P.S

ISSUE 12

THE PREVENTIVE MAINTENANCE MONTHLY

"You really have to keep in shape to cover that kind of territory."

ARMY FIELD FORCES
OFFICE OF THE CHIEF
FORT MONROE, VIRGINIA

Editor, P. S. Magazine
Aberdeen Proving Ground
Aberdeen, Maryland

Sir:

We in Army Field Forces have the mission of training all soldiers how to fight as individuals and as a part of the team to insure success in combat. This training includes instruction in methods of fighting and must of necessity include the care and preservation of equipment.

The need for training never ceases because only by constant practice can habits be formed which will carry the soldier through the fight and insure that he does his job. Proper habits of care of equipment will enable him to have available, at hand, in good order, the means to do this job.

The story of Lucky Pierre in a recent issue of P. S. and the training film, "The Late Company B", eloquently depict the pitfalls of combat that await those who neglect or ignore their training.

I shall appreciate the help your magazine can give us in teaching the soldier how to survive on the battlefield and achieve success in battle.

Sincerely,

JOHN R. HODGE
General, U. S. Army
Chief

IN THIS ISSUE

Vol. No. 12 1953 Series

The printing of PS Magazine, the PREVENTIVE MAINTENANCE MONTHLY, is approved by the Director, Bureau of the Budget (14 Feb 1952), and is distributed as follows: ACTIVE ARMY: Tech Svc (9), except 9 (250); Admin & Tech Svc Bd (5); AFF (5); [illegible] For explanation of distribution formula see SR 310-90-1.

CORRODED FUZES

Dear Editor,

Could be the damp climate in Korea was to blame, but we had a little trouble with reconditioned ammunition. The M51A4 and M51A3 fuzes often came in with the threads corroded and were tough to screw onto a shell—especially when we needed them on the double.

To keep from getting caught with our fuzes short, as quick as we'd get a box of fuzes we'd immediately clean the threads with crocus cloth and put a film of oil on them. This way they'd go on with a mere flick of the wrist when we needed them, and caused us no trouble.

Cpl Bruce Nichols
Andy Ammo, Korea

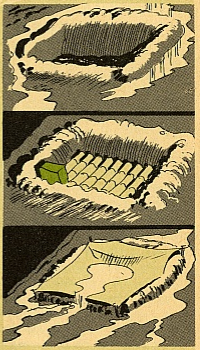
KEEPING YOUR POWDER DRY

Dear Editor,

Storing ammunition and powder so it will keep dry has caused many a headache in Korea. A hole on sloping ground, plus logs and railroad ties (which usually can be found lying around) solved our problem pretty well.

First we dug the hole 3′ to 4′ deep, as big as needed. With the dirt we made a 2′ high embankment on the upper sides of the hole to carry away all surface drainage. Then we laid two rows of logs lengthwise in the hole. We piled the ammunition on top of the logs up to about a foot below ground level. Over the hole we placed a canvas at a slight angle (sloped to the downhill side) so that any moisture would run off. Then we dug another similar hole to store the powder.

MSgt Thomas Harrigan
Korea



ALWAYS CHECK WHEEL STUDS

Dear Editor,

We were coming down a long, steep grade with a tractor towing a 155-Howitzer about 20-mph, when all of a sudden a wheel came off the howitzer. The axle was bent and the drum scarred. The 1200-pound wheel kept on traveling and barely missed a bivouac. The gun was lost to us so far as that mis-

sion was concerned. We had to wait until Ordnance hauled it away.

Since the howitzer was brand new, we'd taken for granted it was OK and hadn't bothered to check it. Being puzzled as to what had caused the wheel to come off, we examined it and found that when the hubs were put on, the wheel studs had been reversed, so the wheel locking-nuts had loosened up instead of tightening.

We checked wheel studs on another bunch of howitzers and found that in the majority of cases they were put on wrong. We didn't take much for granted after that.

WO Louis Fillicelli
Andy Ammo, Korea

A short tale (antidote) to clarify what Mr. Fillicelli means by "on wrong":

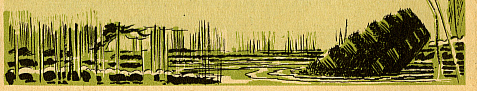
Certain vehicle manufacturers decided that left-hand-threaded wheel-studs on wheel hubs of the left side and right-hand-threaded studs on the wheel hubs of the right side of a vehicle would tend to overcome the loosening action of wheel-stud nuts during braking action. This design was also used on certain artillery carriages.

Up to this point everything is clear, but when the question is raised as what is the right and left side of a towed artillery carriage, confusion and arguments develop because artillery is normally towed from the rear with the muzzle pointing to the rear. Now the right side becomes the left side, and the left side becomes the right side, and we're all mixed up.

So a good rule of thumb to follow is this: **Always tighten the wheel-stud nuts in the direction of the lunette with the wrench handle in the top half of its circle.**

If you follow this advice, your wheel studs won't be "on wrong" and the nuts should stay tight provided they were tight when you started. But . . . some carriages are equipped only with right-hand-threaded wheel-studs, in which case the above advice does not apply.

So, read your TM in each case and get to know which side of your weapon is up.



6TN BATTERIES are different

You'll be surprised one fine day (unless it's already happened) when you draw a 6TN battery and find someone's been playing checkers with the filler caps. The filler holes on most of these batteries run in a straight line from side to side, perpendicular to the battery handles (Fig. 1).

But **Willard** and **Exide** 6TN's have filler caps that zig-zag along the handle side of the battery (Fig. 2). You got trouble? Yes.

The pictures on this page were clicked at an M135, 2½-ton GMC. As you can plainly see, the battery hold-down-strap in its normal position would cover the filler caps on the Willard and/or Exide batteries. What you do is drill or punch new holes in the battery tray (Fig. 2) and move the hold-down bolts over so the hold-down strap will clear the filler caps.

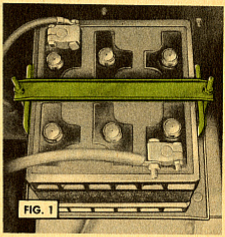


FIG. 1

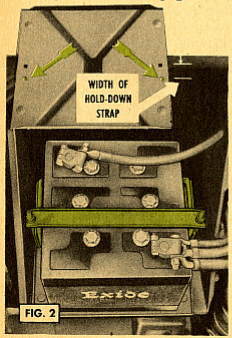
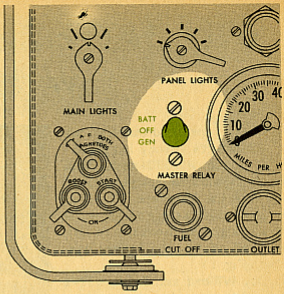


FIG. 2

And what about these Willard and Exide batteries in the M34 Reo and Studebakers? Well, seems the jumper cable for the side-by-side arrangement is going to be a mite short. Maybe some electrical genius you know can dream up a simple solution—like rigging a new cable, 2″ longer than the old one. Hm-m-m-m?

M46 master relay control switch



The M46's in the field that're equipped with the old single-throw master-relay-control switch (that permitted the master relay to be closed by current from the batteries only) should be equipped with a double-throw switch (as per MWO ORD G244-W6). A glance at your driver's panel will tell you if yours has it. It's marked BATT, OFF, and GEN rather than just OFF and ON (see figure above).

This double-throw switch installation (G162-1690370) provides a current source from the generator side of the master relay which will close the relay when the batteries can't provide enough current to close it in the usual manner. Now you'll no longer need resort to flashing the battery terminal to close the master relay as mentioned in PS #2, page 74.

Suppose you have a tank with batteries so dead they won't close your master relay—you turn on the master switch and nothing happens. Here's what you can do to start the vehicle:

First, be sure your accessory switches, radio, etc., are **off**. If you can use a slave cable from a slave kit or another vehicle, do so.

Second, be careful to connect it properly and have the engine on the helper vehicle turning up over 1500-rpm. Leave your master switch off and start your own main engine. When your engine is running well, start your auxiliary engine. Now remove the slave cable. When your auxiliary has warmed up for about 5 minutes, turn your master-relay-control switch to the GEN position. This will close the master relay, connect the genera-

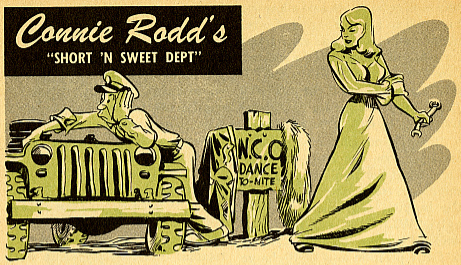
tors to your batteries, and allow the batteries to start charging. Go on about your mission and after about forty-five minutes, turn the master-relay-control switch to the BATT position and shut off the auxiliary (unless you need it for fixed-position firing or at-halt radio power).

If you cannot get a slave cable or slave kit, you can still start your tank. Start the auxiliary generator manually, remembering to turn the manual control on the fuel valve. When the auxiliary has warmed up, turn the master switch to GEN position and let it charge the batteries for about forty-five minutes. Then turn the master switch to BATT position and start the tank as usual.

Another way to start your tank which should be used only in case of an emergency: Start and warm your auxiliary generator same as above, but leave the master switch **off**. Turn on one small circuit, such as the driver's overhead light, to cause the auxiliary-generator-line switch to close before hitting the starter. This prevents severe arcing at the contact points. Now proceed to start your main engine directly from the auxiliary without previously charging the batteries. In temperatures above freezing, the tank should generally start OK. If you should happen to have a cold or stiff engine which calls for too much starting current, there's a thermo-breaker in the circuit that'll kick out and you will hear Li'l Joe speed up and quiet down. When this happens you have no choice—you must wait for the batteries to charge enough to help Li'l Joe. If you ever use this emergency method, be darn sure your radio equipment is **off,** for the voltage control is not so exact without the batteries in the circuit, and radios are touchy about over-voltage.

This double-throw switch was an interim modification, it'll eventually be replaced when your M46 gets rejuvenated at a depot by another single-throw switch with a rectifier that'll do the same work as the double-throw job when flicked to its ON position. If you've already got the new single-throw (OFF-ON) switch, you needn't worry because your tank will never see the double-throw job—you're way ahead of the game.

To close the master relay with this latest switch, just flick it to ON and it'll bring in juice from any source... batteries, slave receptacle, or Li'l Joe.



Valve-rotator caps

Being caught in kind of a chain-reaction is what breaks the rotator caps on your M38 exhaust valves. In the beginning, you have sticky valves. Then a sticky valve gets stuck in its open position, but the rotator cap doesn't get stuck with it. The cap follows the tappet. And the next time the cap and valve meet, the fit isn't like it should be. The cap gets jammed against the valve stem, and goodbye cap. To say nothing about what the jam-session did to the stem—maybe a beautiful bend.

