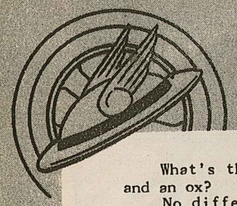
ARMY MOTORS

VOLUME-2 ★ MARCH-1942 ★ NUMBER-12

TO KEEP IT TOLLING·· KEEP `EM ROLLING

Steering Wheel



What's the difference between a military truck driver and an ox?

No difference - if we can take the attitude of some people in the army as an answer. The attitude is that anybody can drive a truck, so why make a fuss over drivers. Driving is a cinch. The streets of the U.S. are full of people driving: sixteen-year-old kids, old ladies, drunks, women - heck, anybody can drive. It's not as though driving a truck is like piloting an airplane, or a locomotive.

Well, now, why isn't it? Granted that a locomotive is an awful big, pile of machinery and an airplane thumbs its nose at the law of gravity. But what about driving a truck? What about waltzing 5 tons of speeding hardware over a narrow road - often as not jam-packed with loony drivers? Child's play? Here's your answer: 34,500 people were killed last year in motor vehicle accidents and 1,200,000 injured.

Granted we're trying to be more selective about the men we choose to drive our trucks. *But why don't we give these men the respect they deserve?*

FM 25-10 says, "A driver and an assistant driver should be assigned to each motor vehicle...the vehicle should not be operated by other drivers if it can be avoided."

The reason for this is clear: to instill in each driver the pride of ownership. Instead we see vehicles and drivers shuffled around 'til nobody knows who is what.

Col. Lewis Landes writing about the 'First Army Provisional Train' in the last maneuvers, says "One of the serious problems confronted during these maneuvers was the tendency of many commanders to oust assistant drivers and replace them with commissioned and non-commissioned officers. The assistant drivers had to ride in the rear and on many occasions were found after forced ejection, aimlessly wandering around on the highways. In some instances, the drivers themselves were removed from their vehicles."

If you think that's bad, get a load of this: there's a fantastic rumor abroad that *some companies have been forcing men to drive as a punishment!*

What it all boils down to, is this: we've been minimizing our drivers too much, we're making too little of the tremendous responsibility they carry. Maybe what they need is serious recognition. Let's show them as the skilled and hardened soldiers they have to be when the shells start falling. Your foot soldier can hike along with his eyes closed, asleep from the ankles up. But show us the driver who can dodge ruts or shell holes and still keep up with the convoy with his brain or any other part of him asleep.

Put the truck driver in the class with the aviator or the tank operator - for what are they but skilled craftsmen with plenty of imagination and a keen sense of timing. Ever watch a really good driver handle a truck? His fingertips play on the wheel and the gear shift as if on a fine musical instrument. His feet dance neatly on the pedals. He's got a sixth sense that tells him what his truck can do and what it needs. Watch him come to a stop, his engine braking the truck 'til the exact moment before it starts to buck. Watch him in blackout driving, almost *smelling* his way. He's a master at preventive maintenance.

Well, then let's give the devil his due, let's reward our drivers. Col. Landes suggests a "new type of uniform for truck drivers...similar to those worn by tank operators," maybe a rating would help or at least some kind of award - an emblem or a streamer for his truck.

At any rate, let's stop belittling the men, for that means belittling the job - and God knows Supply is as important as anything we know of in the Army.

ARMY MOTORS

for March·1942

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Your contributions of ideas, articles and illustrations are welcomed. Address all correspondence to the Editor, at the above address.

MOTOR MARCHING by RAIL

All over the country, the Army is beginning to rustle its bones - like something big and tough preparing to hunt - getting the lead out, you might say. Military organizations suddenly rear up on their hind legs and disappear in the night, on their way to what could very easily be battle stations.

Much of this movement is by rail, for no matter how good or how many the trucks, the iron horse is here to stay. Travel by rail is speedy, reduces wear and tear on men and trucks, and generally, bypasses the accidents and breakdowns that plague trucks travelling over broken, crowded roads in dirty weather.

What's it mean to you? Get ready to move, you may be next.

