's right! Most Army batteries never get a chance to die from "fair wear and tear." They die from neglect—like failure to add water so the plates inside are covered by electrolyte and not exposed to air. Or they're beaten to death—when a hammer is used to drive cable clamps onto the posts, when a screwdriver is used to pry clamps off the posts, when a big wrench is used to tighten the clamps.

In 'most any property disposal yard, you'll find heaps of young batteries with sulfated plates, cracked tops, loose posts—even smashed from being dropped by some "butter-fingers."

"...and proud of it!"

You're in the Army. This means you're at least fairly smart and fairly strong—in good health, mentally and physically.

You've been handed the job of operating a piece of equipment—a tank, bulldozer, truck, generator... whatever. It's your responsibility.

You've got your own senses—

sight, smell, hearing, touch—to spot trouble in your equipment. You're issued TM's so you can figure out what's where and what to do about it. And you're issued tools to fix what's authorized at your level.

But you're not issued a crutch.

You don't need it.

Do you?



Cold Weather
PM Tips...

Fuel Filter/Separators



The fuel filter/separators, ground-mounted or on fuel vehicles, keep dirty stuff, water and—in cold weather—ice from getting pumped into equipment fuel tanks.

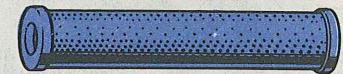
Operators need to keep a sharp "filtered" eye on all connections, valves and gages for leaks or damage.

Keeping a closer-than-usual eyeball

and fewer parts replacement.

Too much junk, water or ice clogs the filter/separator's filter elements. This causes a too-high pressure

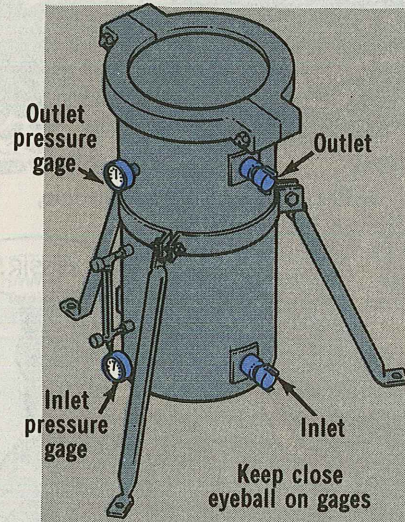
Keep element free of junk



differential between the lower inlet pressure gage and the upper outlet pressure gage.

F'rinstance, on 50-GPM units you never want to see more than a 20-PSI difference between these gages. On other units, you keep close tabs on the pop-up buttons or hard-running pumps. Change filter elements as soon as trouble starts.

Put the filter/separator in a heated shelter—or protected area—after shutdown. If you have to leave it outside or unprotected, be sure to drain all the water out of the unit. This'll stop the water from freezing in the filter body.



on the inlet and outlet pressure gages will pay off with less work in the cold outdoors, less equipment downtime

Lead-Acid Batteries...

In Good Hands?

Pointing the finger of blame at Ol' Man Winter is a cop-out.

He's just "doin' what comes natch-er-ly" when he squeezes the life out of your batteries with his icy grip. He can't lay a glove on 'em unless you let him.

And trying to nail "bum" batteries as the cause of your engine starting problems is like cussin' out your car—for letting itself get stolen—when you left the key in the ignition.

TAKE THAT, YOU STUPID CAR!

ME?

YOU'RE PARANOID... Y'KNOW THAT?

BRRR-RRR... I DON'T LIKE YOU...

KIK

You might skin by with lick-and-a-promise PM in the good ol' summertime, but you can't palm this off on your batteries in cold weather.

If you don't knuckle down to thumbs-up battery PM, you're in for a fistful o' trouble! You're the one who slaps your batteries on the skids—Ol' Man Winter just adds the grease.

GO TO THE ANT, THOU SLUGGARD!

LEARN HER WAYS AND BE WISE!

YESSIR!

10

SORRY...

... I DO WHAT I HAFTA DO... OR TRY ANYWAY!

THE BEST WAY TO INSURE TROUBLE-FREE ENGINE STARTING IS...

- Keep batteries fully charged.
- Keep battery, battery box and holdowns clean.
- Keep electrical connections clean and tight.

Charge—Invisible Key

So your engine's in perfect shape. Your starter's just itchin' to go. All electrical connections are clean and tight. Your battery's clean, too. And you've got the electrolyte level over the tops of the plates—like it's s'posed to be.

But no start! Not even a twitch. Or maybe your engine turns over a couple times—weakly—and quits.

You've got a dead battery—discharged.

HMMM-- WON'T START!

WONDER IF A NICE COAT O' WAX ON HIS BATTERIES WOULD HELP...

SOUNDS LIKE TH' TYPE WHO TRIES TO WIN A GIRL WITH A NEW SPORT COAT 'STEAD O' BRUSHING HIS TEETH!

It shouldn't happen. It won't happen if you keep a close eye on your battery's "state of charge"—the No. 1 key to a good engine starting system.

STATE OF CHARGE-- THAT'S WHERE YOUR STARTING SYSTEM STARTS!

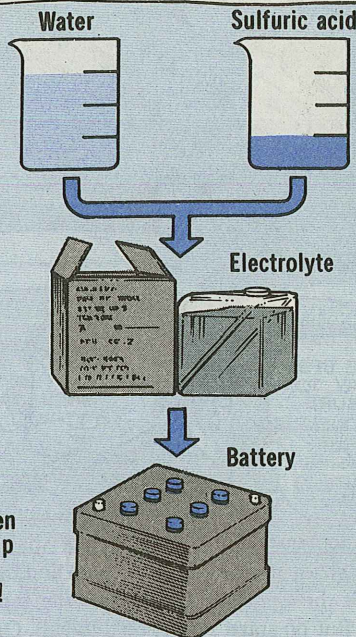
JUST FLIP THE PAGE FOR PS MORE

11

You can't see "state of charge"—except with your battery tester. Even if you look inside your battery, all you see is electrolyte—and it looks like plain water.

BUT IT'S NOT PLAIN WATER... FAR FROM IT WHEN YOUR BATTERY'S FULLY CHARGED.

It starts like this, but...



...then it's up to you!

Electrolyte in a fully charged battery is about one-fourth sulfuric acid. As your battery discharges—puts out electricity—chemical action cuts down on the percentage of acid. Then, when the battery's recharged by your generator/alternator, chemical action is reversed—and the acid comes back.

Now you see the picture of your dead battery—low acid, low charge, low power.

It wouldn't hurt to check your battery state of charge at least once a week when cold's got you runnin' ragged. You've got enough other problems, so why let battery failure add to your misery?

HAUL OUT YOUR BATTERY TESTER, NSN 6630-00-105-1418, IN YOUR NO. 1 COMMON SHOP EQUIPMENT...



...IT'LL TELL YOU THE SPECIFIC GRAVITY OF THE ELECTROLYTE IN YOUR BATTERIES...

...HOW MUCH ACID'S IN THE WATER!



Specific Gravity?

Acid weighs more than water. So, electrolyte—acid and water together—is heavier than plain water.

When you check the specific gravity of battery electrolyte, you're just seeing how much it weighs. The specific gravity of electrolyte in a fully-charged battery is 1.280. This means the electrolyte weighs 1.280 times as much as plain water.

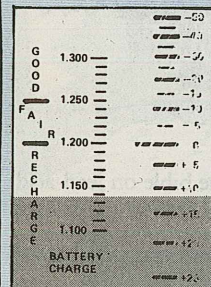
As your battery discharges, the electrolyte gets weaker—less acid.

Battery electrical power gets weaker, too. When the specific gravity drops too far, battery power's not strong enough—and won't last long enough—to get your engine started.

Tester shows the weight of electrolyte...

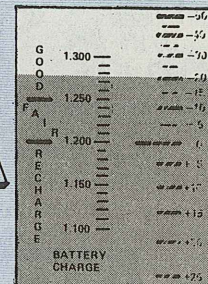
...compared to plain water

Weak

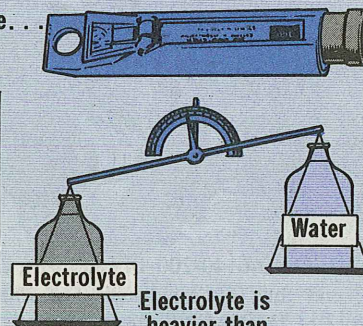


Not enough battery power

Strong



Plenty of battery power



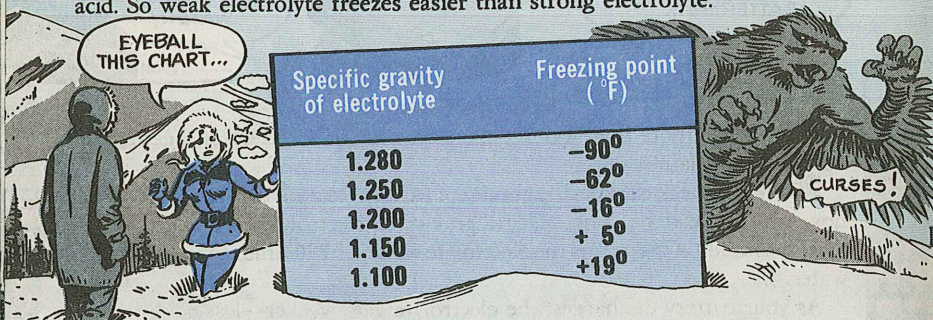
Electrolyte is heavier than water. When it is 1.280 times as heavy, it is said to be "1.280 specific gravity"

HERE'S HOW A BATTERY'S CHARGE AFFECTS ITS CRANKING ABILITY...



TEMPERATURE	SPECIFIC GRAVITY	CRANKING ABILITY
80° F	1.280 (Full charge)	100%
80° F	1.225 (Half charge)	46%
80° F	1.180 (Nearly discharged)	25%
32° F	1.280 (Full charge)	65%
32° F	1.225 (Half charge)	32%
32° F	1.180 (Nearly discharged)	16%
0° F	1.280 (Full charge)	40%
0° F	1.225 (Half charge)	21%
0° F	1.180 (Nearly discharged)	9%

Even worse, your battery could freeze solid! Water freezes a lot easier than acid. So weak electrolyte freezes easier than strong electrolyte.



Get weak batteries recharged.

If they won't stay charged, get your engine charging system checked out.

Give your battery a hand—both hands—in the battle against Ol' Man Winter.

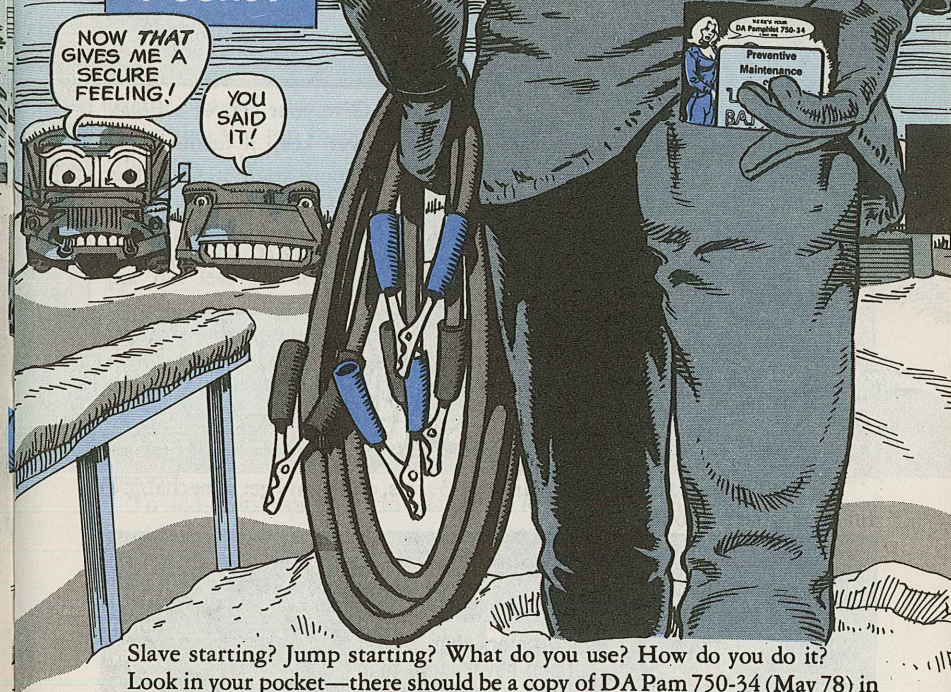


Get all of the dope in TM 9-6140-200-14 (Apr 78), the bible on lead-acid battery maintenance, and that TM's sidekick, DA Pam 750-34 (May 78), Preventive Maintenance of Lead-Acid Batteries.

Films For The Cold

- TF 7-1550 Cold weather (extreme) combat
- TF 8-3977 Prevent cold injury
- TF 8-4879 Prevention of Cold Injury
- TF 9-3109 Cold weather starting—tanks
- TF 9-3957 Cold weather vehicle maintenance
- TF 10-2843 250,000-BTU duct-type heater
- TF 10-4780 Cold weather clothing
- TF 21-3183 Vehicle maint in northern areas
- TF 21-3279 Northern operations
- TF 21-3398 Cold weather uniform
- DDCP 20-286 Winter Storm Survival

A Friend in Your Pocket



Slave starting? Jump starting? What do you use? How do you do it?

Look in your pocket—there should be a copy of DA Pam 750-34 (May 78) in there. Besides giving you a lot of poop on lead-acid battery Preventive Maintenance, it gives you tips—with pictures—on how to slave-start and jump-start your tracked and wheeled vehicles.

This can be used, too, for other engine-powered ground equipment—with either 12-volt or 24-volt electrical systems.