You can check for a bend in the stem by removing the cylinder head to see if the valve's still centered on its seat in the block. If it's bent, it won't seat—and you need a new valve.

If just the cap's damaged, however, you can drive the vehicle without it by adjusting the tappet to a lash of 0.016" between the end of the valve stem and the tappet adjusting-screw. But this is real temporary—using the M38 continuously without a cap means the valve's not rotating and will end up with a burned seat.

Getting back to the beginning again: sticky valves could happen after the vehicle's been sitting around awhile, because the oil that's sprayed up from the crankcase gets gummy on the stem. Using your '38 at least an hour a week helps keep it right. Decreasing valve clearance (in case you're considering it) won't help—the valves will still stick, and then you'll cremate them.

To the rear—halt!

If you're throwing that M135 in reverse while you're still in motion, you're not giving the reverse internal-gear an even chance.

True, the reverse blocker-piston will let the transmission be shifted into reverse position up to speeds of about 5-mph if it's working perfectly. But that's

a big "if" considering the chance that you could crack the gear or shear it off at the undercut portion of the cone.

So be smart: To engage reverse (R) in either High or Low Range, first come to a complete stop.

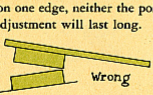
First things first

If you're sluffing over your PM, better keep one eye over your shoulder. Some posts (where there's enough help) are sending out inspectors to look over vehicles scheduled to go to Ordnance for higher-echelon maintenance, to see that 1st and 2nd-echelon work is done on them first.

Point adjustment

People who are adjusting and replacing ignition points sometimes forget to check to assure the points are meeting, flat-face to flat-face.

Bend the fixed point-arm to make the faces parallel. If your points are correctly set, but meeting on one edge, neither the point nor the adjustment will last long.



So you best do it right the first time.

24-volt connections

I repeat . . . please keep your electrical connections good and snug. These new systems have some circuits with up to 300-amp capacity and a connection that isn't snug can set up a resistance that dissipates as much heat as a 90-watt soldering iron. This excessive heat can louse up a lot of surrounding cables.

Also, water can wiggle thru a connection that isn't snug and kill electrical units dead.

You can tell when you got resistance at the connectors by feeling the outer shell; they get hot when the system is operating under heavy load. Dirt on pins, loose pins or solder not solid can be the culprit.

Care of safety arms

When you want to work under the bed on the M47 dump truck you remember about the safety arms—but do you also remember to go easy when bringing the body down on them? If you're careless, you can shear the bracket bolts and tear off the safety arms. The early M47's power-down all the way, and running the bed down too far puts the power of the lift mechanism against the stop arms, and something has to give. So be easy, and, if possible, have someone watching to tell you when you are down far enough.

Noisy power-takeoff

Again, on the M47 dump truck, if you hear roaring noises from your power-takeoff when your truck is weaving over rough ground, chances are the floorboard latch is out of position. Loosen the bolts and slide the latch 'til the shift is plumb neutral, then tighten.

M35's air-line and starter cable

Here are two tricks which can save you grief in the M35's:

First, make a little clamp to fasten the main air-line (from the compressor) to the intake manifold. This prevents it from vibrating loose at the compressor.

To prevent the starter cable chafing at the engine mount, take off the starter cable at the starter switch, slip a one-foot length of heater hose over it, and slide the hose down to the rear engine-mount. Then tape it to the cable.

Hand-brake brackets

When, as, and if you are replacing the hand-brake brackets in the M35, remember to look at the old ones. If you have a long bracket on top, you want the short one underneath the cab floor. If your top bracket is the short one, the lower one must be long, or you won't be able to adjust the cable.

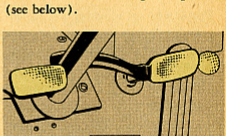
Synchro-mesh transmissions

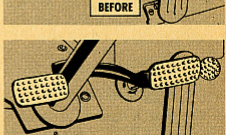
On the new M34 and M35 Reos, that synchro-mesh transmission is a mighty fine thing, and it'll almost shift for itself whether you double-clutch it or not. However, the synchro-mesh brakes last longer if you correctly double-clutch the transmission. Or if you don't care to double-clutch, at least allow enough time for the gears to come up to speed before forcing them in. A gentle, easy shift works best.

And just in passing, this business of blooping the Reo to hear the exhaust roar is strictly for kids, and not very smart kids at that.

Grab a better toe-hold

If the brake and clutch pedals on your favorite transportation have been stomped smooth by your size twelves, they can be made slip-proof again with beads of weld-metal. So one of these days (the sooner the better) when the company welder's boasting about his steady aim, push him in the cab and ask him to decorate your slick pedals like a cake. The pedal surface has to be clean when he starts, and when he's done, grind off all the beads so they'll be as near the same height as possible (see below).





A nimble bead-weld job makes slippery clutch and brake pedals good as new. Same goes for your short-leg extensions, too.

Mr. Inspector, Sir, Here's An Answer To That Ever Aggravatin' Question

HOW TIGHT IS TIGHT

Everybody knows and nobody knows how to get each bolt just right.

There's big bolts, little bolts, fat bolts, lean bolts, gray bolts, black bolts, short bolts, long bolts, and they tie the equipment together as far as the eye can see.

And there's big men, little men, tall men, short men, stout men, and lean men, with all different kinds of muscles, tying and untying equipment as far as the eye can see.

What's more they've got all kinds of wrenches and ideas about what to use on which, and how and when and where.

Well, it's all according.

It's according to so many different things and situations that it's no wonder so many bolts fall out from too-looseness, and so many others snap their fool heads off from too-tightness.

In any of these cases, it means tons and acres of that World's Best Equipment spreading itself over the countryside in the world's worst shape, not only not fit to fight. Not even fit to go out on an I&I patrol, and boy, that's bad.

It's got to be made good.

So gather close and tune-in your hearing aid on this story all about bolts. It's your new standard muscle-and-steel dictionary for all occasions. It's the nuts.

WHEN IS A GIG A GAG

If you're the man most likely to succeed in the military, you'll want to have all things right and in the right places at the right time. This includes chassis fastenings at inspection time.

But t'ain't easy.

Long as there are as many standards of tightness as there are differences in people, tools, time, and materials, there's going to be

confusion and frustration. To say the least.

A lot of letters come a'wailing to PS that no matter how tight or how loose things are around the outfit, the inspection rating as often as not depends on how the inspector's torque wrench was feeling this morning.

One gentleman went through a unit so fast and reckless that he gigged when he oughta gagged. A highly unconstructive proceeding, which does very little to educate the hard working maintenance man in the direction of a standard requirement.

But like PS always says, it behooves people in canvas houses not to throw incendiary remarks at each other. So onward and upward and let's pin down the differences between such things as tight, very tight, real tight, extra tight, X-many-foot-pounds tight, and itty-bitty tight.

Let us now seek us a standard. How Tight Is Tight?

SNUG'S THE WORD

Take body bolts first because they seem to give the most trouble. Tight today, loose tomorrow. With lockwashers, without lockwashers; with flatwashers, without flatwashers; with extra nuts, without any nuts; Permatexed, spermatexed, castellated, lubricated, blest, pressed, swedged, and sledged—same thing. Tight t'day loose t'morra. Why?

Well, those bolts stretch, that's why. And you can't keep 'em tight even if you weld 'em tight. Whaddya think of that.

You cozy your perambulator over assorted hills, dales, and gravel pits until its back molecules are chattering and pretty soon it begins to come apart at every beam and seam. It's just natural.

Only thing you can do is keep snuggin' up those body bolts fast as they stretch loose until one day you snug all the stretch out of 'em and then you replace them. So snug 'em—not tight, or very tight—only snug. They're gonna stretch anyway, so why stretch all the life out of them before they've had a chance.

And there's your **standard** for body bolts. Snug.

The only two kinds of tightness

you'll find very practical under most field conditions will be called "snug" or "tight," and as you read on and leaf through the color pictures up ahead you'll get all the proof you need right in the palm of your hand.

WHEN TIGHT IS LOOSE

Another kind of tight is called loose, or if you like the word "comfortable," use that. It usually applies to items you want only to be well-seated and not really tight by any wrench-and-muscle standard of tightness.

Like with sparkplugs. All you want with sparkplugs is a good squeeze onto the copper-asbestos gasket. You get all the squeeze you need with a half-turn of a socket after the plug's mated hand-tight against the gasket. Not a Half-Nelson or even a Quarter-Nelson. Just comfortable.

Same's true of brass and copper fittings. They get seated, too. Any more than seated may split a flare, crack a nut, or foul up a ferrule and leave you with leaky joints. There's no reason for these soft fittings to be tight anyhow—a good seal is all you want, and just being seated does the sealing.

Your new aluminum electric-connectors also call for the light treatment. They're soft, too, and easily squashed. Use the spanner that's made to fit the serrations and make it easy on yourself. The spanner's leverage is all it takes to make a waterproof seal. Muscular strength is wasted and likely to distort the connector seat so it won't seal. Then where are you?

The squeeze is still lighter for metal-to-rubber connections. Like the oil filter on some of your new equipment, where the filter body bolts to the base with a neoprene seal in-between. All it takes to stop oil leaks is a snug dent in the neoprene like you press into the faucet washer when you shut off the tap.

So there's your third standard of tightness. It's such a loose tight that you don't even have a way to measure it. So let's call it **seated.** The feel of this metal-to-rubber tightness can be perfected with practice. (But confidentially, this kind of loose-tight is largely a matter of using one's head more than one's hand.)

CYLINDER-HEAD TIGHT

In case you're beginning to get the idea that this business of bolt tightening is largely a matter of **adjusting** and not really tightening at all, then you're beginning to get hold of what it's all about.

You're dealing with degrees of tightness that are different from each other according to how much is needed to do a job. Most important is to stop short of too much squeeze so you don't bugger the thing before you get to use it.

With cylinder heads and other metal-to-metal fastenings where performance depends on things staying the way they're put—then you can really turn on the spinach.

A good guide on what should get super-tight treatment (other than where you've got **musts** on torque limits) is any metal-to-metal fastening where there's no weave or twist, and most of the vibration is cushioned.

WHAT ABOUT TORQUE WRENCHES?

And on the subject of torque wrenches, there's a good reason they're being ignored here as a means of getting things field-fixed. Torque wrenches and torque readings are fine in their places, but most of the places you deal with aren't the right places.

To be of practical use, torque wrenches depend on controlled conditions and load specs written for known factors. Threads must be clean and free of burrs. They must be either dry or oiled depending on which way the specs were set up. The dial has to be read during a steady pull like when a nut or bolt is being tightened from scratch. The reading when you readjust a tight nut or bolt usually has no relation to the listed spec for that same fitting when it's first installed. This is because it takes extra effort to break loose a nut or bolt that has set awhile.