Arrangements with the railroad company must be made about the number and type of railroad cars you'll need, stating, of course, the weight and width of the vehicles and stuff to be loaded. Reconnoiter the place where you're to load. Sniff around, draw a map of the place and investigate the roads you'll have to use to get there. Maybe you'll move at night: see that plenty of night-lighting is available. Know what you're going to do before you do it.

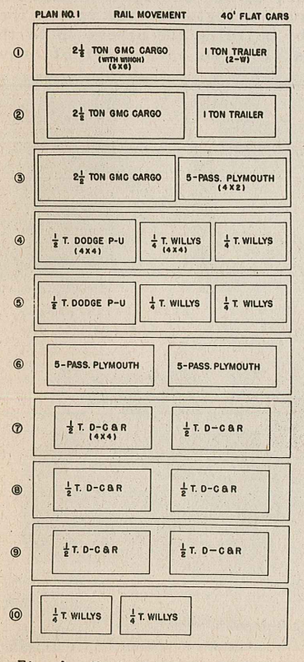


Fig. 1 - No last minute headache - this template shows how to place vehicles on flatcars.

What you really need is a good, stiff Standing Operating Procedure, a *plan*. Let more than one person in on your plans and let him stay behind'til everybody and everything has done departed. If you change plans in mid-air, make sure everybody concerned gets wind of the changes. If you're not taking all your property with you, see that it's properly turned in or stored. As for the stuff you are taking with you: record the number of the car it's being shipped in, and list the property in each car.

Lieutenant J. F. Sinclair, Hq. and Hq. Co., Holabird Quartermaster Motor Base, turned up with a pretty good piece of a plan. He devised a 'template' or pattern to show how his vehicles should be distributed over the railroad cars. It shows clearly (Fig. 1), *how, what* vehicles will fit on *how many* cars. What he did was sketch out the area of a number of the freight cars (to scale) then he cut out pieces of paper to the proper size to represent his vehicles. By fitting the pieces of paper onto the sketches of the freight cars - juggling them around - he discovered how and in just what order his vehicles could best be entrained. Lt. Sinclair tells us that he will give his drivers a number and they will drive up on the freight cars one, two, three, four...with a minimum of confusion. For each of the different sizes of freight cars Lt.Sinclair made an appropriate 'template'. If you're interested, here's the sizes:

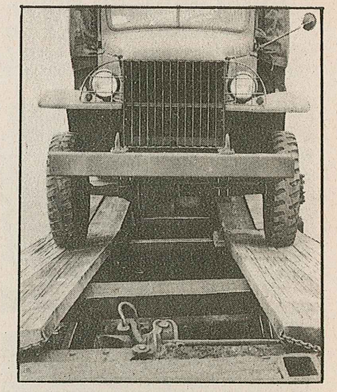


Fig. 2 - A 2½-ton takes the high road. The runway of the ramp is built of 3x12's.

Flat Cars--36 and 40 Ft. long
Box Cars --40 and 50 Ft. long
Gondolas --36, 40, 46, 50, 52 and 65 Ft. long.
*All are about 9½ Ft. wide.

The conscientious traveler - that's you - will cast his glims carefully over AR 30-945 (and also in the 30 series: 930, 935, 940, 955), and War Department Circulars 149, 198, and 269 (all 1941). They're 'must' reading. You'll get a funny feeling reading 30-945. Of course, there's been a lot of changes, but the original was written in 1923 and you'll get a sense of the swift passage of time, what with the references to 'animals' in transport.

FM 25-10 will help you and so will Field Manual 101-10 paragraphs 40 to 45 inclusive.

But getting down to cases, the real work of moving by rail is in getting the trucks up on the flatcars and keeping them there during a rough journey by fast freight. Think of your trucks balanced precariously on a narrow flatcar rushing sixty miles an hour around a bend, through a wet night. Then you'll begin to appreciate the precautions to be taken. You'll need plenty of chocks and blocks.

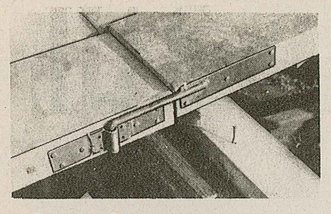


Fig. 3 - This latch-socket idea prevents the ramp from parting in the middle (longways).