There's no reason every operator can't have his own copy of DA Pam 750-34. Every operator should have one! It helps you keep your equipment in top-operating shape—and what helps you helps your command keep all equipment ready-to-go.

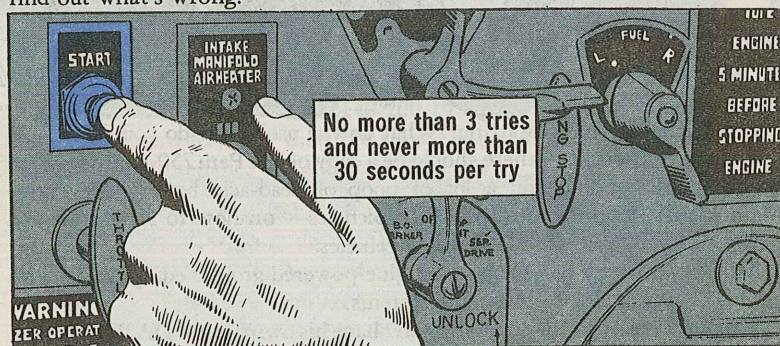
Your own pubs people can get more copies of DA Pam 750-34—as many as needed—by ordering from the Baltimore AG Publications Center on a DA Form 4569.

Get 'em while they're hot—for when it's cold.

HAVE A HEART!

Give your starter a break! Never keep it turning over for more than 30 seconds at a time—it gets hot. Let it cool off for a few minutes in between tries to start your engine.

If you can't get your engine started in 3 tries, quit—and get a mechanic to find out what's wrong.



Too many people don't even know what their starter is—and that's the start of so many starter burn-outs in every cold season. To get all of the fine points on your starter, dig into TM 9-8000 (Jan 56), Principles of Automotive Vehicles, page 189, Starting System.

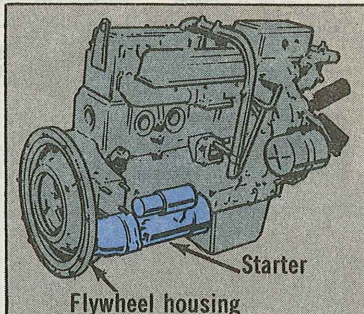
Just keep in mind that your starter is an electric motor—operated by your batteries. But this motor is a lot different from the motor that runs your electric shaver, fan or shop equipment.

Get this! Your starter motor is designed to operate only for a short time each time you hit the button or turn the switch. It puts out a heckuva lot of horsepower for such a small-size motor. It's a workhorse in pony size!

Think of it! This little electric motor has to turn over a big engine until the engine's ignition system and fuel system take ahold and the engine runs on its own. If everything's in top shape, the engine will start within a few seconds.

But your starter needs all of the help you can give it—especially in cold weather. After all, your batteries put out less and less power as the temperature drops—so your starter's trying to do its job with less help from the batteries. And cold-thickened engine oil makes the engine harder to turn over—so the starter works harder and gets hotter quicker.

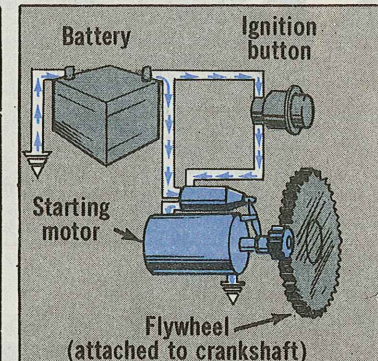
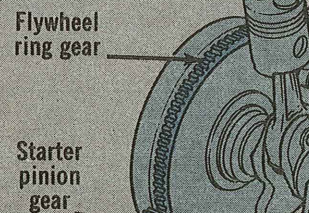
To add to its woes, toss in a faulty engine ignition system or fuel



This small motor does a big job—if you give it a chance

system. And maybe an impatient operator who doesn't use his engine's cold-start system—or one who doesn't dig into his operator's TM to get the full story on “when” and “how.”

Your starter “cranks” the engine by turning that heavy flywheel on the end of the crankshaft



If your batteries and engine are in good shape—and if you don't burn up your starter—you've got it made!

YOUR STARTER WILL LIVE TO SEE YOU THROUGH THE WINTER-- AND THE NEXT WINTER-- IF YOU STICK TO THIS--

Keep batteries fully charged.

Use that tester, antifreeze and battery, to make sure your batteries are fully charged

Make sure all electrical connections are clean and tight.

Your starter can't get full power when battery connections are loose

Watch it! Too much muscle loosens good hookups

Use your engine cold-start system—and use it right.

Put your finger on easier starting

TH' HAWK GOT HIM--

NOBODY DID HIS COLD WEATHER PM!

~GULP~

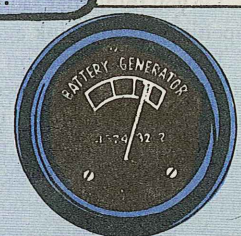
Make sure you've got the right weight oil in your engine

LUBRICANTS	EXPECTED TEMPERATURE		
	Above +32° F	+40° F to -10° F	0° F to -65° F
OE/HDO - LUBRICATING OIL, INTERNAL COMBUSTION ENGINE	OE/HDO 30	OE/HDO 10	OES
OE/HDO - STEERING AND HYDRAULIC SYSTEMS	OE/HDO	OE/HDO 10	OES
GO - LUBRICATING OIL, GEAR			GOS

Heavy summer weight oil makes your starter work harder to turn the engine over, check your LO!

Notice and report any engine trouble that makes your starter's job harder.

F'rinstance—your battery generator indicator. It tells you if your batteries are being kept up to snuff by the charging system—mighty important for starter operation



—Above all, never run your starter for more than 30 seconds at a time. Let it cool off for a few minutes between starting tries. If your engine won't start in 3 tries, get a mechanic on it.

Surprise! Surprise!

There's nothing that'll liven up a dull winter day like a cloud of steam suddenly pouring out of your engine. Or a temperature gage that goes up, up, up—till it pegs out.

Shocking, you bet. But not surprising—if you failed to pull a good check of your cooling system before cold weather set in.

That's the key—before. It's a lot easier on a nice, sunny autumn day—especially when there's time to get whatever parts you need.

It's no fun at all when a frigid wind's whistling around your ears, when snow's sifting down your neck, when your engine compartment's all wet 'n' gloppy. And when the radiator cap or hose you need is in short supply—because a lot of other people made the same mistake you did.

HEY, D'YA REMEMBER THAT RADIATOR HOSE I THOUGHT ABOUT REPLACING A COUPLE O' MONTHS BACK? WELL...

WELL...

SO BEFORE IT'S TOO LATE, LIFT UP THAT HOOD!

LEAN IN!

GET UNDER!

GIVE YOUR COOLING SYSTEM A GOOD GOIN' OVER...

RIGHT ON, CONNIE!

Pressure Cap's Important

Do you think that radiator cap is just to keep junk from falling into the filler opening? If so, think again—think of a boiled potato.

If you boil a potato on top of a high mountain, you may wind up with a half-cooked spud. This's because water boils at a lower temperature at high altitude—much lower than the 212°F at sea level. There's not enough pressure—atmospheric pressure—to let the water get real hot before it boils. The water can't get any hotter under that lower pressure—no matter how much heat you put to it.

But if you put a tight lid on your cooking pot, pressure will build up. This'll raise the boiling point of the water. It'll get hotter before it boils—and it'll cook that potato faster and better.

AIN'T LUNCH READY YET?

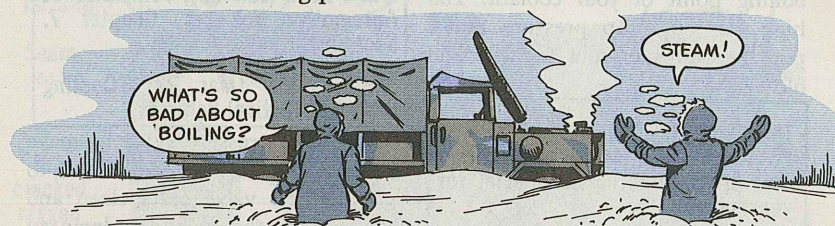
CAN'T B' LIEVE IT! 'WATER'S BEEN 'BOILIN' FER HOURS AN' THOSE SPUDS'RE STILL LIKE ROCKS!

UGH!



OH, NO-- AND WE DON'T HAVE A RADIO!

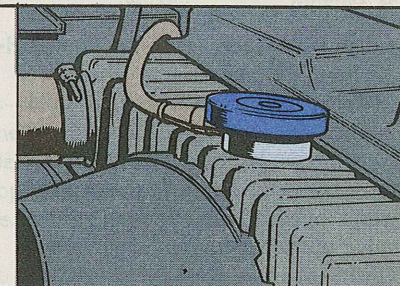
And that's why you've got a pressure cap on your radiator—to raise the boiling point of your coolant. If you've got antifreeze—ethylene glycol—mixed with the water, the boiling point's already been jacked up by several degrees. Pressure raises the boiling point even further.



Steam makes pockets in your cooling system. Your liquid coolant can't carry away the heat in these pockets. Your engine water pump can't pump steam. So it just sits there, like the air that keeps you warm in your mesh-net thermal underwear. These hot spots get hotter 'n' hotter—they can ruin your engine!

Wouldn't a bigger radiator hold down the coolant temperature? Right—too much. Your engine is designed to run best in a certain temperature range. If engine temperature's too low, you get all kinds of problems. And your engine already has a real tough time holding its best temperature in cold weather.

Your engine coolant won't boil, even if the temperature goes over 212°F...the boiling point for water at sea level. Right, the normal operating temperature of your engine's probably no where near 212°F. But the radiator cap's a lifesaver when it helps prevent boiling during operation in hot weather, at high altitudes and under heavy load.





Right Cap! Good Cap!

You help your engine by making sure you've got the right cap on the radiator—and making sure that cap is working right.

Use only the cap the TM lists for your cooling system—not some cap you've scrounged from the junk yard or grabbed off some other equipment. The pressure rating of the cap is No. 1 important! Too low cuts the boiling point of your coolant. Too high can build up pressure that'll pop the seams in your radiator and blow hoses.

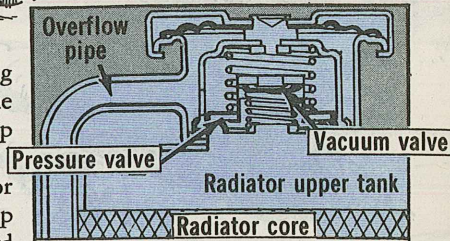
The key's the pressure rating—15 PSI for this one. Mighty important—that pressure rating is special for your engine!



Check your radiator cap real close—no dents, cracks, nicks, or a bum gasket that'll allow leaking. Make sure the cap fits snug on the radiator—or surge tank—filler neck.

Check the valves, too—there're 2 of 'em. The pressure valve holds pressure in your cooling system—up to the pounds rating printed on the cap—but then opens so pressure won't build too high. The vacuum valve opens when your engine cools down—after operation—so outside

pressure won't put the squeeze on your radiator and other parts.



Get all of the poop on your radiator cap and the rest of your engine cooling system in:

TM 9-8000 (Jan 56), Principles of Automotive Vehicles, Chapter 7, Section II

TM 750-254 (Mar 72), Cooling Systems: Tactical Vehicles

Press the pressure valve to make sure it moves free 'n' easy. Check to see that the valve seats clean and true against the shoulder down in the radiator filler neck.

Look for dirt, slime, or damage that'll keep the vacuum valve from doing its job.

Radiator cap tester



Not sure about your radiator cap? Check it out with a tester—like it says in TM 750-254 (Mar 72), Cooling Systems: Tactical Vehicles, para 2-9. The tester comes with NSN 4910-01-018-4373. You get adapters for the tester with NSN 4910-01-018-4374 and NSN 4910-01-018-0986.

Bum radiator cap? Get a new one. Remember—the right one!

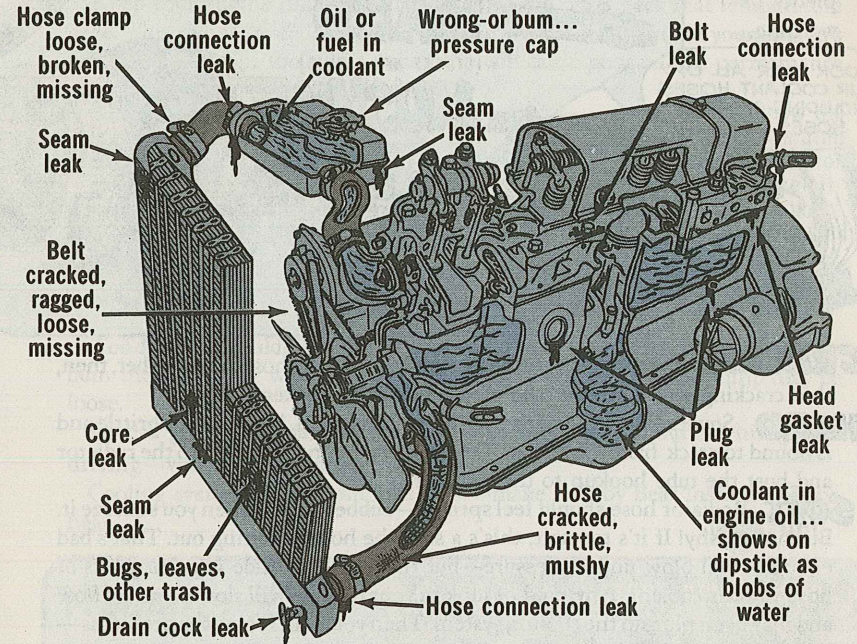
How's Your Radiator?