There are many other factors that make the torque wrench of little use to you, except when you're assembling new or rebuilt units with new nuts, new bolts, or freshly threaded and chased fittings.

Then if you can't depend on an automatic device with known tensions, what can you depend on? How can you tell when adjustments are the way they should be?

Son, the answer's right in the palm of your hand where you can feel it, even if you can't describe it. With a little practice your "feel" will be better than the finest torque wrench under most of the practical working conditions in the so-called "field."

Not only can you feel that tightness, but you can see it. You can see it in terms of length, because it can be measured. When a bolt is tightened properly—when it's tight enough to hold the maximum load it was made to hold—it will be stretched.

This stretch makes it tight by forcing the threads of the bolt against the threads of the nut, and the pressure of thread against thread creates enough friction between the threads to hold the connection tight.

While a bolt is being tightened it's pulling the bolt-head and the nut against the metal being connected—but at the same time the metal is pushing the bolt-head and the nut away. The bolt will not be tight until the pull is equal to the push. And only when the bolt is stretched is the pull on the bolt-head and the pull on the nut strong enough to fight the push from the metal being connected.

The way to be sure of the bolt's tightness is to measure its stretch,

which is measured in relation to the length of the bolt's stretch area, no matter what the diameter.

A bolt that is 1″ long and ¾″ thick will have a greater duty to perform—a heavier load to carry—than a bolt 1″ long and only ¼″ thick. But the thinner bolt will have to be stretched just as much to perform its smaller duty, as the thicker bolt to perform its greater duty.

Like the elastic band in your pajama pants. It doesn't matter if the band is ½″ wide or 3″ wide—it still has to be stretched around the same tub of blubber to hold snug.

The diagram in Fig. 1 shows the elastic stretch range of a bolt in relation to the length of its stretch area. The stretch is called "elastic" because when the bolt is released from the connection, after having been tightened and stretched, it will return to its original length. Take those pajama pants again—they unstretched after you took them off, didn't they?

For each inch of stretch-area length, a properly tightened bolt will stretch three-thousandths (.003) of an inch. Thus, a 3″ bolt with 2″ of stretch-area length will be .006″ longer when tight—a 6″ bolt with a stretch-area of 5″ will be .015″ longer. This .003″ of stretch for each inch of stretch-area length is the ideal amount. The stretch, however, can range anywhere from .002″ to .004″ for each inch of stretch-area length and still be elastic.

A little beyond .004″, a small amount of the stretch will become

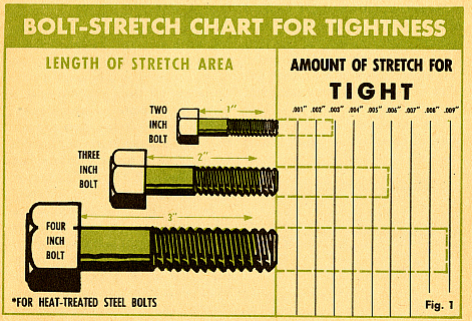


Fig. 1

permanent. For example: the same pajama pants, around your wasp waist, weren't stretched too much—but if a 250-pounder wore the same pants they would be stretched beyond their elastic limit and wouldn't measure the same at the waist when he took them off. Some of the stretch would remain permanent and the pants would measure larger when unstretched.

This permanent stretch naturally weakens the bolt just as it would weaken the elastic band in the pants. And something else that weakens the bolt when it's stretched too tight, is the elastic quality of the metal in the plates—or whatever's being connected. While the bolt is stretching beyond its elastic limit, the metal is being squeezed too much (see Fig. 2).

Since the plates do have an elastic quality—the bolt is under continuous strain from the push in the squeezed plates. Darn soon that overstretched bolt will get plain tired of the whole thing and give up.

The squeezing isn't doing the plates any good either—they'll keep some of the disfiguration after they're released from the connection. Wouldn't that 250-pounder have a bright red dent in his belly from the too-tight pants? And while a dent around his middle would disappear after a while—a dent in the metal wouldn't disappear because it hasn't that living quality. So at the same time you're getting a permanent stretch in the bolt, you're distorting the plates.

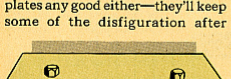


Fig. 2—This is a picture of too tight. It's what you need to stop just short of.

If you aren't careful when you use a torque wrench, you get this same condition of too much tightness. Unless you apply a steady pull on a torque wrench—you don't get a correct reading. A jerk on the wrench won't register correctly on the indicator, and by the time you get the reading up to where you want—you've got the bolt too tight.

Now, measuring the length of a bolt for proper tightness is all well and good if you've got a micrometer and a bolt installation that lets you measure those thousandths of an inch—if you haven't, you're no better off than you are with a torque wrench and no torque specifications. You know darned well that torque wrench in your hand is no good when you're staring a bolt in the face and all the TM says is, "insert bolt and tighten securely."

So this time you haven't a micrometer either—there you are again—how tight is tight? Tight is when you can feel the bolt stretching. It's a signal as positive as the blast of reveille. And somewhere—there's bound to be one in every

outfit—is a man who knows how. A man who can feel, for all his brute strength, that little signal running through the bolt, through the wrench, and up into his hands—telling him the bolt has been tightened just exactly right.

Are you that man? If you aren't—you can be. Practice is what does it—and here's how:

Keep these couple of things in your head as you work this stuff into your hands:

1. It's important always to have the right nut-and-bolt combination for the job.

2. When you measure stretch from end to end, remember there's no stretch in the bolt head, under the nut, or in any excess of bolt sticking out past the nut. Figure the stretch for the inches of bolt between the head and the nut.

Borrow a micrometer somewhere to do the measuring. Any old pieces of scrap iron into which you can insert a bolt will do for the connection. The nut and bolt, though, must be good, hard, heat-treated steel, which is standard equipment for critical assemblies.

A few things to check before beginning practice: the nut and bolt threads should be in good condition—clean and lubricated. This lubrication, if overlooked, is another thing that makes tightening with a torque wrench unreliable.

If you're depending on the bolt stretch for tightness—thread friction doesn't count. The only reason for lubing the threads in this case is to make the job easier and to keep the nut and bolt in good condition.

To get a true reading on the micrometer when you're measuring the bolt length, it's a good idea to polish both ends of the bolt with emery cloth or paper, and get the surfaces smooth. Maybe rough surfaces will throw the reading off only a few thousands of an inch, but that's enough to snafu the whole deal.

Another thing that will take the joy out of feeling—is interfering motion of the vise itself, or of the connection in the vise. Fasten the connection for all you're worth and don't let the vise wiggle on the bench.

Now to begin operations. Measure the length of the bolt as shown in Fig. 3—write down the measurement if you can't keep it in your head. Bolt it up like you always do—insert the bolt, add the nut and tighten it finger tight. Then measure the plates or metal you're bolting, between the bolt head and the nut—this is the length of the bolt's stretch area.

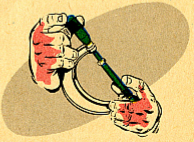


Fig. 3—Feel makes a difference too, when you take a mike reading. Not tight, not loose, it's what you'd call a "rub" fit.

Now use the wrench. The length of leverage used is up to you. You want to be sensitive to the tightness of that bolt, so the wrench length should be in proportion to your strength. If 220 lbs. of GI is playing with the wrench, he won't need as much leverage as a 110-pounder would. Just practice a while—you'll find the right leverage.

At a certain point of tightness, you should be able to recognize the secureness of the bolt. Maybe this is the point at which you think the bolt is tight—or at which you used to think the bolt was tight. But this is just about where the stretching will begin (according to the chart shown in Fig. 1) and although the bolt is not properly tight—it is by no means loose.

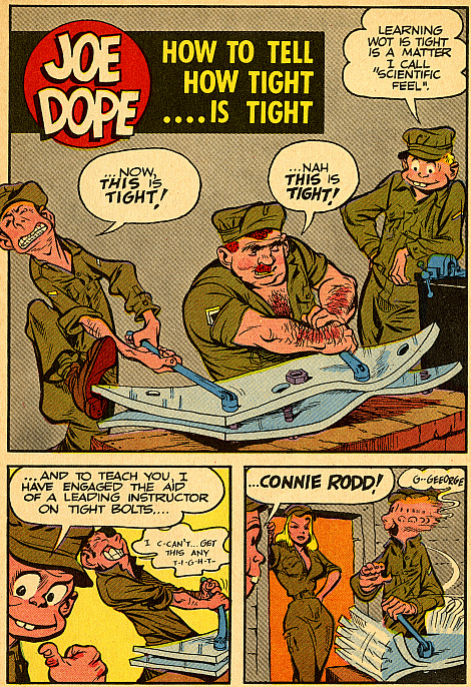
A bit more pull and you should feel it—you should feel the stretch. It's like an inward pull from the bolt—like a tug of resistance—it's as though the bolt were trying to push the wrench back where it came from. When this happens, that bolt has just exactly the right amount of tightness.

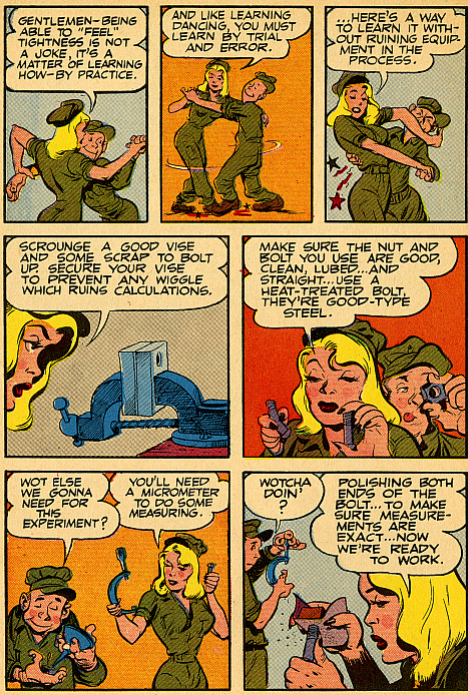
Pick up the micrometer and measure the bolt again. If you had the right feeling, the bolt will be between .002" and .004" longer, per each inch of stretch-area length, than it was when you started. If it isn't, you haven't got the right feeling yet—try again. And keep trying until you have developed the feel for tightness.

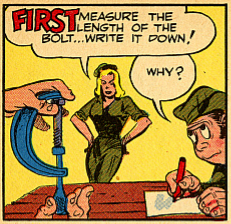
While you're in the practicing stage—remember that if the bolt is tightened too much, you'll go past its elastic limit and the bolt will retain a small amount of permanent stretch after it's released from the connection. The bolt has only so much elasticity—and each time it's permanently stretched, that elasticity gets used up a little more. When this happens, it becomes harder to stretch.