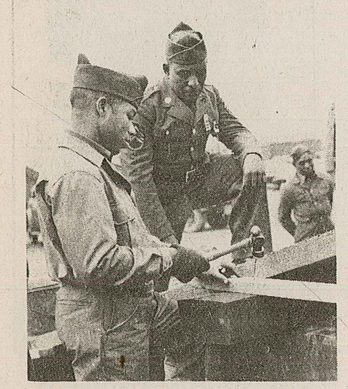


Fig. 4 - Cleats keep the boards from spreading out sideways as the heavy trucks roll up.

Maybe when you arrive at your destination, there won't be a ramp to help you detrain. You can't drop-kick your vehicles off so you'll have to have a ramp with you.

At Holabird, somebody said, let's not get caught with our ramps down. Remember Pearl Harbor. No sooner said than done - the shops went ahead and designed ramps and chocks - and built a complete set for every company on the post. Furthermore, an order went out that all hands were to get out and practice embarking - so every morning for a week or more, if you had been there, you would have seen the ramps set up and vehicles running up and down the flat cars.

In building the ramps and blocking equipment, scrap lumber was used as much as possible. The chocks and blocks alone almost fill three 2-1/2-ton trucks so it's sheer recklessness for a truck company to think of keeping it as permanent equipment. The stuff will have to be turned in at the end of the journey to the nearest Quartermaster. Besides, scrap lumber does the job as well as anything else, so why spend money? (You'll probably have to buy those 3x12's which, you will discover, are needed for the ramp).

This ramp is the biggest item, and could stand a bit of talking about.

At Holabird, it was found that for most outfits, a 24-foot ramp would do. It satisfactorily handles anything up to and including a 2-1/2-ton, 6x6. Anything over the size of a 2-1/2-ton job - say a semi-trailer - requires a 36-foot ramp. Otherwise the ascent to the flatcar is too steep and you have the pretty spectacle of the back wheels on the ramp and the front wheels dangling in the air.

As you can see by Fig. 2, the runways of the ramp consist of 3"x12" boards, 12 feet long. Supporting the runway, are braces built up of lumber, roughly about the size of railroad ties. An ample number of these braces tactfully distributed, take all the dangerous 'flex' out of the long boards. And believe us, when you try out your own ramp, you'll appreciate that.

To hold the 3x12's firmly together end to end, a latch-socket arrangement was worked out, (Fig. 3). The male portion of this arrangement consists of a flat piece of metal with a hooked arm welded to it. The female is another piece of metal with a socket welded to it. Nailed to the ends of the 3x12's and hooked together, they keep the ramp from pulling apart. Center each latch and socket so that interchangeability between latches and sockets is possible. When and if the ramp is abandoned, remove the latch and socket and take them with you.

To keep the 3x12's from spreading out sideways and dropping the truck to the ground beneath like a load of bombs, cleats (Fig. 4) are nailed onto the underpinnings.

As you will discover when you put a truck on it, the ramp needs all the stability you can give it.

Something has to hold the top of the ramp to the end of the flatcar. The something (Fig. 5) is a couple more flat pieces of metal nailed to the end of the boards that lay on the flatcar. Chains, welded to the metal, lay crossways and are nailed securely to the floor of the flatcar. For best results, a piece of lumber laid across the flatcar and on top of the chains, will make the ride over the threshold and onto the car a lot smoother. Then again, when the trucks are detrained, this arrangement will take some of the load off the chain anchors and prevent the wheels of the truck from shoving the ends of the boards off the flatcar.

The railroad company announces that it will be very, very happy if you use some of your lumber to build an approach to the ramp. This will keep your heavy trucks from tearing the rails up, and the rails from wrenching your wheels out of line or even off, as the case may be. Just throw a bunch of long boards about as high as the rails, parallel to same (Fig. 6).