While you've got the cap off, look down into your radiator filler neck. Enough coolant? It should be at least over the top of the core—all of those little holes that're the tops of tubes running down through the core.

Your coolant should be almost clear—it'll be colored by the antifreeze. If your coolant's muddy-looking or has bits of junk in it, your cooling system may need 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 your crankcase dipstick and check for water in your engine oil—little globs on the dipstick. Either way, report it.

Cooling System Problems You Can Spot—And Fix Or Report



Look over your radiator for leaks—top tank, front and back of core, bottom tank. Leaks may not show up wet when your engine's cold. Look for rust or odd-colored dribbles where coolant has leaked and then dried up. Then later, when you've got your engine running at operating temperature and pressure, check these places again for wet leakage. Use a flashlight for both hot and cold inspections.

That radiator cap tester can also be used to check your radiator for leaks.



Friend and Foe

The cooling system pressure your engine needs puts a strain on all parts of your cooling system. Any weak spots will leak when pressure builds up.

Besides your radiator, those hoses connecting the radiator and engine can poop out under that pressure. Hoses don't last forever—they rot and weaken.

There's no need to wait for a radiator hose to blow before you replace it—the hose gives you plenty of warning.



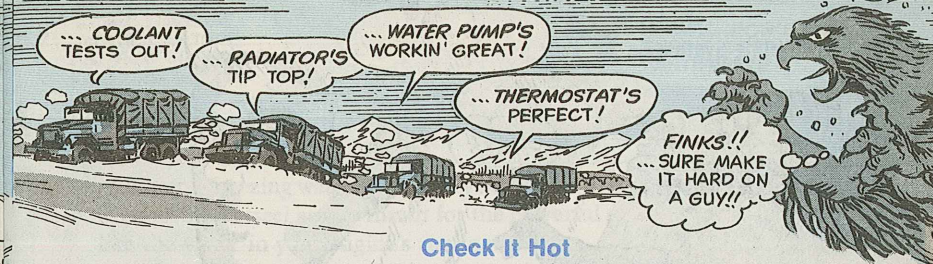
CRACKS These may show up first at the ends of the hose. You can bet, then, that cracking will take over the whole hose. It's weakening fast!

HARD Squeeze the hose with your hand. If it's hard, like rock, it's brittle and is bound to crack from vibration. Or it'll carry engine vibration to the radiator and bust the tube hookup to the radiator.

SOFT Radiator hose should feel springy—rubber-like—when you squeeze it. But not mushy! If it's too soft, this's a sign the hose is rotting out. That's bad enough—it'll blow under pressure—but that rotting inside is putting bits of hose in your coolant. Any kind of junk in your coolant will slow down its flow and may even plug up the cooling system. Then you're in for bigger problems—like engine overheating.

PUFFED A swollen hose means trouble coming. Even if only the ends are puffed, the hose has been on the job too long—it's rotting.

DAMP Natch, any wetness at the hose ends shows something's wrong. But even dampness is a sign of a poor connection—bum hose, loose or damaged hose clamps or a bad tube on the radiator or engine. Maybe the tube wasn't cleaned when the hose was installed.

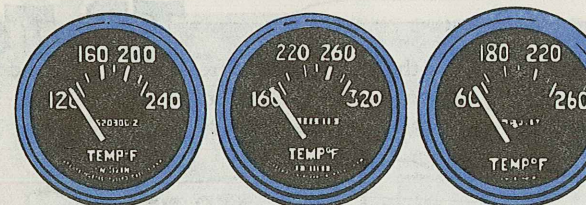


Check It Hot

Finally, eyeball your hoses while the engine's running—at operating temperature so there's full pressure in your cooling system.

Besides looking for leaks, see if the lower hose is collapsing—caving in. This shows a weak hose—it can't take the pull of the engine water pump.

Keep your engine running—and hop into the cab. Check that temperature gage. This's your “eye” inside your cooling system. It tells you if your engine's running too hot or too cold—either one will cause poor engine performance and can lead to engine damage.



Do you know the “normal operating temperature” for your engine? If not, check your operator's TM. It's important—and it's not the same for all engines.

Too hot? Too cold? Report it. You could have a clogged cooling system, a bum thermostat or water pump. Or the belt driving the water pump may be loose.

Give a glance at your temperature gage every few minutes while you're driving—winter, summer, anytime.

Cooling system trouble can be a bear—make it Baby Bear instead of Papa Bear.



Radiator PM

Radiators and winter. Could be tough...on the radiator, but DA Poster 750-70 is a good reminder to have around...to prepare for it. A DA Form 4569 will get the poster from Baltimore Pubs Center.



Engine Cooling System...

MUSCLE BUSTER

ELVIS?!

Water—freezing water—turns mountains into pebbles. As water turns into ice, it expands. When this happens down in a crack in a rock, the pressure against the rock is tremendous. The rock can't take it. The ice splits the rock!

But you don't have to figure out the percent of antifreeze needed for the expected low temperature in your area. It's all spelled out in Table 1, TB 750-651 (Nov 77), Use of Antifreeze Solutions and Cleaning Compounds In Engine Cooling Systems.

Table 1. Guide for Preparation of Ethylene Glycol Antifreeze Solutions

Lowest Estimated Temperature in Geographic Area	Pints of Ethylene Glycol Antifreeze to be Included in Preparation of Equal Antifreeze Solution
+20°F	1%
+10°F	2
+0°F	2 3/4
-0°F	3 1/4

***TB 750-651**

For instance, to protect your cooling system down to 0°F, you need an antifreeze mix that's close to 35 percent ethylene glycol. Like it says in Table 1 of the TB, a gallon of this mix is made of 2 3/4 pints of ethylene glycol and 5 1/4 pints of water.

For the 32-quart cooling system in an M813 5-ton truck, this comes to about 11 quarts of ethylene glycol with 21 quarts of water.

To protect your cooling system down to -55°F, you need a 60 percent antifreeze solution. As Table 1 puts it, that's 4 3/4 pints of ethylene glycol with enough water to make a gallon.

For that M813 truck, this comes to 19 quarts of ethylene glycol and 13 quarts of water.

For your equipment, look up the cooling system capacity in your equipment TM—usually in a "Capacities" table in the front of your operator's TM. Then go by Table 1 in TB 750-651 to mix the right amount of ethylene glycol with water for the expected low temperature in your area.

WOW!... IMAGINE MOTHER NATURE DID THAT JUST WITH FREEZING WATER!

HMMM... HOW'S OUR ENGINE SITTING ON ANTIFREEZE?

Water—freezing water—can turn your engine into scrap metal. That's right, even iron and steel are no match for the powerful muscle of freezing water—like the water in your engine's cooling system.

So how do you protect your engine against this monster?

Simple. You just keep the water from freezing. You mix antifreeze—ethylene glycol—with the water to lower the freezing point. Plain water starts turning to ice at 32°F (0°C). But the antifreeze solution has a lower freezing point—as low as you need to make it.

The more antifreeze you add to the water, the more the freezing point drops—until you get to around 65 percent antifreeze. Then the freezing point of your antifreeze solution starts to go back up.

TB Tel Is ALL

FIGURING GALLONS MAY BE SIMPLER FOR YOU... HERE'S HOW TO FIGURE FOR AN M880-SERIES 1 1/4-TON TRUCK...

TM 9-2320-266-10

Table 1-1. Tabulated Data—Continued

Data	Model			
	4X4 Cargo Truck	4X2 Cargo Truck	4X4 Ambulance	4X2 Ambulance
Capacities—Continued:				
Cooling system	18 qts (17 liters)	18 qts (17 liters)	18 qts (17 liters)	18 qts (17 liters)

1 COOLING SYSTEM CAPACITY IN GALLONS

4 qts = 1 gal, so divide capacity (quarts) by 4

$$\begin{array}{r} 4.5 \text{ (4 1/2 gal)} \\ 4 \overline{)18.0 \text{ (quarts per TM)}} \\ \underline{16} \\ 20 \\ \underline{20} \\ \end{array}$$

2 PINTS OF ANTIFREEZE FOR 0°F PROTECTION

8 pts = 1 gal, so multiply capacity (gallons) by pints-per-gallon as specified in TB (change 2 3/4 to 2.75)

$$\begin{array}{r} 2.75 \text{ (pints)} \\ \times 4.5 \text{ (gallons)} \\ \hline 1375 \\ 1100 \\ \hline 12.375 \text{ (round off to 12.5 pints)} \end{array}$$

3 GALLONS OF ANTIFREEZE

Remember, 8 pts = 1 gal

$$\begin{array}{r} 1.5 \text{ (1 1/2 gallons)} \\ 8 \overline{)12.5 \text{ (pints)}} \\ \underline{8} \\ 45 \\ \underline{40} \\ \end{array}$$

4 GALLONS OF WATER

Subtract antifreeze (1.5) from capacity (4.5)

$$\begin{array}{r} 4.5 \\ -1.5 \\ \hline 3.0 \text{ (gallons)} \end{array}$$



... WHICH MEANS YOU'LL NEED 1 1/2 gal. OF ETHYLENE GLYCOL TO 3 gal. OF WATER TO PROTECT YOUR M880 18-qt. COOLING SYSTEM TO 0°F.

Watch it, tho. If the temperature in your area goes below -55°F, you don't use this table. In fact, you don't even use the same antifreeze. You go to arctic-type antifreeze. This's put into your cooling system as it comes—straight—with no water at all. NSN's for both kinds of antifreeze are in the TB.

Already Got It? Maybe!

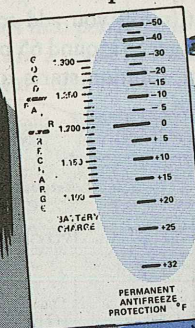
Probably your cooling system's already got antifreeze in it—if you're where the temperature goes down at least to freezing.

Like the TB says, you don't switch from plain water coolant to antifreeze—and back again—when the seasons change. You leave the antifreeze solution in your cooling system the year around. Fact is, you stick with that same coolant for 4 years—if it checks out OK for both freeze protection and corrosion protection.

Check it! Somebody might've refilled with plain water when some of the coolant leaked out. This weakens the solution—raises the freezing point. You could wind up with a frozen—busted—engine!

Use your antifreeze tester, NSN 6630-00-105-1418, in your No. 1 Common Shop Equipment.

PS END



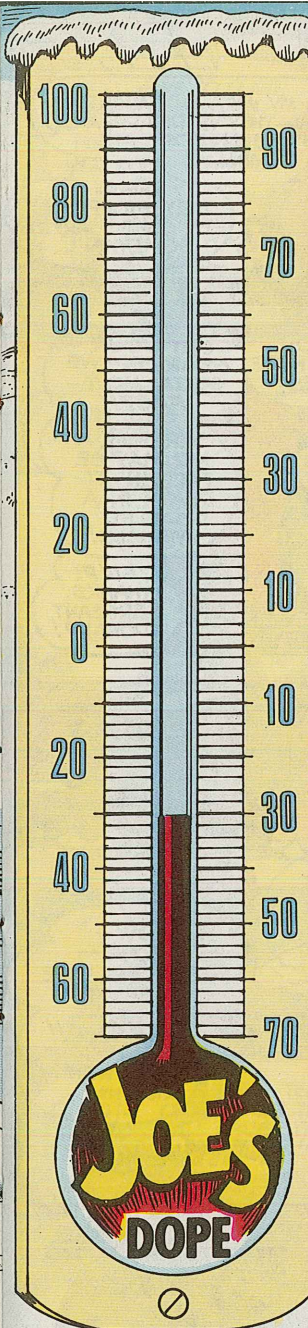
PLAY IT SAFE...
CHECK IT OUT!

Freezin' Season

Freezin' Season is tough on multi-fuel filters, and you can have a permanent reminder to drain 'em daily...with DA Poster 750-73. A DA Form 4569 will get it from Baltimore Pubs Center.

IT'S FREEZIN' SEASON!
DRAIN
MULTI-FUEL FILTER
MOISTURE
DAILY

READ
FM 9-207
on Vehicle
Cold Weather
Operation
PREVENTIVE MAINTENANCE



THE WINTER HAWK

FORT FRIGID,
EARLY P.M.

WOW! OL'
HAWK'S
EARLY
THIS
YEAR!

...REALLY
POUNCED
TOO!

BETTER B' LIEVE IT!
TH' THERMOMETER
DROPPED LIKE A
LEAD BRICK IN
TH' LAST FEW HOURS!

IT'S 30° B'LOW
OUT THERE!

YOUR
PHONE,
JONES.

BRRR-RING-BRRR-RING

DAD-- MOM AN'
SIS TOOK OFF
FOR GRAM'S TWO
HOURS AGO...
BUT GRAM SAYS
THEY'RE NOT
THERE YET!

OH,
NO!



WHAT'S WRONG, JONES?
YOU'RE WHITE AS A SHEET!!

M-MY WIFE AN' DAUGHTER,
SIR--THEY'VE DISAPPEARED
B'TWEEN POST AN'
TOWN....!!

MEBBE
THEY STOPPED AT
TH' COMMISSARY OR
SOMETHIN'...

N-NO--NOT IN *THIS*
COLD... ELLEN WOULD'A
TOLD MY SON...

P-PROBLEM
IS... I HAVEN'T
GULP: WINTERIZED
OUR POV
YET...

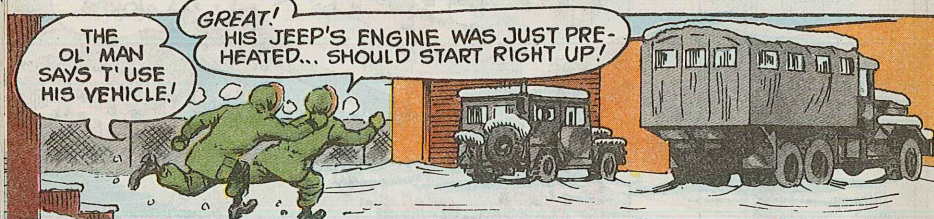
SHEESH!