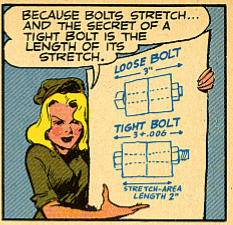
If this permanent stretch in the bolt is added to each time you over-shoot the right amount of tightness, the elasticity is getting less and less. You will feel the same stretch at maybe .002" per each inch of stretch-area length, that you felt at .003" before the bolt was permanently stretched. You can get the feel of both by trying the stunt first with a new bolt, then with an old, overworked one. It doesn't matter, though, when you feel it as long as you feel it—and as long as what you feel is proper tightness—the same feel of stretch.

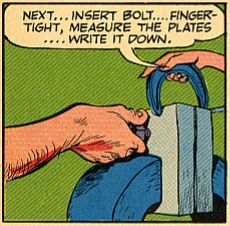
You can show someone else the tricks of the trade when you know how—and until you know how—someone who does know can show you. The important thing is that there is an answer to, "How tight is tight?" and now you know it—you know that any tanks or half-tracks or trucks you work on aren't going to stop dead and crumble in the middle because a few nuts and bolts are on the loose.

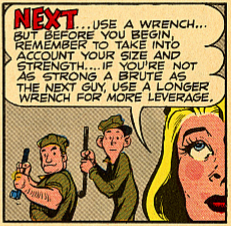

JOE DOPE
HOW TO TELL HOW TIGHT ....IS TIGHT
LEARNING WOT IS TIGHT IS A MATTER I CALL "SCIENTIFIC FEEL".
...NOW, THIS IS TIGHT!
...NAH THIS IS TIGHT!
...AND TO TEACH YOU, I HAVE ENGAGED THE AID OF A LEADING INSTRUCTOR ON TIGHT BOLTS,...
I C-CAN'T...GET THIS ANY T-I-G-H-T-
...CONNIE RODD!
G-GEEORGE

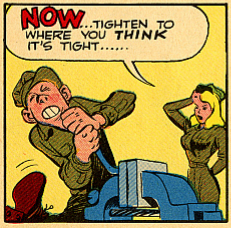

GENTLEMEN-BEING ABLE TO "FEEL" TIGHTNESS IS NOT A JOKE, IT'S A MATTER OF LEARNING HOW-BY PRACTICE.
AND LIKE LEARNING DANCING, YOU MUST LEARN BY TRIAL AND ERROR.
...HERE'S A WAY TO LEARN IT WITHOUT RUINING EQUIPMENT IN THE PROCESS.
SCROUNGE A GOOD VISE AND SOME SCRAP TO BOLT UP. SECURE YOUR VISE TO PREVENT ANY WIGGLE WHICH RUINS CALCULATIONS.
MAKE SURE THE NUT AND BOLT YOU USE ARE GOOD, CLEAN, LUBED...AND STRAIGHT... USE A HEAT-TREATED BOLT, THEY'RE GOOD-TYPE STEEL.
WOT ELSE WE GONNA NEED FOR THIS EXPERIMENT?
YOU'LL NEED A MICROMETER TO DO SOME MEASURING.
WOTCHA DOIN' ?
POLISHING BOTH ENDS OF THE BOLT...TO MAKE SURE MEASUREMENTS ARE EXACT...NOW WE'RE READY TO WORK.

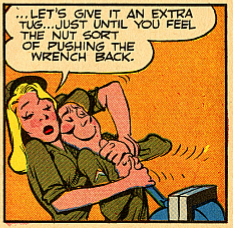

FIRST MEASURE THE LENGTH OF THE BOLT...WRITE IT DOWN!
WHY?

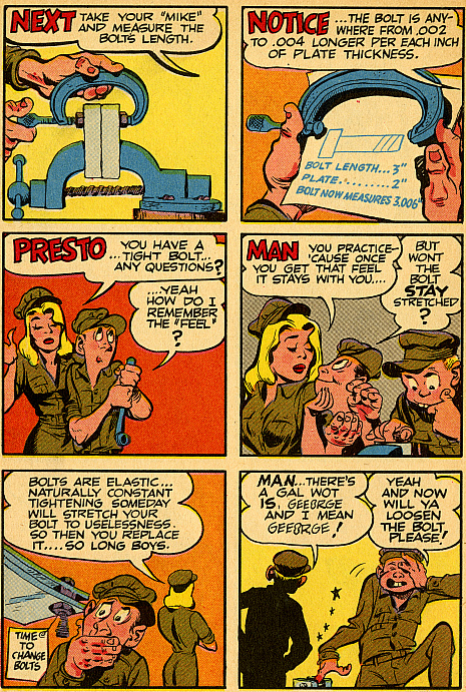

BECAUSE BOLTS STRETCH... AND THE SECRET OF A TIGHT BOLT IS THE LENGTH OF ITS STRETCH.
LOOSE BOLT 3"
TIGHT BOLT 3"+.006
STRETCH-AREA LENGTH 2"


NEXT,..INSERT BOLT....FINGER-TIGHT, MEASURE THE PLATES ....WRITE IT DOWN.


NEXT...USE A WRENCH... BUT BEFORE YOU BEGIN, REMEMBER TO TAKE INTO ACCOUNT YOUR SIZE AND STRENGTH... IF YOU'RE NOT AS STRONG A BRUTE AS THE NEXT GUY, USE A LONGER WRENCH FOR MORE LEVERAGE.


NOW...TIGHTEN TO WHERE YOU THINK IT'S TIGHT.....


...LET'S GIVE IT AN EXTRA TUG...JUST UNTIL YOU FEEL THE NUT SORT OF PUSHING THE WRENCH BACK.


NEXT TAKE YOUR "MIKE" AND MEASURE THE BOLTS LENGTH.
NOTICE ...THE BOLT IS ANY-WHERE FROM .002 TO .004 LONGER PER EACH INCH OF PLATE THICKNESS.
BOLT LENGTH... 3"
PLATE..... 2"
BOLT NOW MEASURES 3.006"
PRESTO YOU HAVE A ...TIGHT BOLT... ANY QUESTIONS?
...YEAH HOW DO I REMEMBER THE "FEEL" ?
MAN YOU PRACTICE-'CAUSE ONCE YOU GET THAT FEEL IT STAYS WITH YOU....
BUT WONT THE BOLT STAY STRETCHED ?
BOLTS ARE ELASTIC... NATURALLY CONSTANT TIGHTENING SOMEDAY WILL STRETCH YOUR BOLT TO USELESSNESS. SO THEN YOU REPLACE IT....SO LONG BOYS.
TIME TO CHANGE BOLTS
MAN...THERE'S A GAL WOT IS, GEEORGE AND I MEAN GEEORGE!
YEAH AND NOW WILL YA LOOSEN THE BOLT PLEASE!

TIGHTEN

CYLINDER HEADS
WHEEL STUDS
SPRING BOLTS
FRAME-BRACKET BOLTS
MANIFOLD STUDS
ENGINE-BLOCK BOLTS
CRANKSHAFT-BEARING BOLTS
CRANKSHAFT-BEARING NUTS
GROUSER BOLTS
CHASSIS BOLTS

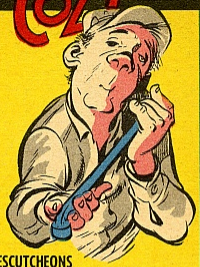
SNUG

WOOD BODY BOLTS
METAL BODY BOLTS
HOSE CLAMPS
OIL-FILTER-TOP COVERS
PETCOCKS
BOLTS INTO WHITE METAL
WINDSHIELD CLAMPS
DIFFERENTIAL-COVER BOLTS
COPPER NUTS
SPRING CLIPS
OIL DRAIN-PLUGS
CRANKCASE OIL-PAN SCREWS

SEAT

GAS-LINE FITTINGS
AIR-LINE FITTINGS
OIL-LINE FITTINGS
ZERK FITTINGS
GAS CAPS
RADIATOR CAPS
CLEVIS BOLTS
CAST-IRON PIPE FITTINGS
SPARK PLUGS
SOFT SEALS
ENGINE VALVE-COVER BOLTS
ENGINE MOUNTING-BOLTS
HEADLIGHT-LENS-RETAINING-RING SCREW
24-VOLT ELECTRICAL CONNECTORS

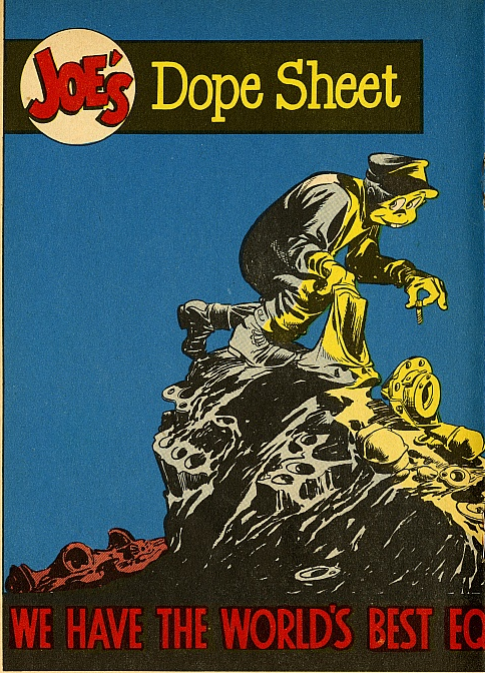
COZY



ESCUTCHEONS
TRIM PANELS
HUB COVERS
AIR-CLEANER-TOP COVERS
M34-SERIES WATER-PUMP SET-SCREW

NOTE: PS hopes this article will in no way be interpreted to discredit torque wrenches, which are unquestionably fine in their place, or that readers will fail to use torque wrenches whenever possible to measure the spinach on critical assemblies like cylinder heads.

IF YOU HAVEN'T READ THE ARTICLE YET, GET ON BACK AND STRUGGLE THROUGH IT, SON!



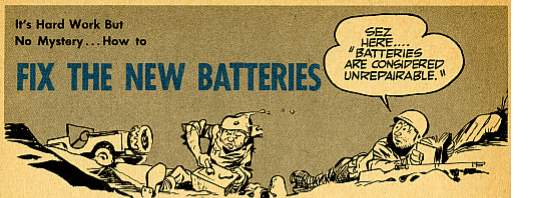
Dig that real gone "cannibal" Joe
Just adds to his own pile of woe
For stock-level neglecting
He's out there selecting
Parts common in the moon's
mellow glow.

UIPMENT.. Take care of it

IONS

It's Hard Work But
No Mystery . . . How to

FIX THE NEW BATTERIES



As you know, the new batteries, 6TN and 2HN, are officially unrepairable. The reason for this is said to be a matter of providing greater support for the plate bridges by way of the hard thermosetting plastic you find under the soft sealer on the top of the cells.