After watching one ramp-raising party break up in a riot, about two weeks ago in an attempt to set the braces at just the right height under the runway boards, we sat down and thought and thought. Just as rigor mortis was about to set in, we jumped up in the air with precisely the right idea. Why not, we said to ourselves, why not stretch a piece of string or tape from the point where the edge of the boards will meet the flatcar, to the ground where the other end of the boards will rest? The string being twenty-four feet long (as long as our ramp is to be) we can easily determine the proper angle for the ramp. Then by building the braces up to the string, we save a lot of heavy

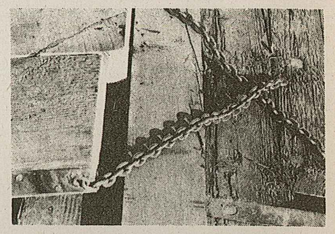


Fig. 5 - These chains anchor the boards of the ramp to the flatcar, prevent 'gaposis'.

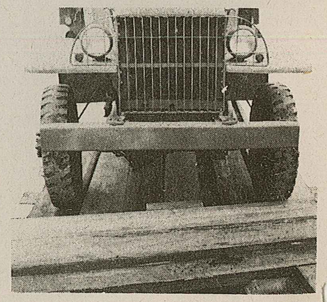


Fig. 6 - The rails won't tear the wheels off your trucks if you pave 'em with lumber.

lumber juggling to get the right height and support.

Another and later ramp-raising party, under the influence of this idea, functioned brilliantly.

Once the ramp is up, one man and one man only should guide the truck drivers up onto the flatcars (Fig. 7). With the nose of the truck aiming at the sky, the driver can't see where he's going and a Greek Chorus of directions shouted from all around him if it doesn't turn his hair grey, will probably send him in a power dive off the upper reaches of the ramp.

'Spanners' bridge the gap between the flatcars. For details of the construction of these and the various chocks, and side-boards you'll need to keep the vehicles right and tight on the flatcars, examine Figure 8 (the spanner is upside down to show what holds it together).

The purpose of the chocks under the tires is to prevent forward or backward movement of the truck; the sideboards keep the truck from waltzing sideways and overboard (Fig. 9). The best practice in chocking consists of placing a chock - tightly - front and back at every wheel, including a chock between the wheels of the bogies. We didn't have a between-the-bogie chock for our pictures and you'll find that you have to build a special one. Ordinary chocks won't fit. Knock all chocks in *tightly* beneath the tires then nail them down using 4 or 5 inch spikes.

Put sideblocks on the outside and *inside* of all wheels - don't pay any attention to these guys that say outside blocks are enough.

Now there's just one other problem in connection with chocking: How to prevent side-sway and keep the wheels from leaping right out of the chocks and sideboards as the train jolts along. As one officer put it, "Harmonic motion sets in as the flatcar bumbles along. Like bouncing up and down on a bed spring, the vehicles go higher and higher."

Several other people in the crowd nodded their heads gravely as the officer said this. And then it was, that we discovered that there are two schools of thought on the subject of tying vehicles down to discourage them from leaping out of the chocks.

The first school of thought swears by the old *wire* method. In Figures 10, 11, and 12, you will observe how this is done. Notice that the wire - which is "No. 8 Gauge, black, annealed" - is fastened to sections of the vehicle that won't easily give way, and to the 'stake boxes' at the sides of the car. In some cases, you have to nail or bolt pieces of wood to the floor and run the wire up from them - but use the stake boxes, if you can. In any case, don't fasten the wire to hand-holds or foot-steps on the flatcar or arrange them in any way so that these are fouled. In passing the wire through the holes in the truck wheels, please notice that these holes have sharp, knife-like edges. Under the constant jiggling of the train in transit, it shouldn't take any time at all before these wires are sawed in two. Try padding

Fig. 7 - Man guides truck. The truck-guider is the driver's eyes. Sees all, tells all. Any heckling or added directions from the nickel seats will drive the driver crazy.

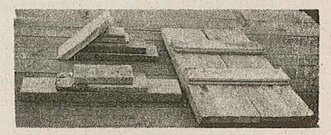


Fig. 8 - The spanner, chock and block are made of scrap lumber. Easy to throw away.

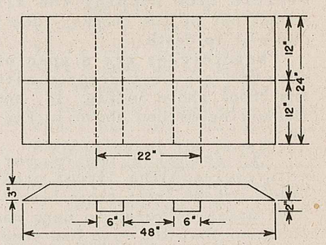


Fig. 8a - Here's the inside dope on how to build the 'spanner' in Fig. 8.