WOT'RE YOU
STANDIN' THERE
FOR, JONES?

GET YOUR
GEAR ON-- WE
GOTTA MOVE--
FAST!!!

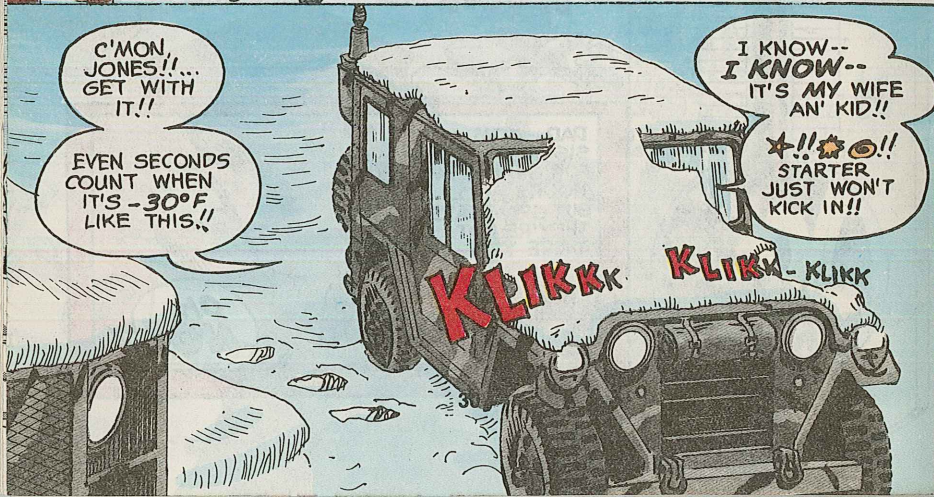
YER WIFE AN'
KID MAY BE
FREEZIN' T'
DEATH IN A
DISABLED
VEHICLE!

GULP: THANKS,
SERGEANT
DONALD!



THE
OL' MAN
SAYS T'USE
HIS VEHICLE!

GREAT!
HIS JEEP'S ENGINE WAS JUST PRE-
HEATED... SHOULD START RIGHT UP!



C'MON,
JONES!!...
GET WITH
IT!!

EVEN SECONDS
COUNT WHEN
IT'S -30°F
LIKE THIS!!

I KNOW--
I KNOW--
IT'S MY WIFE
AN' KID!!

★!!★!!
STARTER
JUST WON'T
KICK IN!!

KLIKKK KLIKK- KLIKK



WE'LL HAVE TO SLAYE
START IT, JONES--

GULP: ME--
ER-- I DO, SARGE

B-BUT WHAT IS
RUNNING NOW THAT
CAN SLAVE US?

BATTERY SHOULD O'
HAD COLD WEATHER
PM...

WHO MAINTAINS
THIS VEHICLE FOR
THE OL' MAN
ANYHOW?



YOU GUYS
GOT PROBLEMS,
EH?

MAYBE I CAN
GIVE YOU A HAND--

HALF-MAST!!

SARGE-- CAN
YOU SLAVE
START US WITH YOUR
VEHICLE-- QUICK?

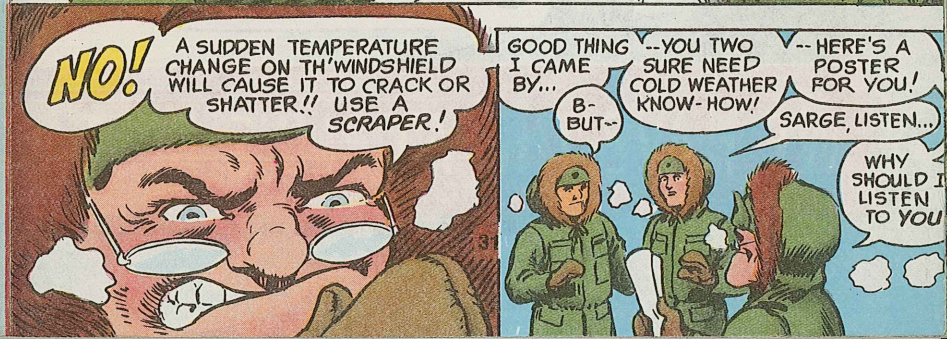
QUICK?
WHY?



EVEN IF YOU START
IT-- YOU'RE NOT GOIN'
ANYWHERE--

-- NOT UNTIL YOU CLEAN
ALL THAT SNOW AN' ICE
FROM YER WINDOWS AND
WINDSHIELD!

OH, YEAH-- I'LL GO FOR
SOME WARM WATER
T' POUR ON AN'...



NO!

A SUDDEN TEMPERATURE
CHANGE ON TH' WINDSHIELD
WILL CAUSE IT TO CRACK OR
SHATTER!! USE A
SCRAPER!

GOOD THING
I CAME
BY...

--YOU TWO
SURE NEED
COLD WEATHER
KNOW-HOW!

--HERE'S A
POSTER
FOR YOU!

SARGE, LISTEN...

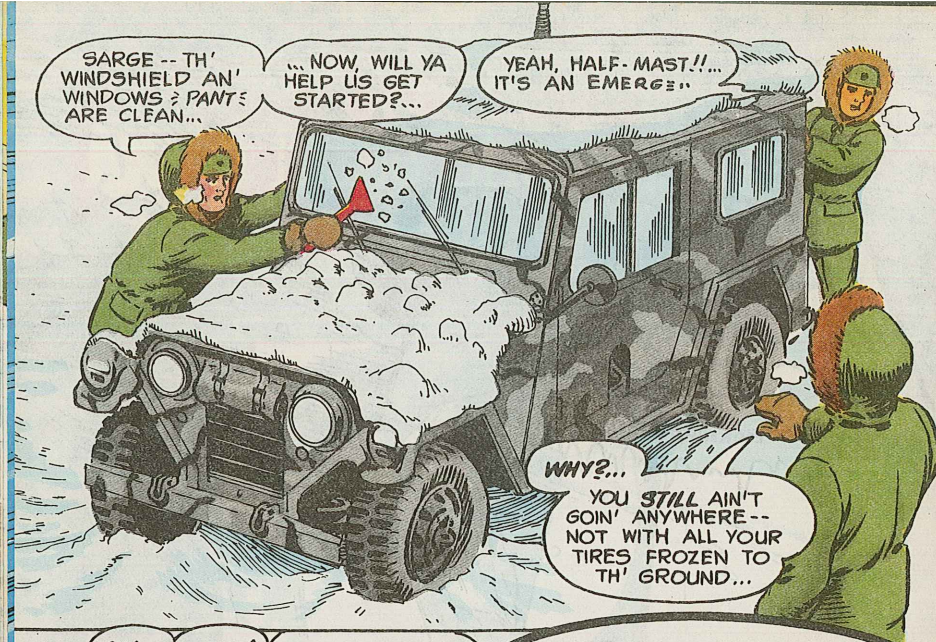
WHY
SHOULD I
LISTEN
TO YOU

Joe's Dope Sheet



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

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



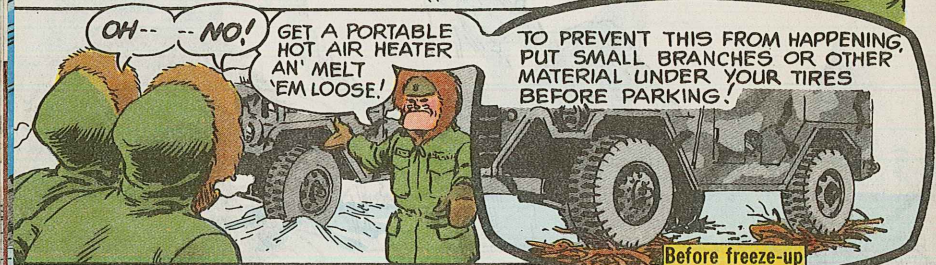
SARGE -- TH' WINDSHIELD AN' WINDOWS & PANTS ARE CLEAN...

... NOW, WILL YA HELP US GET STARTED?...

YEAH, HALF-MAST!!! IT'S AN EMERG...

WHY?...

YOU *STILL* AIN'T GOIN' ANYWHERE-- NOT WITH ALL YOUR TIRES FROZEN TO TH' GROUND...

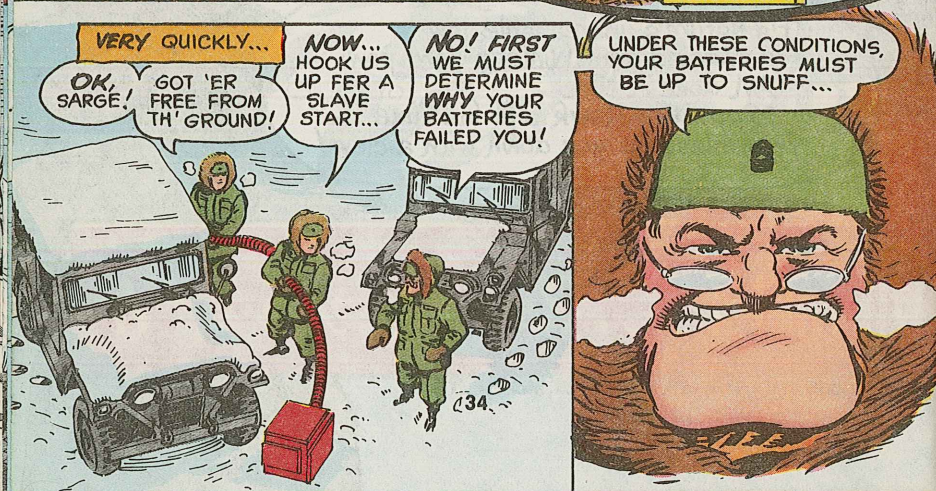


OH-- --NO!

GET A PORTABLE HOT AIR HEATER AN' MELT 'EM LOOSE!

TO PREVENT THIS FROM HAPPENING, PUT SMALL BRANCHES OR OTHER MATERIAL UNDER YOUR TIRES BEFORE PARKING.

Before freeze-up



VERY QUICKLY...

OK, SARGE!

GOT 'ER FREE FROM TH' GROUND!

NOW... HOOK US UP FER A SLAVE START...

NO! FIRST WE MUST DETERMINE *WHY* YOUR BATTERIES FAILED YOU!

UNDER THESE CONDITIONS, YOUR BATTERIES MUST BE UP TO SNUFF...

THEY GOTTA BE GETTING AND HOLDING A SATISFACTORY CHARGE TO SUPPLY THE CURRENT DEMANDS OF COMMO GEAR AND HEATERS-- OTHERWISE YOU'LL SOON HAVE A DISABLED VEHICLE DUE TO *DEAD* BATTERIES...

YES... BUT...

PLEASE, SARGE... LISTEN!... I...

QUIT STALLING! CHECK YER BATTERIES... NOW!!



VERY, VERY QUICKLY...

!ULP! SPECIFIC GRAVITY OF BOTH BATTERIES IS...ER...FAIR, SARGE-- JUST ABOVE 1.200--

NOT GOOD ENOUGH! THEY MUST BE FULLY CHARGED FOR THESE CONDITIONS... OR THEY CAN FREEZE AN' BUST!

B-BUT-- HALF-MAST, Y' DON'T UNDERSTAN...



BUT I *DO* UNDERSTAND!! OL' *WINTER HAWK* IS A MERCILESS ENEMY... YOU AND YOUR GEAR MUST BE IN TOP SHAPE AT *ALL* TIMES IF YOU'RE TO SURVIVE...



RIGHT, SARGE, BUT...

DON'T "BUT" ME-- JUST LISTEN!

... GET THIS VEHICLE UNDER COVER AND DO WHAT YOU SHOULD'VE *ALREADY* DONE, JONES! GIVE IT A THOROUGH GOING OVER IN ACCORDANCE WITH TH' WORD IN FM 9-207 (Jan 78)!... BEFORE YOU TRY GOING ANYWHERE WITH IT!



NO BACK TALK, JONES!

!SOB! ... BUT, BUT... !SOB! B-BUT...

HALF-MAST-- YA GOTTA LISTEN T' SPEC JONES, PLEASE...

!GLUB! SARGE, HELP ME... 'FORE IT'S TOO LATE... I GOTTA FIND MY WIFE AN' DAUGHTER-- !SOB!

Y'MEAN YOU WERE GOIN' T' LOOK FOR ELLEN AND LITTLE FRAN ??

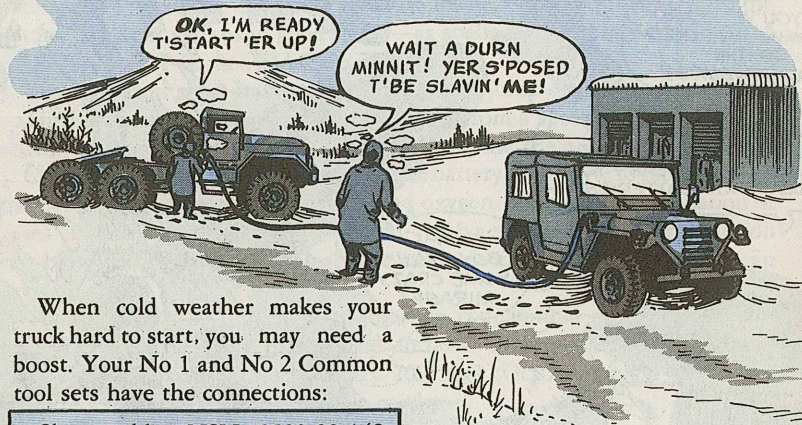
WHY DIDN'T YOU SAY SO?