It's made that way to give a stronger grip on the cell caps, which in turn hold the plate bridges that control the position of the plates. OK, so the battery must be turned in if and when it goes dead in one cell, or whenever you have a cracked or broken cell cover. But whadda ya do if you can't get replacements?

Well, you **can** fix these batteries, at least enough to take your vehicle off the deadline, and mebbe you can use it long enough for a new battery to arrive. One thing to remember, however: A repaired battery is no longer waterproofed. It may get fouled up in deep fording.

It is a lot more work to fix one of these batteries than it is to fix the old kind, but you go about it the same way, up to a point. Let's look at the 6TN first. Assume you have a couple of 6TN's with one or more dead cells in each one, and you want to get a good battery out of the pair. Before you start, of course, you'll want to drain and store the electrolyte, and flush the batteries a couple of times with clear tap water.

First, take the soft sealer off the top. This is the same soft sealer used on the old-type batteries, and you can save it and remelt it just like before. Removing this sealer will uncover the cell connectors and the cell covers. You drill out the cell connectors, or cut them, same as any battery repair. The difference comes when you try to lift off the cell covers.

There is an additional sealer between the cell and its cover, and because you can't melt or dissolve it, it must be cut out. You can cut it with a piece of broken hacksaw blade, a small metal saw blade in an electric drill, rotary files in the drill, or with one of the "Handy Tools" if you happen to have one around. Under extreme field conditions, a chisel, old bayonet, or other knife edge can be used, but be careful not to break the cell or the cover. Any way you go about it, this is sure to be a long, hard job, but if ya gotta, ya gotta.

With the cell cover cut loose from the cell, you pull the plates the same as with

USE AN OLD SAW BLADE FOR DIGGIN' OUT THE *@#*!!

There's no battery like a new battery—but when you gotta go you gotta go...only place y'can't go is in deep water . . .

any battery repair, and replace the bad plate assembly with a good one from the other battery. Burning the new connectors into place is also the same as any battery-repair job; improvise if you haven't got the tools. (A pretty good connector mold can be built up from a bit of sheet metal and some stiff clay.) It's when you try to reseal the cell cover that your job will fall down.

Since you have no thermosetting plastic, you seal the cover as best you can with the sealer you took off the top of the batteries. This'll seal fine as far as leakage is concerned, but won't give strong support like the other does. So while your battery will work OK for awhile, it's more likely to short out from bouncing plates under rough driving.

As for the 2HN batteries, you will find that one type works the same as the 6TN—but the second type has a one piece cover; and frankly, only rates fixing s a last resort. You're more than likely to break the cover getting it off, and if you don't, it'll surely be a problem getting it back on. However, if you must, you must, so work around the edges as carefully as you can and get the lid off (remove the cell caps first). To reassemble after repair, you'll have to lay in your hot compound and press the lid down quick like.

Mind you, both these ideas are only last ditch field expedients. And confidentially, Bud, it takes a man to do these tricks—a man who really knows his way around batteries.

Now, as for 6TN's that run themselves down for no reason that can be traced to shorts or other causes, it's a different matter. Seems electrolyte sometimes seeps under the gunk, and makes bubbles in the gunk when the seepage gets real bad. This, in turn, forms current paths that let the battery discharge itself under the sealer.

Such trouble you can fix fairly easy, because it doesn't take a lot of cutting or an expert to do it. Remove the soft outer sealer, clean the cell-top sealer real good and dry it, then reseal with new sealer, because what you scraped off is probably soaked with electrolyte. That's all.

A good book to read, if you want to know more about what you're doing with batteries, is Storage Batteries Lead-Acid Type TM 9-2857 (15 May 1945).

BE BRIGHT

WITH YOUR LIGHTS

THE people you meet when you're driving at night break down into two groups: them what know how to use their lights and them what do not. The smart boys get along better and can also take pride in being good drivers. Nobody loves the dopes.

The main reason you have a dimmer switch is to lower your lights when meeting a car. Both the law and good sense demand that you do this. And if you're smart, you'll go dim as soon as you can and not run up real close before switching. A neat trick when meeting someone over the brow of a hill is to drop your lights just before you break over. If he does the same, neither of you has to look at any brights. And while it's all right and sometimes necessary to flick your lights a few times to get the other guy to dim his, only a fool yields to the temptation to "Give him the brights" if he doesn't dim for you. Blinding lights make a driver instinctively pull to the left, away from the shoulder or guard rail. This can make your insurance due and payable even though you had the right of it. Then, too, some trucks traveling busy roads have their dims set pretty high and don't use brights at all. If you pick a light-fight with one of these, his brights will knock you right out of your cab. So discuss his ancestors and morals if you gotta, but leave your lights down.

By the way, if your dim lights should happen to burn out or your dimmer switch go bad so you can't dim your lights, turn them off for just a second when meeting others, then they'll know you're in trouble and won't throw their brights at you.

The next most common use of the dimmer switch is when passing a vehicle going your way. Nearly everybody does this, but most of them do it wrong. First of all, when you approach another vehicle from the rear, dim your lights as you come up. This is to take your brights out of his mirror. When you are ready to go around, flip them up and right back down again. The other guy should flip his down and up again to let you know that he knows you are coming around.

As you go around, you keep your lights down until you are abreast of

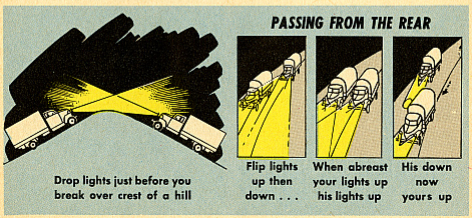
his cab, and then kick them up to see the road ahead. If the guy you are passing is on the ball, he will flip his lights down the second you are far enough ahead to cut back in. This tells you to come over and at the same time takes his brights out of your mirror. It is customary for you to blink your marker lights a couple of times to say "Thanks" as you go on.

Of course when some one is passing you, you play it the same way for his benefit. Also, if someone is hanging close behind you waiting for a chance to pass, it is nice to look over the top of the hill and if the road ahead is clear, flick your markers to tell him to come on around.

Another use of the lights which marks a good driver is the flashing of marker lights (or all your lights if the markers are not on a separate switch) whenever you are about to stop. Remember that your stop light goes on only when you **are** stopping—and you should warn following traffic of your intentions **before** you hit your brakes. For instance, if you come around a turn or over a hill and see a red traffic light ahead, flashing your lights will give the guys behind a chance to slow up so that maybe they can hit the crossing on the green without stopping a heavy load. Or when turning off a highway or even just pulling over for a nap, the flash of your lights will warn the other guy of your intentions. (And if you have one of the ZI vehicles equipped with turn signals, remember to signal not only your turns at corners, but also your intended changes from lane to lane on the highway.)

Another good highway stunt to remember is that if a vehicle facing you or parked beside the road flashes its lights rapidly when you approach, it means he wants you to stop. Do it. He may be asking for help, or he may want to tell you of a bridge out or a spot of high water or other obstruction ahead. A swinging flashlight means the same thing. Of course if you know there is ice or high water in the vicinity, you'll be watching for signals anyhow.

And speaking of stop signals, the

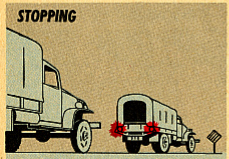


prime stop signal of them all is the red fusee or "Stick Flare." Never over-run a red flare; they always mean trouble of some kind. Approach them under good control, prepared to stop. If your assistance isn't needed, somebody'll flag you around. Since the flares are used by Highway Patrolmen as well as others, running by one may get you thirty days in the jug—or if the flare is marking a hole in the road, it may get you thirty days in the hospital. Either way there's no profit in it.

One thing more: Flashing your lights off and on is generally used to tell another man that he is running with his lights off. This frequently occurs when a man returns to his parked car in a brightly-lighted street or parking lot. Since he can see perfectly, he may forget to turn on his lights. The same signal is used to tell a person he is running in daylight with his lights on. So any time a man blinks his headlights at you several times, check the position of your light switch. If that tells you nothing, look at your lights the next time you stop. He may have been trying to tell you that one side was burned out.

And a word about running with your headlights on in daylight. In the present acute shortage of 24-volt bulbs, there is no justification in burning your lights in the daylight, even in convoy. Of course if you are ordered to do so, you must, but unless you have specific orders to use your lights, keep 'em off in daylight hours. The old notion about running your lights on a long trip to prevent overcharging your battery went out when the regulated generator came in—back in 1939. If, by someone's order, you are using your lights in the daytime, when an oncoming driver flicks his lights to tell you that yours are on, it is nice to turn yours off and on again to let him know you saw and appreciated his signal.

So much for the etiquette of headlights. Knowing what to do, and doing it, will earn you the respect of other good drivers wherever you go. Not knowing, or not practicing what you know, makes you not very bright —with or without lights.



Blink marker lights to signal intentions before braking for a stop or pulling truck off highway.

Swinging flashlight, blinking vehicle, red flare, may ask help — or could be warning for you.

WINCH CABLE CARE

Dear Half-Mast,

All the LO's and TM's (for vehicles with winches) I've checked say to clean and oil winch cables with OE or used crankcase oil. I think OE is OK for the job, but as for "used crankcase oil"—can you really trust it to clean and protect wire rope?

WOJG E. M. V.

Dear WOJG E. M. V.,

You're right, sir—when it comes to the winch cable, used crankcase oil is a poor preservative. As an expedient—well, it's better than nothing. But even as a cleaner its scouring qualities are questionable.

It's best by far to use unadulterated OE to clean and oil the cables, as new directives will tell you.

As you know, pertinent LO's and TM's give clear and simple instructions on how to care for winch cables—after each operation, and at the weekly, monthly, and semi-annual inspection sessions. Follow those instructions as per usual, **except** where the call is for cleaning and oiling the cable—then it's better to draw some trustworthy OE for the job.

Half-Mast

VALVE ADJUSTMENT

Dear Half-Mast,

In school I was taught that adjusting valves properly was very important. I understood the adjustment of the valves of a 2½-ton, 6x6, GMC (CCKW) was set at 0.012" Intake, and 0.016" Exhaust. Well, I have seen some mechanics set them at 0.012" straight through. The other day while looking for the engine number of a vehicle assigned to us, I noticed the valve adjustment on the valve cover read "0.012" Intake, 0.020" Exhaust." What I would like to know is: what authority do mechanics have to change those adjustments?

Cpl J. J.

Dear Cpl J. J.,

Glad to hear from you again, Corporal. Your question on the valve clearances for the 2½-ton GMC engines puzzled me for quite awhile. But

after poking about in the TM's, I think we've got the answer. True, TM 9-801 calls for valve settings of 0.012" intake, and 0.016" exhaust. However, there is a pamphlet entitled Change No. 1 (12 Sept 50) which says, "(1) Valve stem. With engine hot and idling, insert feeler gage (0.012" for intake and 0.016" or 0.020" for exhaust) between rocker arm and valve stem at each valve. Adjust exhaust-valve clearance to 0.016" on engines having the early type camshaft installed. Adjust . . . to 0.020" on engines having the late-type camshaft installed. The late-type camshaft can be identified by the GM Part No. 2191529 stamped on the shaft between Number One intake and Number Two exhaust cam, and by the dark colored cams in contrast to the highly polished cams of the early-type shaft.

"Note: *If there is any doubt as to whether the camshaft in an engine is of the late type, adjust exhaust-valve clearance to 0.020 inch."*

There it is. And I have no doubt that the cover you found stamped for twenty-thousandths exhaust clearance came from a late-type-camshaft engine. As to the boys who swear by the twelve and twelve setting, chances are they got their schooling on the Cab-Over-Engine model, which calls for that setting.

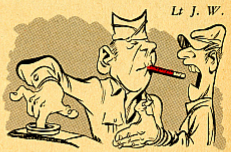
Half-Mast

TESTING ANTIFREEZE

Dear Half-Mast,

I've always read that you need a warm engine to test the strength of antifreeze. Tell me if I'm right, because we're forever getting gigged by technical inspectors who insist on testing the stuff when the engine's cold. Naturally it shows up weak.

Lt J. W.



Dear Lt J. W.,

If the hydrometer is calibrated for a warm solution, naturally the antifreeze should be tested when the engine's warm. Many hydrometers are charted for both cold and warm solutions, however, and it's just a matter of reading in the right place on the chart. Now, tell the inspector. (Also see p. 513)

Half-Mast

TOO MUCH OIL

Dear Half-Mast,

Why is too much oil in the crankcase just as bad as not enough? And why do some engines use about a pint of oil and then seem to stay at that level?

MSgt T. A. B.

Dear MSgt T. A. B.,

The best reason for sticking to the prescribed oil-levels is that there's no added benefits from being overly generous with the oil. Any more than the

LO's call for is just wasted and can encourage engine trouble—the extent of the trouble depends on how much is "too much" oil, and on the type of vehicle.

To begin with, the crankcase needs a certain amount of breathing space, which it won't have if it's too full. Too much oil creates an over-concentration of oil mist that crowds things up in the crankcase. The crankcase vent-system takes care of as much of the excess oil as it can, but it still hasn't done anybody any good. The excess oil has another route of escape—it can get sucked past the intake valves and rings where it'll end up as carbon.

Some engines will stop using oil after the dipstick shows that the oil's gone down about one pint because the crankcase got too much oil to begin with. Once it throws off the over-load, by fair means or foul, the crankcase'll hold on to what it's made to handle.

On the other hand, if you short-change the crankcase, the oil's in for over-heating, over-working, sludging, and breaking-down long before its time.

That answer your questions?

Half-Mast

DIRECTIVES UNDER REVISION

Dear Half-Mast,

I was lucky enough today to pick up a copy of PS #7 and I have a few questions—but no one around here seems to have the answers.

This is a Signal Base Maintenance Co and we use some Ordnance tools that we can't get parts for. For instance, there's a Sander, electric hand-belt type, Stock No. 40-S-21—how are we supposed to get belts for it?

ORD 3 SNL J-17 is also mentioned in PS #7—how do you go about getting one? The AG Pubs section here says it's out of publication.

SFC E. F. D.

Dear SFC E. F. D.,

Your AG Pubs man is right—ORD 3 SNL J-17 is out of distribution right now. It's being revised . . . it's still in effect but they don't print or distribute directives after they're scheduled for revision.

This seems to be your problem on the belts for the sanders, too. Service parts for tools are ordered from ORD 7 SNL J-612—it's still in effect but being revised, and the only people who have access to it are those who're lucky enough to have a copy on hand. I found one, and here's your info:

Grade 2/0, #100 grit;
Stock No. 40-B-129-237
Grade 1/2, #60 grit;
Stock No. 40-B-129-241
Grade (1), #50 grit;
Stock No. 40-B-129-243

These are the only belts listed for your sander and they're all the same size, 3" wide by 23¾" long. The difference seems to be in the type or grade of abrasive.

Couldn't you manage to locate someone who has copies of these SNL's you need? Could be some time till the revised copies get to you

Half-Mast

All Training Is For Combat

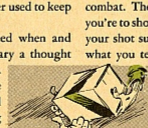
New ZI Ammo Supply Stresses Simplicity, Speed

UNTIL a few weeks ago the Army had two different ways of passing you the ammunition, depending on whether you are in training or in the combat zone.

Now it makes nary difference.

If you're in training, now you'll just do like you'd do if you were the most farthest forward of front-line fighting units, surrounded on all five sides, huddled in fox burrows with water up to your perimeter, and wearing two weeks whiskers because your moustache cup is better used to keep your head in.

You'll get what you need when and where you need it with nary a thought to paperwork in the getting. That's all behind you where there's more time, tools, and as the saying goes, training and tactical situation. There'll be more training now, and less time and tools. Writing tools, that is.



About the most you'll see of ammo-supply paperwork from now on is the paper the stuff's wrapped in. And that's only because you'll find it as smart as it ever was, to read on the carton to see if the name of the bullet's the same as the name of the shooter.

It's always so discouraging when you go to load your crossbow, to reach in the box and pull out B-B's.

But getting back to the paperwork, that's getting back to where it belongs in combat. The echelon that decides what you're to shoot, will now see that you have your shot supply refilled today based on what you tell 'em you let fly yesterday. That's all you have to do is tell 'em.

Eighteen-hundred hours this afternoon you count bulletheads and whisper your calculation to the least common denominator back at the dump. Oh-six-hundred later, before you've got

your last leg out of your sleeping bag, here comes a Jeep with fresh loads.

Streamlined? You know it's so.

But it's only the beginning. The army's decided there's no such thing as peacetime for the army. Whatever you learn from now on in—wherever you are—will be just like you were for real.

As fast as the directives can be muddied with grenade dust you'll be finding yourself covered with it from the Washington Monument to Thule Airbase. A lot of them are in the works already.

Tile-floored classrooms and kitchen stoves will soon give way to a shelter-half with central Sterno. You'll just love every minute of it. You'll feel yourself getting bigger and stronger all the time, 'til you're about busting your britches with ability. That great good feeling that you can stand up to whatever's thrown in your way. Even if it's a Marine.

Seriously, and that includes Marine readers too, you'll have every advantage of front-line feel that you'll be so glad you did when you get there.

While you're out fitting logs together to make yourself the kind of bunkers howitzers really have for targets instead of old tank hulls, a coupla jets'll scream down to spatter you with flour puffs. Only you'll find out that you don't hear the scream until you already look like a doughnut ready for dunking.

It's a great day, mates . . . start waking up for it.

Hot Dog! We're bein' shipped into real combat.

HOT SHOTS on the M33

Fire-control equipment manufacturers and instructors list twelve important PM & safety pointers for handlers of the M33:

1. **SAFETY REMINDER**—Before starting to work near the acquisition antenna, flip the outside antenna safety switch to make sure the antenna won't be turned on at full-speed from inside the van.

2. **HANDLING TR TUBES**—Handle these radioactive tubes gently, bury unserviceable ones in a deep hole, or protect against breakage for return to factory.

3. **LEVELING THE VAN**—Before jacking up the van to level it, insure that its wheels are locked so they'll clear the ground to be sure you hold level position.

4. **GENERATOR CABLES**—Cables are seriously damaged by vehicles running over them.

5. **STOP THE M33 IN SEQUENCE**—Shutting off the M33 too fast, and/or not in proper sequence, throws a heavy current thru the relays and can cause power failure.

6. **TESTING UNKNOWN VOLTAGE**—Double-check safety-factor requirements when selecting a scale for voltmeter to test unknown voltage.

7. **PLASTIC KNOBS ON CONTROLS**—Protection from rough handling keeps them intact.

8. **INSTRUMENTS NOT IN USE**—Find a safe, level rest for instrument to avoid accidental breakage.

9. **OIL-FILLED DATA-POT**—Use care in removing the oil-filled data-pot for a cleaner van and equipment.

10. **M33 FUZES**—Prevent shorts—use fuzes that are not oversize.

11. **SCREW-DRIVER ADJUSTMENTS**—Setting M33's screw-driver adjustment is a job for qualified personnel **only.**

12. **CHECK SHORTING-BARS**—Before you start monkeying around your M33 with its cabinet doors open, remember to check the shorting-bars. With the acquisition-track voltage-circuits as high as they are (6,000 volts), you'd best be sure all the circuit condensers have discharged their power. Experience says some of the bars' springs lose their tention, leaving the charge in the condensers. To be sure, first operate the shorting-bars manually with insulated tool or piece of wood.

DRY-LOCKER FOR HUMID CLIMATE

If you're going to be in a humid area for awhile, your unit—especially if it's a garrison outfit—will do itself a lot of good by building a dry-locker. They're swell for keeping optical instruments free from fungi and rust, or at least cut down on the stuff. And if large enough, you can keep your wood stock and most everything else protected in it too.

They're easy to make. Just build a cabinet with air holes at top and bottom and keep a light bulb inside at the base burning all the time. A locker 3′ x 3′ x 7′ could use three 1″ holes drilled about 6″ to 8″ from the floor and three more such holes near the ceiling to allow for air circulation. Shelves should be split the long way with space left for air to get through.

How large a bulb to use depends on the amount of humidity in the area. State-side and in the temperate zone generally, 25-watts may be enough; while in the tropics you may need much more. Be sure to shield the source of heat from the stored material with a screen so as not to make it a fire hazard.

In the locker, air comes through the holes at the bottom, is warmed by the bulb, rises through the cabinet decreasing humidity, and goes out the top holes. If you raise the temperature 10° to 15° over the temperature outside the locker you'll have good protection but be careful—if it gets over 100° inside you can damage your instruments and melt their lubricants.

SR 743-110-1 has good dope on coating against fungi that's worth looking into, for equipment in or out of your dry-locker.

KEEPING IN SHAPE

THE WHOLE POINT IS: Your fire control is only as good as your instruments—your instruments were good to begin with, but how's your fire control?

The man with good fire control has the advantages of a scientific boxer—he knows what he's aiming for, makes each punch count, weakens his enemy instead of himself, and keeps up a good offense without leaving himself open.

Effective fire depends on a ready punch. For instance, taking the instruments off your tank or gun while traveling and putting them in their cases will save your glass-eyes from being lost or damaged from vibration. A case will also protect its contents from the elements, cushion the extra shocks, and keep out dirt. Instruments that are ready for use, free from little specks and big splotches, may one day make a difference.