IT'S AN EMERGENCY!

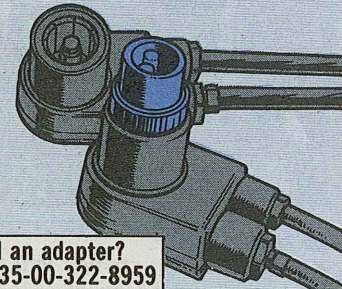


Slave Start Kits for Trucks



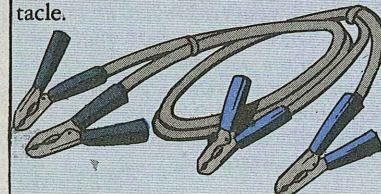
When cold weather makes your truck hard to start, you may need a boost. Your No 1 and No 2 Common tool sets have the connections:

Slave cable, NSN 2590-00-148-7961, for vehicles with a slave receptacle.



Need an adapter?
NSN 5935-00-322-8959 gets it

Jumper cables, NSN 2920-01-027-0125, for those without slave receptacle.



Some military-design trucks already have slave receptacles. For instance, all M123-series 10-ton trucks, Goer vehicles and the M746 22½-ton HET tractors have them.

The commercial-design M915 series trucks all have slave receptacles.

Your command can authorize slave receptacles for other military-design trucks if you're in a cold climate. SB 9-16 (Apr 77) is the authority. You'll find the parts or installation kits in your vehicle's TM.

You can't get slave start kits for commercial-design trucks, such as the M880-series 1¼-ton, M876 telephone maintenance truck, M911 C-HET tractor.

A set of jumper cables, PN 64547A, NSN 2920-01-051-6680, is listed on page C-2 of TM 9-2320-270-10 (Oct 77) for the M911 C-HET.

Lead-Acid Battery...

YOU'VE HEARD
O' WHAT HAPPENED
TO THE
HINDENBURG?

WELL, YOU'LL GET A
REAL BLAST IF A SPARK
IGNITES THAT HYDROGEN
GAS IN --OR NEAR-- YOUR
LEAD-ACID BATTERIES!

GASP!
BOY, THAT'S
SOME CRAZY
MIRAGE!

Jump Starting SAFETY

Dear Half-Mast,

A lot of the jump-starting info I've seen in civilian publications says the battery caps should be removed from the batteries—both live and dead batteries—before hooking up the jumper cables.

This's supposed to prevent an explosion of hydrogen gas that might be trapped in the batteries.

I don't find the same instructions in Army pubs.

What's the word—battery caps on or off for jump-starting?

CW2 G. W.

Dear Mr. G.W.,

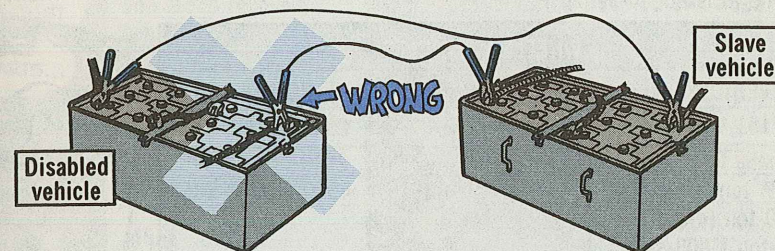
You don't have to take the battery caps off for jump-starting. Caps on Army batteries are vented to let off any pressure inside. Natch, you always keep the battery cap vent system in good shape—as spelled out in TM 9-6140-200-14 (Apr 78), para 2-6b, and DA Pam 750-34 (May 78), page 11.

That DA Pam gives you the straight poop on jump-starting—pages 21-24.

The big danger of battery explosion comes from a spark near the batteries setting off hydrogen gas that may be in or around the batteries.

Charging causes some of the water in the battery electrolyte to turn back into the original components—hydrogen and oxygen. When this combination of gases is ignited, it turns back into water—with a mighty bang. This explosion can blow your battery to pieces! You can't see that hydrogen—it's like an invisible bomb.

That's why it's so important to hook up your jumper cables in the right order—and to the right places. You do not—ever—connect all 4 jumper cable clamps as shown in TM 9-2320-209-10/1 (Oct 76), page 2-44. Fact is, there're a coupla bum steers in that rundown.



This wrong hookup also shows up in TM 9-2320-211-10 (Nov 77), page 2-55, and TM 9-2320-260-10 (Nov 77), page 2-46.

Never connect both ends of the black (negative) cable to the batteries. On the disabled vehicle you connect the black cable to some part of the chassis or engine—at least a foot away from the batteries.

Mighty important:

—Make sure the 2 vehicles are not touching each other. If they're touching, it's the same as connecting the negative cable—at the wrong time.

YOU COULD
STRIKE A
SPARK WHEN
YOU HOOK
UP THE
POSITIVE
CABLE!

PERSONNEL

OK, FELLAS! NO MORE GUESSIN'!
THIS YEAR, I'M GONNA USE THE
CORRECT IGNITER FER EACH OF YA!

WILL MIRACLES
NEVER
CEASE!

HOORAY!!

HEATER IGNITERS

WOT A
RELIEF!

YOU SAID IT!

'BOUT TIME! LAST YEAR
HE MELTED MY IGNITER
COIL WIRES!

There are a dozen different fuel-fired personnel heaters scattered thru all kinds of tracked and wheeled vehicles.

Sorting out the igniter for the right heater is a bear. And puttin' the wrong one in is not too smart.

WHEELED VEHICLES

VEHICLE	HEATER	IGNITER
M151 ¼-ton	2540-00-736-8563	2540-00-319-5933
Gama Goat	2540-00-113-4180	2540-00-217-5782
2½-ton (multifuel)	2540-00-933-8916	4520-00-790-8417
10-ton (diesel)		
5-ton M809-series		
5-ton M39-series (multifuel)		
2½-ton (gasoline)	2540-00-692-8848	2540-00-312-2017
5-ton M39 series (gasoline)	Heater as in kit	2540-00-312-2017
5-ton M39 series (diesel)	Heater as in kit	2540-00-312-2017
22½-ton M746 tractor	2540-01-013-0846	2540-00-217-5782

SO, TO GET
THE RIGHT
PART, JUST
FOLLOW
THESE
CHARTS...

TRACKED VEHICLES

VEHICLE	HEATER	IGNITER
M113 APC family (gasoline)	2540-00-555-9230	2540-00-333-1582
M107, M110, M108, M109 SP artillery and M578 recovery vehicle	2540-00-854-4449 or 2540-00-967-3352	4520-00-790-8417 2540-00-941-8681
M113A1 APC family M109/M109A1 SP Arty	2540-00-854-4449 or 2540-00-930-8938	4520-00-790-8417 2540-00-941-8681
M60, M60A1, M60A2, M728, M48A3 tanks		
M551	2540-00-759-8018 or 2540-00-113-4180	4520-00-790-8417 2540-00-217-5782
M109A1/M109A2 SP Artillery M88A1 recovery vehicle, M60A1 (RISE) and M48A5 tanks.	2540-01-013-0846	2540-00-217-5782

Unpainted igniters reflect so much heat that they sometimes melt igniter coil wires. Igniters NSN 4520-00-790-8417 and 2540-00-319-5933 are issued unpainted. You should dip $\frac{13}{16}$ inch of the igniter barrel into heat-resistant enamel and air dry. Make sure you don't let the enamel plug the holes in the igniter barrel base. NSN 8010-00-297-2013 gets a quart of the enamel.

Tire Chains...

Who? What? Where? Etc...

THE WAY I FIGURE IT... WE'RE AUTHORIZED 27 AND 34 TIRE CHAINS!

TAP-TIPPY-TAP!

HAVE YOU BEEN FEELIN' A LITTLE TIRED LATELY, ROBINSON?

WE GOTTA GET THAT CALCULATOR AWAY FROM HIM... HE'S GOIN' APE WITH IT...

?

You won't find specific authorization for tire chains in all truck parts manuals. Your own command determines if tire chains will be issued.

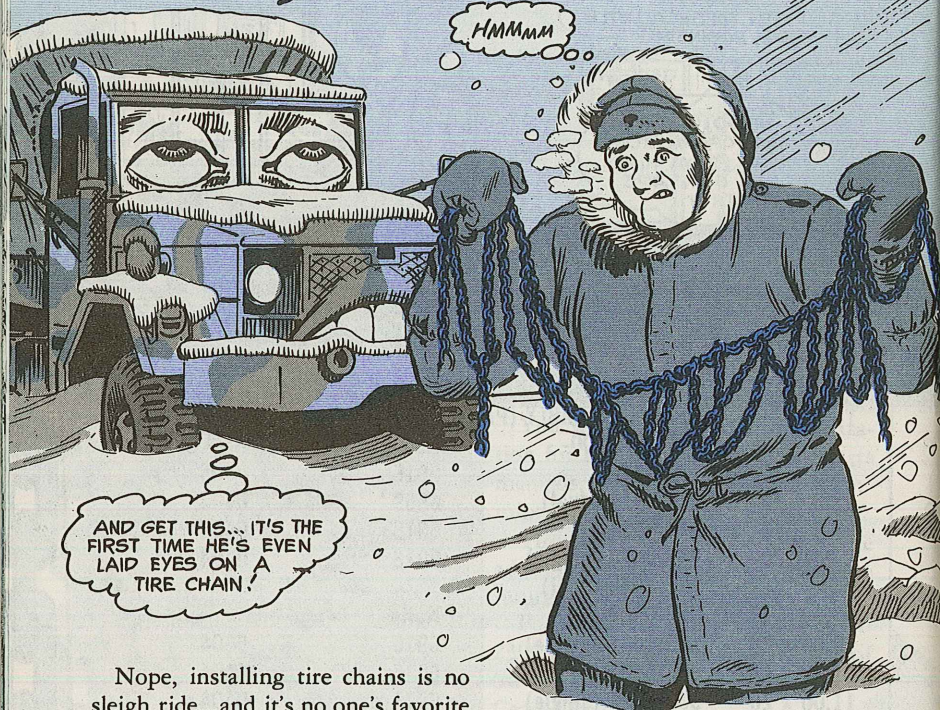
Tire chains are being added to the additional authorization list (AAL) in future editions of -10 TM's.

For tire chain repair, see TB 9-2300-282-12 (Nov 65), "Use of Swivel-Type Hook for Securing Tire Cross Chains."

HERE'S A RUNDOWN ON TIRE CHAINS, CROSS CHAINS AND SWIVEL HOOKS FOR MOST TIRE SIZES. THIS UPDATES THE TB'S INFO ON SWIVEL HOOK NSN'S...

TIRE SIZE	CHAIN ASSEMBLY (PAIR)	CROSS CHAIN	SWIVEL HOOK
	NSN 2540-00-	NSN 2540-00-933-	NSN 2540-00-937-
7.00 x 16	177-7235	6916	0405
8.25 x 20	528-9514 (dual)	6959	0404
9.00 x 16	933-9026	6916	0404
9.00 x 20	933-9024 (single)	6916	0404
	933-9030 (dual)		
9.50R x 16.5D	057-0204	None	
10.00 x 20	933-9034 (single)	6916	0404
11.00 x 18	933-6933	6915	0404
11.00 x 20	933-9022 (single)	6915	0404
	933-9599 (dual)		
11.00 x 24	933-6935 (single)	6915	0404
12.00 x 20	933-6922 (single)	6915	0404
	933-6917 (dual)		
14.00 x 20	933-9033 (single)	6992	0404
	933-6928 (dual)		
14.00 x 24	933-9023 (single)	6992	0404
	933-6929 (dual)		
16.00 x 20	933-6937	6914	0403
18.00 x 22.5	01-024-4440	None	
18.00 x 33	FSCM 19207	FSCM 19207	None
	PN 11632607	PN 11669475	

Oh, What FUN It IS... NOT!



Nope, installing tire chains is no sleigh ride...and it's no one's favorite winter sport, especially when—

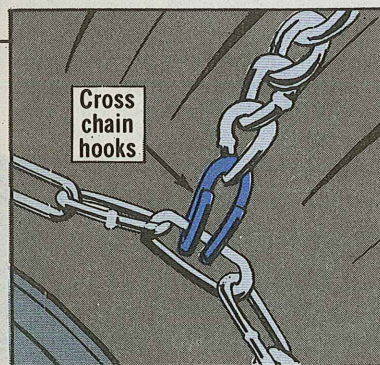
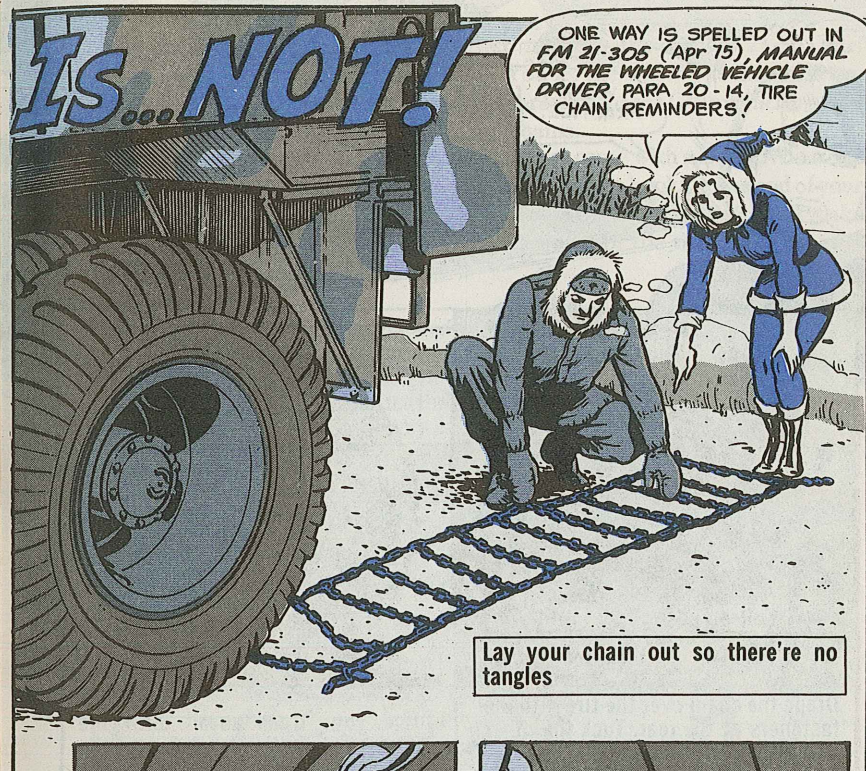
★ You've got to work in the worst conditions Ol' Man Winter can throw at you.