For a clean-up job, tissue or a camel's hair brush are best. In cold weather moisten your tissue with a **few drops** of ethyl alcohol. (Too much can injure the sealing compound or break down the Canada Balsam cementing your compound lenses together.) Any rougher polish may scratch the surfaces.

And to keep your levels on the level, keep the level-vial covers closed. A dishonest reading can throw you off-balance.

ARMY AIRCRAFT

The first commandment for airmen is "Thou shalt not taxi thy aircraft into thy neighbor's aircraft, nor his house, nor his ox, nor his ass, nor any other thing."
—KUNFUCYUS

What Kunfucyus sez is one thing—making it so is another. In any other field, you couldn't be expected to know all the tricks of the trade, but around aircraft, you'd better. So what? So read on, boy, and bone up some.

WHICH NUT?

You should know by now that aluminum alloy AN nuts must never be used on a bolt in stress, only on bolts in shear. If you can't be sure what a given nut is made of, try a magnet. The alloy nuts will not be attracted.

STANDARDIZE YOUR INSPECTION ROUTINES

Dick Batcheldor of the Bell service school has a good point. He contends that half the secret of a good preflight or daily inspection is in having a definite procedure and following it every time. It doesn't matter much where you begin your inspection or where you go from there—just so you begin at the same point each time and go the same way. Point is that soon it becomes a habit and you don't miss anything.

When it comes to your periodic major and after-repair inspections, Dick credits one of his highly successful students with an even brighter idea. After you have completely inspected the aircraft, move it around a bit in the hangar or on the ramp and head it in a direction it wasn't facing when you inspected it. Leave it, go for a Coke, or go to chow and forget it. Then when you come back, inspect it carefully again. You'll be surprised at the number of items you'll catch this way. So who knows why—?Try it.

AIR-SPEED INDICATOR CHECK

The Base Field Maintenance shops, San Marcos Air Force Base, have a clever trick for making a quick check on the air-speed indicators on L-21's and any other aircraft in which the pitot tube is separate from the static tube at the pitot head. Slip a 3' length of rubber hose over the end of the pitot

tube, and while somebody watches the instrument, squeeze the end tight shut and slowly roll up the hose. The dial should show progressively higher air speed as you roll it up. Hold your hose when you reach cruising air speed for that airplane, and watch the dial, it should not leak down. If it does, check your line connections.

Note: This is a quick check only and should not be substituted for regular calibration at specified periods. It will, however, make your inspection more thorough between instrument checks.

Caution: Under no circumstances blow in this tube, either with compressed air or orally, it will wreck the instrument.

HELICOPTER ROUNDUP

H-19C ENGINE DROP

If it hadn't happened to others, I wouldn't mention it, but the sad thing is that you can forget one or more lines when dropping your H-19C engine, and they are difficult to replace. Check carefully, and then have someone else check, too, before dropping the engine.

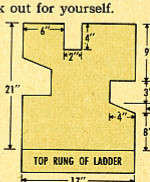
VISUAL CHECK FOR H-13 RUDDER NEUTRAL

Here's a quick visual check for correct rigging of your rudder pedals. Pull on the cables at the tail-rotor pitch-change-screw-drum, and adjust the tail rotor till the centerline of the pitch-change-link bolt is about ⅛" inboard of the Delta-hinge bolt centerline. Your rudder pedals should be in neutral.

Please to Note: This is not a substitute for specified rigging procedure when adjusting this cable. It only tells you if you need an adjustment.

H-13 WORK STAND

In case you aren't already well equipped with work stands, here's a stand that fits right in on top of the basket on either side to give you a place to stand when working on or inspecting the rotor head. (This idea, by the way, came from the Bell plant.) The beveled recesses at each side of the top (see figure below) are to clear the gas tank brackets, while the 2" x 4" rectangular recess in the face is to clear the transmission oil lines. The dimensions not shown you can work out for yourself.



Windy's Windstorms

STATIC GROUNDS

The boys at Fort Knox are making a static ground which not only substitutes for an unavailable part, but does a better job and lasts longer. They use a length of old control cable (or sometimes a salvage automotive speedometer cable) brazed at the ends to prevent fraying. It's doubled into the retainer plate with bolts and washers to hold it. The one they displayed was on an L-19A, but the trick will work on any aircraft.

L-19 BRAKE LINE

Please to be sure your L-19's brake-line tubing is correctly installed **under** the flap-control cable, and check for wear. Cable mustn't touch.

LC-126C PROP LUBE

The lubrication period on the Hamilton-Standard Propellors on the LC-126C aircraft is being revised to call for **daily** lubrication of the counterweight bearings and 25/30 hour lubrication of the Spider arms. TO AN 01-125CAA-2 is being altered to cover.

LINE EQUIPMENT

They've got a little line cart at Fort Sill which carries a 30-gallon oil tank and a pump. This was pulled up to each ship and the direct oil-servicing kept the ships cleaner and assured dust-free oil. Stations using gas trailers or tank trucks might install the oil tank on the service vehicle.

LC-126 TACH CABLES

Been hearin' talk that not only do the long tach cables told about in PS #8 give trouble, but the little ones have been known to break, too. So OK, it's no great job to disassemble this little cable and grease it—at least every 600 hours (or more often if you think it needs it). At the same time, you can keep a close eye on the core for signs of excess wear or incipient breakage.

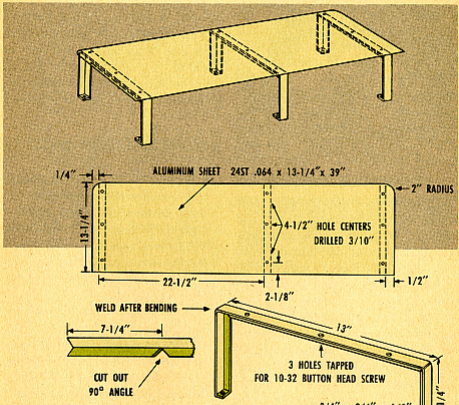
L-19A DOOR BUMPERS

Here's one more door bumper for your L-19A's. Slot a 1½" length of rubber hose (about ⅜" ID) and slip it over the door stop. It will hold itself, or you can cement it on if you like.

LC-126C CHEST PACK 'CHUTE RACK

Here's a handy shelf that the boys at Fort Knox Air Field Maintenance whipped out to hold the chest-pack-type parachutes in the LC-126C's. Its weight won't call for a new W&B job, and it'll keep your 'chute packs from snagging in the radio's cover fasteners.

The same shelf with a little lip on the forward edge could also hold spare clothing, maps, and the miscellany you carry on XC.



PARTS NEEDED	NO. REQD.
SHEET ALUMINUM 24ST .064x13-1/4x39"	1
ANGLE IRON 27-1/2x3/4x3/4x1/8"	3
FLAT HOT ROLL STEEL 5/8x5/8x1/8"	6
10-32 BUTTON HEAD SCREW 1/4" LONG	9
WASHER, PART NUMBER AN970-4	6
10-32 BOLT 17/32" LONG, STOCK NUMBER 6500-032010	6
10-32 NUT ELASTIC STOP, PART NUMBER AN365	6

MAJOR-ITEMS DIRECTIVES

In case there's any doubt in your mind about the purpose of each type directive on the issue, proper use and care of Ordnance materiel, there's a liberal education to be had in the latest SB 9-1 (11 June 52).

It's a handy reference, too, in the form of an alphabetical listing (by main noun) of all major items, combinations and parts of combinations as well as general classifications of Ordnance materiel. Publications and other useful information are given for each item. You'll want one around when you need to know what's what.

ANOTHER COLOR CODE

One smart supply man at Fort Sill has developed a stunt that tells him at a glance what vehicles in his pool still owe turn-ins for parts received. He issues the part on request, and notes it on the "Parts Issued" column of his Form 421. When the old part is turned in, he fills in that square of the form in red pencil. Any blank, indicating a part for which he has not yet received his turn-in, stands out like a sore thumb—it's not filled in with red. This same idea can be used to color-code parts not in stock, or for any other information you want to stand out at a glance.

OIL-PRESSURE SAFETY SWITCHES

Davey air compressors 66-C-1426 (105 cubic feet) that were put out under contract numbers DA 20-018-ORD-10274 and DA 20-089-ORD-7852, have been ordered stopped on the spot because they got out with defective oil-pressure safety switches.

Compressors in use (as well as those in stock) will have to sit tight till they get Switch, safety, oil-pressure No. 17-S-25574-505—Davey Compressor Company No. M14693. The new switch is stocked at Rossford Ordnance Depot and is available thru regular supply channels.

When the defect is corrected, compressors will be marked to show they've got the new switch. The bum switches'll get mutilated and scrapped.

TOOL AND SHOP SETS

SR 310-30-60 with Change 1, June 52, rescinds and replaces Circular 96 and is the authority now for issue of the new Organizational and Field Maintenance and 2nd-echelon MOS tool and shop sets, as well as the vehicles needed to transport them. This, until the T/O&E's and T/D's can be brought up to date.

Supply economy, 'specially where tools are concerned, forbids ordering these sets in toto. It's SOP to lay out your old sets, and with the help of the supply catalog take out the items that aren't necessary in the new sets, turn 'em in, and then order only the things you need to make up the new set.

Same goes for the vehicles to carry the sets. Any that you don't have and will need to carry the new sets can be requisitioned under this authority. Vehicles you already have and don't need can be turned in like the tools.

LIGHTEN YOUR T/O&E LOAD

You've heard the old familiar song "We don't need it but the T/O&E says we gotta have it and we'll get gigged by inspectors if we don't keep it." Well, it ain't so.

Uncle doesn't want you to keep what you don't need, and you won't get gigged for not having it if you do it the right way. DA Circular 54 (June 52), tells you the new T/O&E's will say just that. Also see SR 310-30-1 and SR 310-30-4.

So, if your unit is hanging onto a lot of stuff you don't need to do your job and you'd like to unload, get a letter off thru channels to higher headquarters recommending turn-in.

WARRANTY PERIOD

Have you a shiny new truck that's already showing signs of an early demise? Does your carburetor have a cough and your battery fail to bat? You will be the first to know, so don't keep it a secret—let Ordnance know, too. If the ailing part's defective, Ordnance might get a new one for free if the deal's made before the warranty period expires.

"He wants to know how far to the Sixth Echelon."

free turn-in

BEFORE YOU BURY THAT HATCHET CONSIDER THE GUYS WHO MAY NEED IT.

Dear Half-Mast,

We hear a lot about not hoarding parts but us supply men have learned the hard way that it sometimes pays off—and keeps vehicles off the deadline.

But then comes the day when it isn't healthy to have those unauthorized parts around—and it's downright unhandy to get rid of them. Or it was till some smart cookie around here thought up the idea of a "free turn-in station" where a guy can unload all that stuff with no questions asked. So instead of a lot of good parts getting buried or burned or what-have-you they get a chance to get back in circulation. In the interests of supply economy why can't this idea be used army-wide and given official sanction?

MSgt G. E. H.

Dear MSgt G. E. H.,

You've hit the daily double when you say those good parts should not get buried or burned. Your free-turn-in-no-questions-asked idea sent me barreling for the nearest bistro to see what the boys would sputter on the subject. When the foam settled, here's what brewed:

Seems you're in the money basically, **if** your idea can be made to work practically. But there's many a big "If." F'instance, **if** you want the whatsit back (many a part gets dinged or out-dated from hoarding, and then it's just so much garbage) Or, **if** the guys really understand that your "Free Turn-in" is to help them get rid of embarrassing stuff **—only** to save good parts for the joes that really need 'em. And, **if** the CO goes along with the idea—the Ole Sarge can't set up ground rules for all the CO's in the Army.

You shouldn't need to hang onto those "just-in-case" parts with careful planning and the new supply system. Cleaning one's specs before reading a Supply Catalog also makes the odds a leetle more even that one'll get what one asks for. And also, if the boys in your supply room add an extra knot to the strings on the part-number tags, you could save many a good part from going the way of all junk for want of quick identification.

But, to answer your question: In the interest of supply economy, Sarge, **anything** that makes for economy ain't such a bad idea—even if it isn't the best.

Half-Mast

CONTRIBUTIONS

PAINT ON RUBBER

Dear Editor,

Latest local order tells us we must take the paint off the rubber around our windshields, across the cowling and the battery box seals, and so on, on our Jeeps. This presented a small problem as to what would cut the paint without harming the rubber or taking the paint off the other parts of the Jeep.

What we finally did worked fine. We used steel wool.

Boyd McClintock, OCT
Fort Sill, Oklahoma

CARGO "DUMPER"

Dear Editor,

Have you ever faced the problem of doing a big hauling job with only a few cargo trucks and with men at a premium?

If so, you'll be glad to spend a few hours making an "unloader" which can dump a full load of gravel or coal from a cargo truck in **less than two minutes**—and with the help of only two or three men.

The inclosed sketches show how to construct and how to use it. Notice that there are no moving parts to wear out!

For a 2½-ton flat-bed cargo-truck, you'll need two 6½-ft. lengths of 12" plank (3" or 4" thick), one 4-ft. length of 2x4, 8 wire-rope clips, and about 75 ft. of wire rope, ½" or ⅜" in diameter. Most camps will have the material on hand (we used lengths of broken cable from power shovels and bulldozers).

When you install the unloader on the truck, leave at least 1" clearance between the plank ends and the sides of the truck body. Fasten the 2x4 to the cab rear-window screen with a loose wire to keep the front plank from falling over while you're loading. (Don't forget to unfasten the wire before you start unloading, or you'll unload the window screen.)

Place the rear plank in the center of the body, leaving some slack in the cable so you'll be able to dump the rearward load before the front load begins to slide off. (This eases the strain on the anchor truck when you're unloading and dumps the load in two

piles—for easier spreading.) Now hang the draw cables over the tail-gate and you're ready to load.

Incidentally, if you're loading with a power shovel, the first shovel-full should be dropped on the rear plank **carefully,** so the plank won't be knocked over. (Unless it's vertical, it doesn't do much good.)

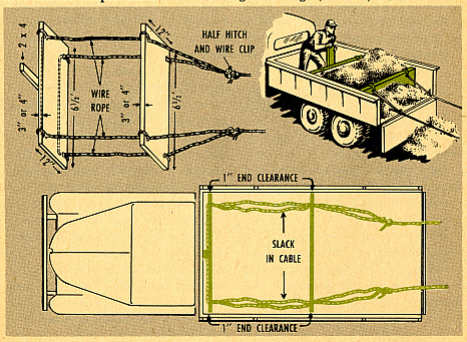
Now attach the draw cables to the bumper hooks of another truck which has the brakes set. This is the "anchor" truck—for a 2½-ton-cargo dumper, it should be another 2½-ton or a loaded 1½-ton job. Drive the cargo truck ahead in LOW gear—LOW range, and the load will slide off in nothing flat. While the truck is being unloaded, two or three men should "ride" the forward plank so that the floor will be scraped clean.

After you've used the device once, you may have to readjust the clips so the planks will stay in their vertical position while being pulled out.

If you intend to use the device for unloading coal, you can operate it with a winch and snatchblock instead of an anchor truck.

Capt D. M. Googins

(Ed Note—Sounds like a swell idea. No doubt you'll use your own imagination and variations while making the device. Of course, you could drill holes ***through*** *the planks for the cable, rather than wrap the cable around the sides. If you do, don't forget to anchor the rear plank to the cable, to prevent its slipping while the truck's being unloaded. Salvage wire rope is plenty good enough for this job.)*



NO NOISE, PLEASE

Dear Editor,

Have you heard of characters who close up the ends of muffler tail pipes just to hear the pretty sound? No one ever catches these pranksters. Apparently, they've never heard of engine back-pressure.

How about a blast in all directions on the harm this stunt does?

By the way, the best way we have found to get maintenance manuals into use is to chain them to a desk or table in some prominent part of the shop, and insist that if any mechanic isn't sure, he consult the manual.

Maj Lawrence Dewhurst
Maryland Military District

(Ed Note—You're right. Not only does the "pretty sound" cut down engine power, it burns up exhaust valves. All ye who are pranksters oughta get "blasted.")

CARE OF TIRES

Dear Editor,

There's been a lot of talk about requisitioning new tires, and matching them when you get used ones, and all that sort of stuff. But too little has been said about taking care of tires after you get them. Why not tell the boys who're using the tires how to make 'em last longer—only the fellas driving the vehicles can keep them in good condition. You can't over-estimate the tactical value of keeping vehicles mobile (aside from the ever-so-constantly-reminded-of fact that tires cost tax dollars).

Even after the tires on a vehicle are perfectly matched, they won't wear alike because road conditions are never alike for all the tires on a vehicle. So we don't wait for a blowout, we rotate our tires regularly.

A good driver will never over-inflate or under-inflate tires. Not only because it affects his driving, but because it shortens the life of the tires.

Careful use of brakes and accelerator are signs of a good driver and make tire life longer. We never overload a vehicle and try to keep from hitting rocks and such in the road. Wheel alinement is another must—and too much toe-in will ruin good tread in no time flat.

These are the fundamentals—it's all in TM 31-200, and more, too. Anyone who has anything to do with wheeled vehicles should keep a copy of this TM handy.

ARE YOU A GENIUS?

Or maybe just a plain common-sense guy who has worked out a way to do your job easier and better? You got tricks up your sleeve? Why not share 'em? You, too, can win the admiration of the engineers and technicians at the top of the Ordnance show. And besides—you'll get your name in print, if not in lights. Write to the **Editor, PS Magazine, Aberdeen Proving Ground, Maryland.**

It's not that drivers mean to misuse their tires—it's just that they take them too much for granted.

MSgt R. O. Breckenridge
Korea

HALF-TRACK ROLLERS

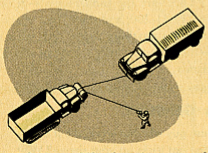
Dear Editor,

Recently we got some half-tracks and found that the front rollers were frozen tight, so we worked out the following procedure for loosening them.

We first oiled the bearings and then fastened a strong rope to the tow hook of a truck, wrapped the rope around the frozen roller several times, and had one of the fellows pull at the other end.

Then, as the truck moved slowly back and forth, the fellow also moved back and forth and the roller was loosened. Maybe the drawing makes it more clear. This was not only a fairly easy process, but it didn't harm the roller.

Cpl Charles H. Creamer



(Ed Note—The bearings on the front rollers are apt to become rusty or dirty when the roller's not used much. Oiling them with engine oil every thousand miles will prevent them from freezing again.)

WATER HOSE REQUISITION

Dear Editor,

SR 700-51-112, page 6, item 37, dated June '51, changes Water Hose from an Ordnance to a Engineers Corps item and should be requisitioned under Engineers Stock No. 33-6232.070-050 Hose, Water. You'll get it sooner asking for it this way if your T/A calls for it, or you've a special need.

J. H. Fuller, OCT
Fort McClellan, Alabama

(Ed Note—You are so right.)

WATCH OUT FOR CRACKED FLARE NUTS ON M47 TANKS

Right now, even before you smell gasoline, take a close look at all the gasline connections on your M47's to be sure they're fuel-proof.

Some recent gas leaks have been traced to cracked flare nuts, others to cracked flexible lines.

Whether it's caused by vibration, over-tightness or bad material, the important thing for now is to replace them before they do you harm. Then dash off a boldface UER.

Connie Rodd's BRIEFS

Oil-cooler ground-strap gaskets

On your 5-ton, 6x6's, you'll find a ⅜" copper gasket (Stock No. H102-0105451) squeezed behind the head of the oil-cooler-housing-to-engine-block screw, which anchors the rear-engine ground-strap. If you remove the ground strap or screw for any reason, for oil's sake, stick a new copper gasket behind the head of that screw; or you might find your oil cooler leaking oil all over your block.

Winch lube

TM 9-819 and the Lube Orders for the 2½-ton Reo and Studebaker winch need correcting. The winch worm-housing (gear case, as it's more commonly called) will not hold the specified 3½ pints. The correct capacity is 1¼ pints. The winch-end-bearing frame-housing on the other hand, needs more than the specified ½ pint. The correct amount is 1 pint.

The same winch is used on the 2½-ton GMC, but you'll find TM 9-819A and the Lube Order for this vehicle are correct. Which explains why the M34 winches have been shooting their seals while the same winches on the M135's have been giving no trouble.

Personnel-heaters

About the South Wind personnel-heater fix (PS #11, p. 489)—forgot to tell you to tap mighty easy on that baffle. It's welded in three places, but might not be if you get rough. Also, don't make wholesale fixes—heaters modified in production after Serial No. 61055 aren't likely to give trouble.

Map-light plug-in

On some of your M42 utility trucks (command), the place to plug in the command's map-light is under the dash. It's a quick-disconnect on one of the circuit breakers, set on the cowl ventilator-brace's right side, between the instrument-panel and the cowl front-panel. Stick your head under the dash, disconnect the terminal from the wire, and you're in.

turn off the faucet, Joey...

It's going down the drain.
Wake up tomorrow with both eyes
and look around
at what people are doing.
Is your supply and maintenance
on the ball?
They're spending your equipment,
your country's resources....
Does it make you happy?
Will there be more when it's gone?
Are you proud of what you're doing?
Or do you need to rear up
on your hind legs and roar....

Turn off the faucet, Joey...
it's going down the drain.