★ You've got to take 'em off and put 'em on over 'n' over because of weather changes or because of long stretches of bare pavement.

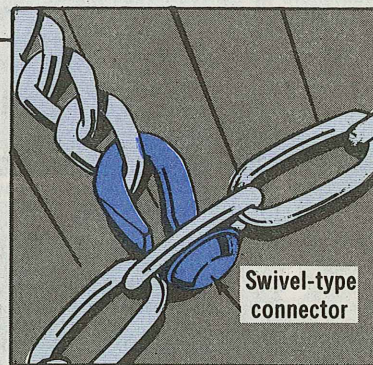
★ You overlook a weak cross-chain and have to take your chains off to keep the broken cross-chain from beating your truck to death.

★ You put 'em on wrong...and have to start all over again.

So, get ahead of the game and save yourself some pain. Make sure your chains are in good shape, clean and untangled. Practice putting 'em on—in good weather so you'll have it down pat when the real need comes. There are wrong ways and hard ways. Do it right. And do it the easiest way possible.

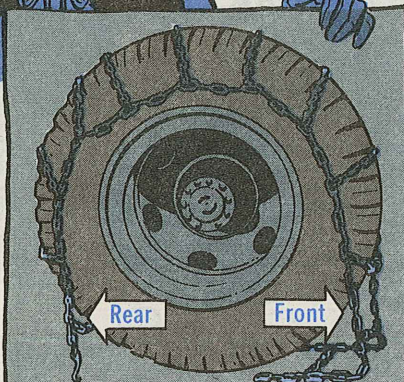


Make sure the chain will go on with the cross-chain hooks away from the tire

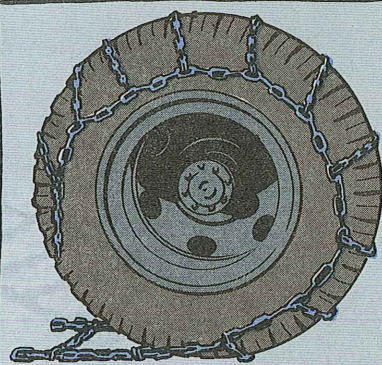


If your chain's got swivel-type connectors, they take care of themselves

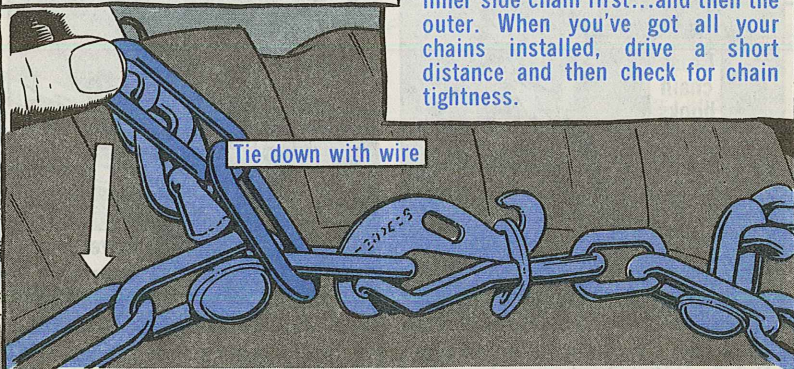
WITH A LITTLE PRACTICE, IT'S EASY!



Drape the chain over the tire with the fasteners at the rear. Tuck the other end of the chain under the tire.



Drive your truck ahead until the fasteners are at hub level. Fasten the inner side chain first...and then the outer. When you've got all your chains installed, drive a short distance and then check for chain tightness.



Get the chains as tight as you can...but by hand only, no tools. Chains need to creep a little.

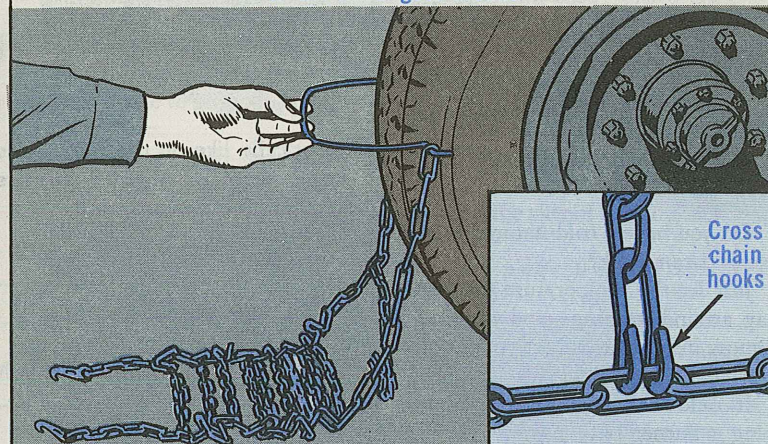
But some people think there's an easier method—the way FM 21-305 tells you to install chains on a mired vehicle. You let the wheel put the chain on.

Fact is, this way is spelled out as standard practice for the Goer vehicles—TM 9-2320-233-10 (Jun 76), page 2-61, Tire Chains.

And it's pretty much like the instructions that come with a lot of civilian tire chains—which come with a special clip or applier for hooking one end of your chain to the tire. You can make a clip from some rod or strap metal. Just make sure it's got a little spring to it so it'll grab ahold of the tire.

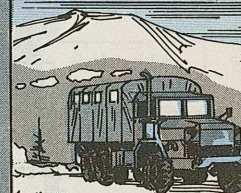
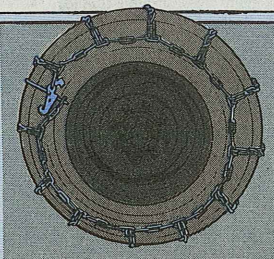
Try it—maybe you'll like it.

Hang the end links of your chain on the clip. Press the clip onto the tire at hub level. Pile the chain neatly close to the tire...so it'll peel off when the wheel goes around



Make sure the cross-chain hooks face up...so they'll face away from the tire when the chain's installed.

Drive ahead until the wheel makes a complete turn. Pull the clip off. Connect the chain ends.



GET

A GLOW ON!

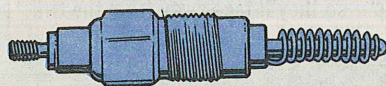
I GOT YOU A SLAVE!
NOW WHY WON'T YOU START?

WHY YOU DUMMY--
YOU LEFT MY
COLD-START
SWITCH ON ALL
NIGHT -- AND
BURNED OUT
MY GLOW
PLUG!

Do you have a cold-natured M809-series 5-ton truck?

Just let the temperature drop—to, say, around freezing—and you find it almost impossible to get your engine started?

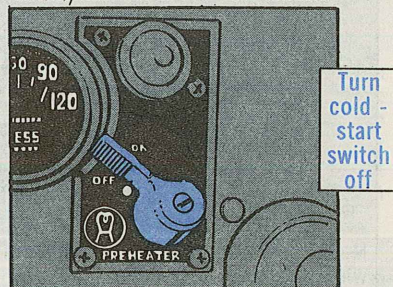
It could be the manifold heater glow plug is burned out.



Glow plug's
gotta glow

The cold-start switch on those 5-tonners has to be turned to OFF manually. It won't flip to OFF

automatically like on the M39-series 5-ton and TM-209-series diesel/multifuel 2½-ton trucks.



Drivers sometimes forget to turn the cold-start switch to OFF. This'll burn out the glow plug. And that's hard to detect because the indicator light will still glow.

Your mech can check it out as shown in table 2-5 of TM 9-2320-260-20 (Jul 72). But here's a quicker and easier way.

Turn the cold-start switch to ON. Preheat for about 30 seconds. Operate the primer pump only 1 or 2 strokes.

Touch the manifold—carefully—to see if it gets warm. No heat? Read on:

GLOW PLUG CHECK

Pull the wire at the glow plug. Set your multimeter to 100 VDC (50 VDC for some).

Turn the cold-start switch to ON. The indicator light should be lit...it'll glow a little brighter with the wire to the glow plug disconnected.

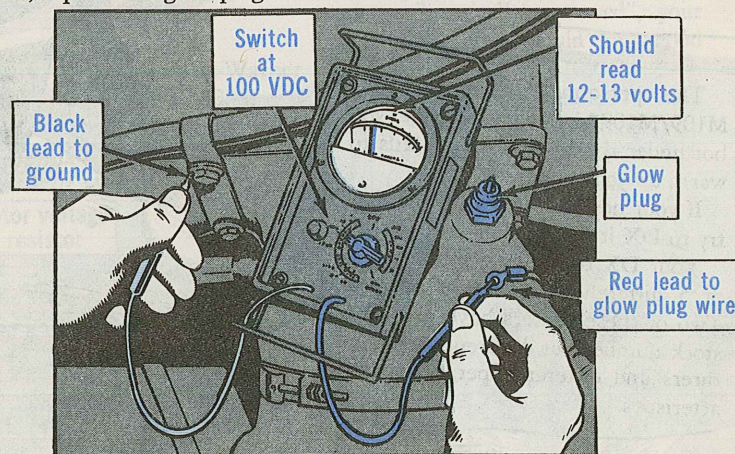
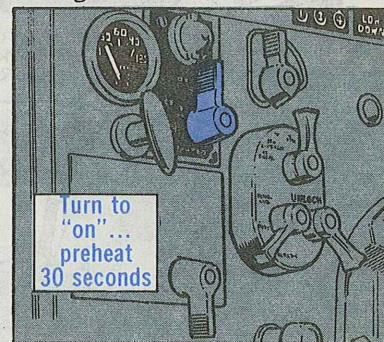
Touch the red probe to the wire and the black probe to ground. You should get 12-13 volts.

If so, turn the cold-start switch to OFF.

Remove the glow plug.

Connect the wire to the glow plug and hold the side of the plug against a good ground.

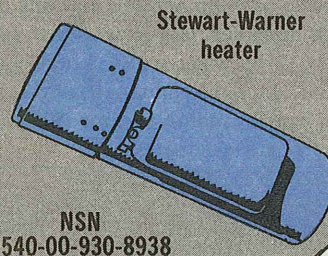
Turn the cold-start switch to ON. The glow plug coil should turn red. If it doesn't, replace the glow plug. Use NSN 2920-00-088-9310.



Personnel Heater

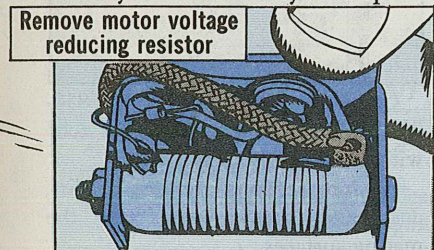
Hot Flashes

HEATER STOCK NUMBER	MANUFACTURER	MODEL/PART NUMBER	OPERATION IN M109
NSN 2540-00-930-8938	Stewart-Warner	PN 11601809 (10560-Series)	Works a few times then conks out. Works OK in M60-series tanks
NSN 2540-00-854-4449	Stewart-Warner	PN 7748716	Old issue but should work OK.
NSN 2540-00-930-8938	Perfection	PN 5420061	Works OK in both M109 and M60-series tanks
NSN 2540-01-013-0846	Stewart-Warner	PN 11668862	New model. Now ready for issue.
NSN 2540-00-967-3352	Stewart-Warner	PN 8737692	Old issue but should work OK.



up and snip out the motor voltage reducing resistor. Some shops wire in a 7.7-ohm resistor where the motor voltage reducing resistor was and some don't. It seems to work equally well either way.

With the motor voltage reducing resistor "surgically removed", your personnel heater should give good service in an M109/M109A1. 'Course, if it's to be used for an M60 tank, M113A1 personnel carrier, etc., it works fine with the motor voltage reducing resistor still in place.



THIS FAST FIX'LL KEEP YOU WARM!



RATS! CAN'T FREEZE 'EM OUT!!

HAH! WE'RE SNUG AS BUG IN A RUG!

RIGHT ON! OL' HAWK CAN'T BOTHER US...

HERE ARE THE HEATERS YOU CAN GET!

...NOT SINCE SUPPORT TOOK CARE OF OUR HEATER!

The personnel heater in your M109/M109A1 howitzer can get you hot under the collar when it fails to warm up your assets.

If your heater won't work you may try to DX it for another one.

Your DX could issue you any one of 5 different replacement heaters. Two of these heaters have the same stock number but different manufacturers and different operating characteristics.

Radiate Some PM...

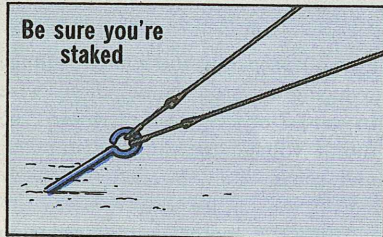
Cold Care for Antenna, Cables

When Old Man Winter threatens to turn your antenna into a tall, skinny icicle, it's time for you to radiate some hot PM.

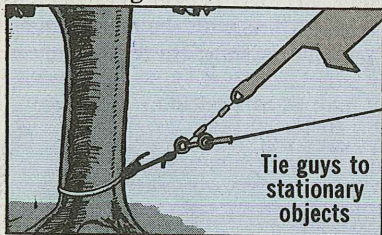
Here's how:

Be sure you're staked. If your mast doesn't have a cold weather stake (like the RC-292 antenna equipment's GP-2) use a GP-112/U, NSN 4030-00-291-9354. Careful during thawing days, tho. Its small surface won't hold much in wet earth.

Be sure you're staked



'Course, in a pinch, you might tie guys to stationary objects, like a tree. But, don't try to get by with fewer guy wires than your TM calls for. That's asking for trouble.



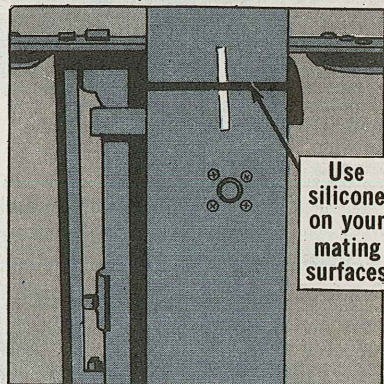
Tie guys to stationary objects

Poor grounding is really big trouble. Eyeball TC 11-6 Grounding Techniques (Sep 76).

HEH-HEH!! WHAT A LOVELY ICICLE THAT'LL MAKE!

Frozen Joints?

Mast or whip antenna sections can stick together like glue when Jack Frost turns water to ice. Check your manuals for the right stuff, of course, but, usually adding silicone can head off this sticky situation.



Use silicone on your mating surfaces

Get a 2-oz tube with NSN 6850-00-177-5094. You get an 8-oz tube with NSN 6850-00-880-7616.

Be sure sections are free of dirt, dust and grease, especially the mating surfaces.

OUTTA TH' WAY, PUNY SOLDIERS... THAT ANTENNA IS MINE!!

NO WAY, HAWK!!

RIGHT ON, SPARKS...

WE'VE DONE OUR PM... ...ON TIME!



Tale of the Tape

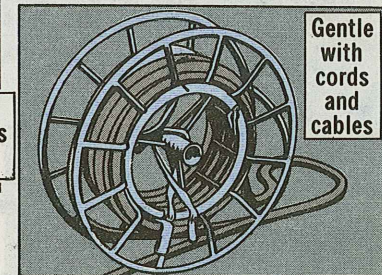
Some troops report tape loses its grip in cold weather. The biggest villain is the TL-83 tape TM 11-5820-348-15 (May 66) recommends for fastening the CG-107 cord to the RC-292.

The taping relieves strain on the MP-68 antenna base connections.

A low-temp tape that holds is TL-600, NSN 5970-00-240-0620. If it gets too cold for even that tape, switch to clamps to relieve the pressure. Order NSN 5975-00-563-0229.

Short Stuff

Finally, be gentle with cords and cables in cold weather. Brittle insulation breaks. That makes the innards



Gentle with cords and cables

Knock It Off

Ice on your antenna cuts down the radiating range—clean it off. From the safety angle, a piece of ice falling 40 feet can ruin your whole day.

Clean The Bowl

Keep ceramic insulator bowls dry. Water collects in the bowl during warm weather. Comes a cold snap, the water'll freeze and break the glass.



Keep insulators dry

Just being cold makes the glass brittle. Handle it carefully.

Once you've wiped the bowl clean and dry, reach for the silicone again. Use it to reseal the insulator.

a candidate for shorts that kill commo.

When Temps Go Down... HOT PPM

Keeps Commo Up

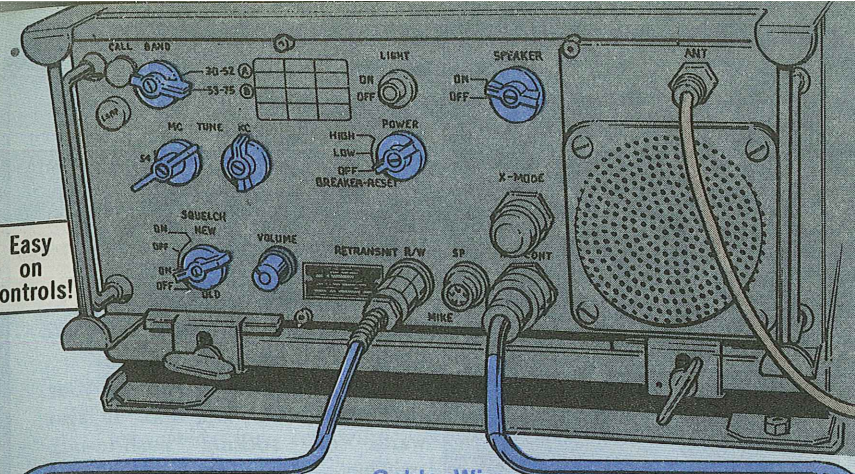
WHEN THE MERCURY DROPS,
A LOT OF COMMO STOPS---
UNLESS YOU FOLLOW SOME
BASIC RULES!

And, we mean basic. You know, like you don't work so good on cold days 'til you've warmed up a little. Your commo gear's the same way.

Sheltered gear needs some looking after, of course. But care is critical for gear left outside.

Receiver-transmitters f'rinstance. Cold soaks right through 'em. Smart operators give 'em 10 to 15 minutes warm-up before they transmit. Go easy on control knobs, too. They get sluggish. Watch shock mounts. They get brittle with the cold.

Easy
on
controls!



Cable, Wire

Cables and wire need more care during a cold snap. Watch for kinks. If you can, warm cable up before flexing it or reeling. Insulation gets brittle.

'Course, it's not just the outside that can break. Those cold wires inside can go, too.

Run cable and wire overhead if you can. No sense freezing 'em to the ground. That just makes reeling in that much harder.



Repairing or splicing wire? Use cold weather electrical tape TL-600. NSN 5970-00-240-0620 brings you a 30-ft roll.

Connecting or disconnecting cables takes a little more care in cold weather. Rough stuff'll break something.



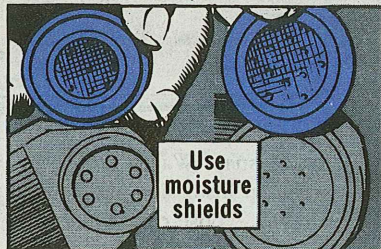
Watch
connectors

Accessories

Commo accessories pose cold weather problems, too. Like moving them in and out of doors. Cold to hot and hot to cold causes condensation.

If you can't balance an item's temperature by keeping it in your jacket, try wrapping it in a dry woolen cloth. That absorbs the moisture for you.

Likewise, if your handset or



microphone has a moisture or deicing shield, use it.

Course, if you've got one with the shield inside the mouthpiece—like the AN/PRC-25 or -77's H-189 handset—you need extra help keeping wetness out.

Before going outside, wrap it in the plastic bag from your BA-4386 battery. That keeps out moisture.

Putting accessories inside your clothes protects 'em, too. It also wards off sticking push-to-talk switches.

In really cold times, watch how you use your accessory. Putting it to your lips or ears could cause a "sticky" problem. Not to mention a painful separation.

Batteries

Batteries need the warming treatment, too. They take a big beating from cold weather.

You get help with several pieces of equipment. They switch to a cold weather battery in chilly times.

For instance, if you use BA-30's, they switch to BA-2030's or -3030's. For others, like the AN/PRR-9 radio receiver and AN/PRT-4 radio transmitter put the batteries inside your clothes. Cables connect the battery and radio.

Keep batteries in your pockets... carry spares



Check your TM. It'll tell you if your gear uses these cold-killing methods.

Course, it's a good idea to keep all batteries in your pockets. Pull them out only when needed. Be sure to carry extras.



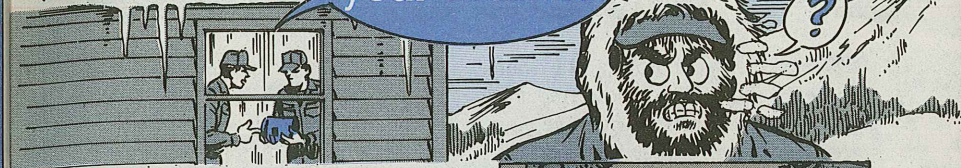
Using plug-in type batteries?

Watch connector plugs. Especially the plastic one on your AN/PRC-25 and -77. It gets brittle—and breakable—in the cold.



AIR MOBILITY

How are your Brushes?

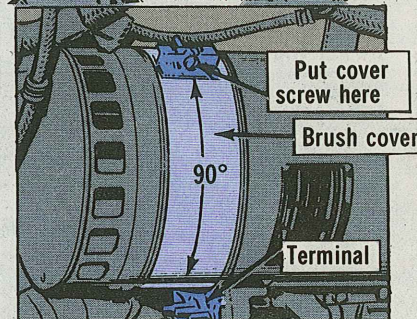


It's not unusual to remove the starter-generator on a T-53 engine in your Huey or Cobra just to inspect the brushes for wear.

The need for removing the starter-generator, of course, is because you can't get to the brush cover screw.

That means a lot of extra sweat and elbow grease!

The overhaul-types are now placing the cover screw 90 degrees to the right of the terminal block, viewed facing the aft end of the starter-generator. This will give you easy access to the brushes.



If you have to remove the starter-generator for any reason, be sure to put the brush cover back in the new position. It'll save sweat when you inspect the brushes next time.

Safety-of-Flight Messages

UH-1-79-8 AH-1-79-6	Maint Info Eliminate T53-L-13B Engine 1800-Hr TBO DRSTS-MEP 071345Z Jun 79
UH-1-79-9 AH-1-79-9 AH-1-79-7	Maint Advis Msg Nonstandard/Local Mfg Hvy Duty Skid Shoes DRSTS-MEU 221435Z Jun 79
AH-1-79-8	Maint Advis Msg AH-1 Canopy Removal Sys DRCPM-CO-T 082015Z Jun 79
OH-58-79-10	Maint Advis Msg Skid Shoes for OH-58A/C DRSTS-MEL 221430Z Jun 79
OH-58-79-11	SOF One-Time Inspect OH-58A/B/C Storage Battery BB-676/A (TB 55-1520-228-20-27) DRSTS-MEA 262115Z Jun 79
CH-47-79-6	Maint Advis Msg Op All T55-L-11-Series Engines DRSTS-WC051230Z May 79 (correct to: 051230Z Jun 79)
OV-1-79-8	SOF One-Time Inspect Erroneous Illum of Engine Fire Warn Lamp (TB 55-1510-213-20-2) DRSTS-MEW 041945Z Jun 79
OV-1-79-8 (Amendment)	Amend SOF Msg OV-1-79-8 (TB 55-1510-213-20-2) DRSTS-MEW 052030Z Jun 79

Protect Your Birds!

When the wind howls, the thermometer slides 'way below freezing, and the snow starts to fly, give your aircraft all the protection you can. Use hangars, buildings, tents—any shelter you can find!

GET 'EM...
UNDER COVER...
FAST!

THE HAWK
CAN STRIKE
WITH LITTLE
WARNING!

If your bird's out in the open, use the standard covers at the engine air inlet and exhaust, and the pitot tube.



58

Birds!



YEAH, WINDY, TELL IT
LIKE IT IS ...

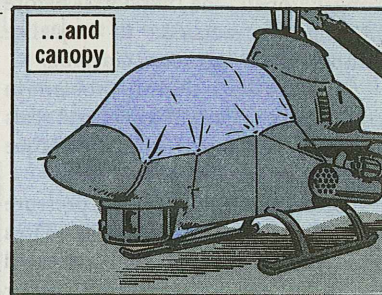
THE WINTER HAWK
IS ALMOST HERE!



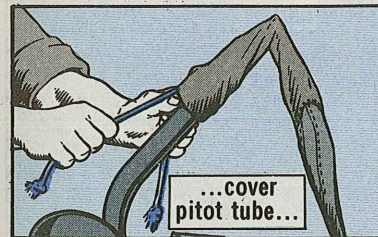
break also provide protection.

If you have all-weather covers, use 'em for protection from the ice and snow. Vehicles parked as a wind-

...and
canopy



Protect your birds from strong winds when you get a severe weather warning. Mooring and cover info is in the tech manual for each aircraft.



59



Try These PM Tips

Never attempt to defrost a cold windshield with hot water. The rapid temperature change will crack it. Plexiglass becomes so brittle in low temperatures that dropping a tool on it can lead to a replacement.

If your aircraft is parked in a hangar, open the windows before moving it outside to equalize temperatures...prevents cracking.

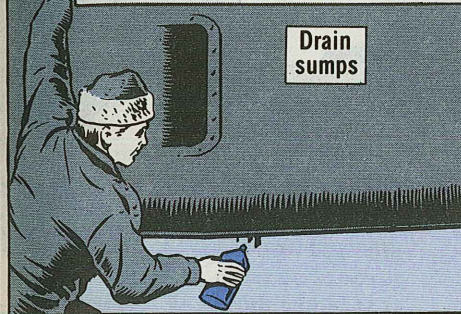
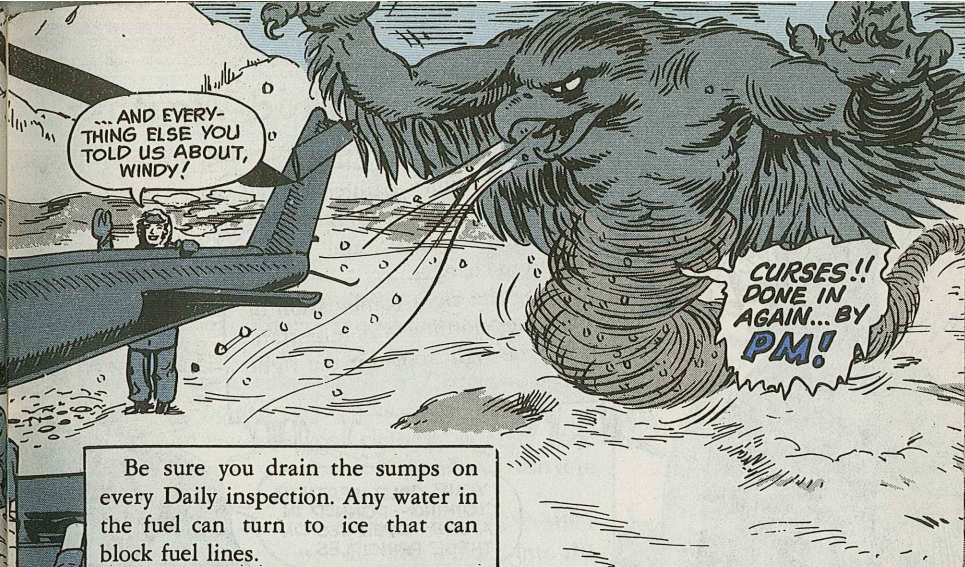
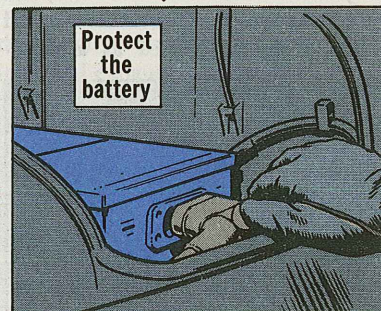
Oil leaks are a chronic problem in cold weather. Eyeball joints and seals regularly and make with the torque wrench, as necessary.

Focus-in on the tires. Air pressure drops with the temperature. Tires frozen to the ground can be released by using heat—not over 160°F—or by using liquid deicer. Never use the deicer on the plastic windows or you'll get crazing (small cracks) for real!

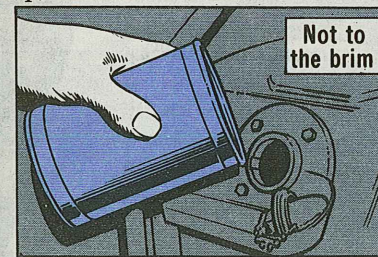
When pre-heating an engine, keep a fire extinguisher handy. Never touch bare metal unless you have your gloves on...bare skin will freeze on contact.

Batteries tend to lose their charge and even freeze. 'Store 'em in a warm place.

Use an APU on the first start of the day. It'll save a lot of drain on the cold battery.



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



When you've refueled a bird outside in subzero temperatures, always check the fuel level outside. When a full bird is moved into a hangar, the fuel level will rise with the higher temperature. Opening the filler cap will give you a fuel spill to clean up.

Cold weather affects your flying machine in many ways. For example, steel control cable tensions decrease due to the higher contraction of the aluminum airframe. A bolt that is overtightened on a warm day could shear off as the bolt shank contracts.

The efficiency of soldiers and machines goes down in cold weather.



COMBAT SUPPORT

Cold-Weather

You can't pull maintenance if you're fighting cold, snow, rain, mud, slush, high winds and rapid temperature changes.

Wearing the right combination of cold-weather clothing is as important as using the right tools for the right job.

YOUR COLD WEATHER CLOTHING--DONNED IN LAYERS--OPERATES ON THESE PRINCIPLES ...

- Removeable insulated materials slow the flow of your body heat to the outside.
- Ventilation allows air to cool the overheated body areas thru openings such as cuffs and front closures.
- The layers of materials, and the layers of air trapped between them, act as buffers against changes in outside temperatures.

'Course, when any part of your cold-weather clothing is torn, worn-out or dirty, it loses part of its protective features.

Clothing PM

YOU WANT TO KEEP EVERY PIECE OF COLD WEATHER CLOTHING IN GOOD REPAIR... AND CLEAN!!

CTA 50-900 GETS US THIS GEAR!

Brush your clothing often when wearing it. Dirty clothing reduces insulation because it clogs air-space between the textile fibers. Dirt also cuts the fibers and holds in perspiration.

Be sure you give your clothing as extra good brushing before you store it. If possible, brush it in the sunlight.

Take care about washing your cold-weather clothing. You can't put the whole batch into the washing machine, set it one one temperature and forget it.

Some items are washed in cold water; some in lukewarm water; and some in warm water. Some of it may be drycleaned.

Para 21, 22, and 23, TM 10-275 (Jul 68) have the PM story of when and how to care and clean cold-weather clothing. Cozy up to this manual so you'll keep your clothing up to snuff.

Stop Cold Metal Burn!

CTA 50-900 (Oct 78) authorizes anti-contact gloves for mechanics working in extremely cold areas. These cotton skin savers have soft deerskin reinforced palms, thumbs, and fingers...to protect your hands from metal burns in temps as low as -60°F.

They're not made to stand up for hours of rough, heavy duty work, tho. Take 'em off as soon as you can work without 'em or with regular gloves.

Here're the sizes available:

NSN 8415-00-
227-1220
227-1221
227-1222

Size
small
medium
large

PUBS

This is a selected list of recent pubs of interest to organizational maintenance personnel. For complete details see DA Pam 310-4 (Dec 78), TM's, TB's etc; DA Pam 310-6 (Jul 78) and Ch 2 (Jan 79), SC's and SM's and DA Pam (C) 310-9 (Nov 76), COMSEC pubs.

TECHNICAL MANUALS

TM 5-1080-200-10-HR Jun Camouflage Screen Systems
Ch 4, TM 5-4320-252-14 Dec Pump, Recip, 100-GPM
TVT 5-6115-274-12 Jun Gen Set, DED, 45-KW
Ch 3, TM 5-6115-590-12 May Power

Plant, Util (MUST) GTED
TM 9-1005-249-10-HR Feb M16A1 Rifle
Ch 1, TM 9-1005-313-10 May M240 MG
TM 9-1005-313-10-HR May M240 MG
Ch 5, TM 9-1330-200-12 May Grenades
TM 9-1425-473-24P May TOW
Ch 1, TM 9-1425-480-24 May Dragon
Ch 2, TM 9-2320-233-10 Apr Truck, 8-ton, M520, M877, M553, M559
TM 9-2330-251-14-1&P Apr Trailer, 1/2-ton, M416A1
TM 11-1520-237-23-3 Apr UH-60A Avionics
TM 11-5805-357-14-2-HR Jul Terminal Set, Tel AN/TCC-61
TM 11-5805-358-14-2 May Terminal Sets, Tel AN/TCC-60, AN/TCC-69
Ch 5, TM 11-5815-238-12 Jun Teletypewriter Sets AN/GGC-3, AN/GGC-3A, AN/GGC-53, AN/GGC-53A; Repeater-Transmitters TT-76/GGC, TT-76A/GGC, TT-76B/GGC, TT-76C/GGC, TT-699/GGC, TT-699A/GGC, TT-699B/GGC, TT-699C/GGC
TM 11-5821-285-20P Jul AN/ASC-15
Ch 1, TM 11-5840-347-13 Jun AN/PPS-15A(V)1
TM 11-5840-347-13-HR Jun Radar Set AN/PPS-15A(V)1
Ch 1, TM 11-5855-237-13 Jun AN/TVS-4, -4A
TM 11-5855-237-13-HR Jun AN/TVS-4, -4A
Ch 1, TM 11-5855-237-23P Jun AN/TVS-4, -4A
TM 11-5860-201-20 May AN/GVS-5
TM 11-5895-807-23P Jun KY-801/GSC
TM 11-6130-368-12 May PP-7442/GC
TM 11-7440-240-10-1 Jun Arty FDC OA-8399/GSG-10(V) (Bn)
TM 11-7440-240-10-5 Jun Arty FDC OA-8399/GSG-10(V) (Bn)
TM 55-1510-201-20P May U-8D, RU-8D, U-8F, U-8G
TM 55-1520-210-CL Feb UH-10D/H, EH-1H
Ch 1, TM 55-1520-237-MTF May UH-60A Helicopter

AUDIO-VISUAL STUFF

Available at battalion or post Learning Center

TEC LESSONS

GTA, TV Tapes
GTA SLC 3-8-9 202 Rocket Launcher
Green Scene No. 15 (Has segment on maintenance)
TVT 5-102 Traction aids and the winch

020-171-1663 After-Op Maint Checks, Service-M551
030-051-6421-F Ribbon Bridge/Raft: Disassembly
101-113-4779-A Measuring DC Voltage With Multimeter ME-26
101-113-4780-A Measuring AC Voltage Multimeter ME-26

104-301-7501-A AN/PPS-4A Radar
201-113-4570-A Op of AN/VIC-1
231-906-4006-A Initial Adjust of AN/TRD-15/23 Goniometer Drive Unit
642-091-5802-J Troubleshoot

Rammer Control Circuit, M107, M110
642-091-5803-J Troubleshoot PTO Clutch Circuit, M107, M110
643-091-5709-J Op Checks (Stab Test Set, Turret Elect Sys Test Set, Sensor Simulator)

GOER Steering Gear

If your GOER steering gear box isn't filled, condensation can collect where oil ought to be. During cold weather, it can freeze and cause steering problems. Check the steering gear oil level as required by the PMCS in TM 9-2320-233-10, Change 2 (Apr 79). It's item 29 on page 3-20c.

M88A1 Mystery Wrench

Having problems getting the spanner wrench you need for your M88A1 recovery vehicle? It's listed as Item 2 of Fig 267 on page 470 of TM 9-2350-256-20P (May 77)—but the NSN's wrong. Pencil it out and pencil in NSN 5120-01-043-5205, wrench, spanner.

Connie's Mini Minis

CONNIE -- I GOT A PROBLEM... BREAK-UP CAME SO SUDDENLY...

... I'M TRAPPED IN A WARM AREA!!

M880 Fuel Filter

To get a fuel filter for your M880 series truck, you must order NSN 2910-00-845-6770 fuel filter package. It gets you the filter, 2 hoses and 4 clamps. Make a note in your TM 9-2320-266-20P (Feb 78), Fig 17, item 5 is no longer available as a separate item of supply.

M416 Trailer Brakes

Use NSN 2530-01-032-6676 to get the lined brake shoe for your M416-series 1/4-ton trailer. The NSN on page 10, Fig C7, item 5, in Ch 3 (Oct 77) to TM 9-2330-251-14 is for an unlined shoe. Don't use it.

Symbols Aircraft Style

TM 38-750 says aircraft status symbols will be in red. Red pen or red pencil, typed or stamped—that's up to you. But felt-tip pens and grease pencils are out! Whatever you use, never erase a status symbol.

D7F Fuel Filter Gage

NSN 6620-00-111-7089 gets the D7F Cat tractor's final fuel filter pressure gage. The NSN and PN in TM 5-2410-333-20P are no good.

Order Record Folders

The new Equipment Record Folders, NSN 7530-01-065-0166, described in Change 2 to TM 38-750 are now in supply.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1979—657-003/12

Tire Chain NSN's

You can add a couple more tire chain NSN's to your list. Use NSN 2540-00-933-9025 for a single tire chain to fit an 8.25 x 20 tire. 2540-00-933-9020 gets a dual chain for a 10.00 x 20 tire.

2 1/2-Ton LO Switch

OHT is out for your 2 1/2-ton truck's brake air-hydraulic cylinder. Note 23 in LO 9-2320-209-12/1 (Sep 76) is being changed to call for OHA—up to the plug level at 6,000 miles or semi-annually. This's already specified for the 5-ton trucks—in Note 18, LO 9-2320-211-12 (Jan 79), and Note 16, LO 9-2320-260-12 (Mar 79).

Zap Those Zeros

Forget about putting zeros in Blocks 11 and 12 of the DA Form 2408-13 when no fuel or oil is added. The signature in Block 15 of the form serves as proof the tanks were checked.

Computer Booter

The M13A2 computer in the M60A1 (RISE) will get booted right out of the business if you try to operate it while the main gun is in travel lock. The computer strips its gears and has to be rebuilt. So remember, do not operate the computer in manual or power mode when the gun is in travel lock and never use power mode for computer testing.

Would You Stake Your Life ^{right now} on the Condition of Your Equipment?

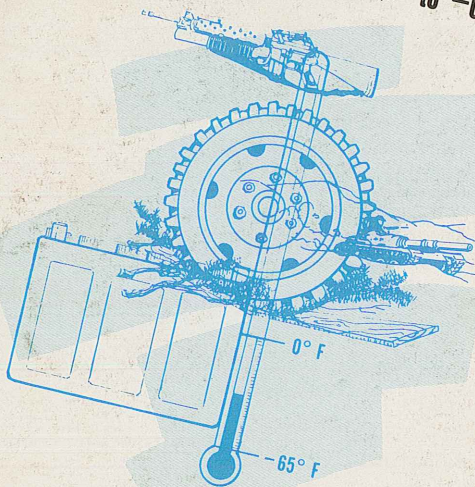
READ IT...

YOUR LIFE
MAY DEPEND
ON IT...

Department of the Army
FM 9-207

Department of the Air Force
TO 36-1-40

Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to -65°F)



JANUARY 1978

...B'LIEVE
IT!

and

KNOW IT!