Fig. 9 - This is the way we chock our wheels, chock our wheels...(Aw shut up!)

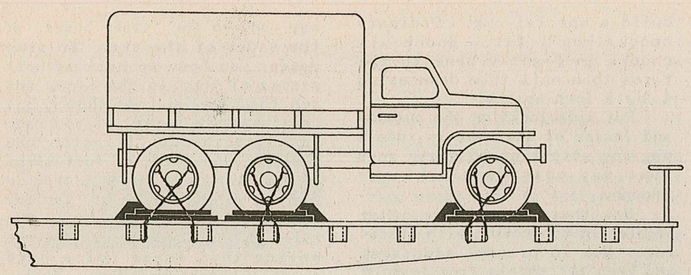


Fig. 10-- Wire is the tie that binds the vehicle to the flatcar. Use plenty of padding wherever sharp edges may chafe the wire in two.

all such points of abrasion, including the stake boxes.

Tighten the wires by inserting a drift pin (Fig. 11) as a rack stick and twist the wire to the desired tension - then drive the point of the drift pin into the floor of the flatcar, to keep the wire from untwisting and loosening. Don't go hog wild on this matter of 'desired tension' leave some resilience in the wire. Let it be slightly relaxed to allow some room for up and down movement of the vehicle. Remember all we're trying to do is keep the vehicle from hopping the six inches out of the chocks - don't choke it to death.

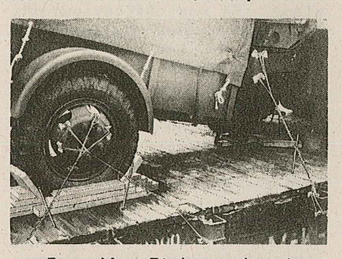


Fig. 11 - Tighten the wire with the drift pin - then sink the pin into the floor.

Motorcycles are a special case and are best secured with the chock shown in Fig. 13, and the wiring method shown in Fig. 14.

In securing two or more motorcycles Ⓐ the 'front cross brace' and the 'rear cross brace', have nails hammered in here and there so that the wire has something to cling to. Likewise with the 'side braces' in Ⓑ. These 'side braces' are nailed to the flatcar at the bottom and are tied together where they almost meet at the top with a short piece of wire.

Don't, for the love of Pete, fasten the wire to parts of the motorcycle that may be torn off in transit.

The second school of thought on tying vehicles down, swears loudly by the *metal strap and anchor* method. The metal strap is, well...metal strap. The anchor is a flat metal plate with a slot and eight nail holes in it. You can see them both in Figure 15. The idea (Fig. 16), is to pass the strap through the slot in the plate and nail the plate down (using drive screws illustrated in Fig. 15). Do this on one side of the axle - run the strap over the axle and bolt it down on the other side the same way.

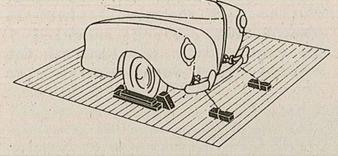


Fig. 12 - Passenger cars have knee action. Wire from bumper bracket to the floor.

This 'strapping' method is used extensively by truck manufacturers in shipping vehicles throughout the country. And a wiry, little guy by the name of Frank Dabroney, who personally ships vehicles for a big outfit we know of, says, "I personally have been shipping trucks this way for the last seven years - and I ain't never heard of no trouble come of it." (He swung his eyes about quickly, looking for some wood to knock.)

As far as we personally look at it, we ain't been shipping vehicles nowhere for the last seven years, but we will say that the strap and anchor method looks good to us. However, if we shut our mouth and listen for a minute, we can hear the hoarse shouts of derision and jeers from a truck Company (known hereinafter as 'Co. X') who say that on a recent rail journey, almost every one of their straps broke.

To offset this, we have the considered opinion of Frank Dabroney, who shook his fist violently under our nose and cried, "They had them straps pulled too tight and the chocks was too loose! I personally been

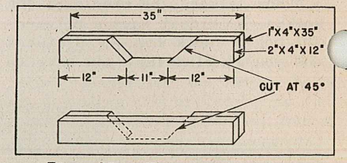


Fig. 13 - Motorcycle wheels set in this kind of chock like a babe in a cradle.

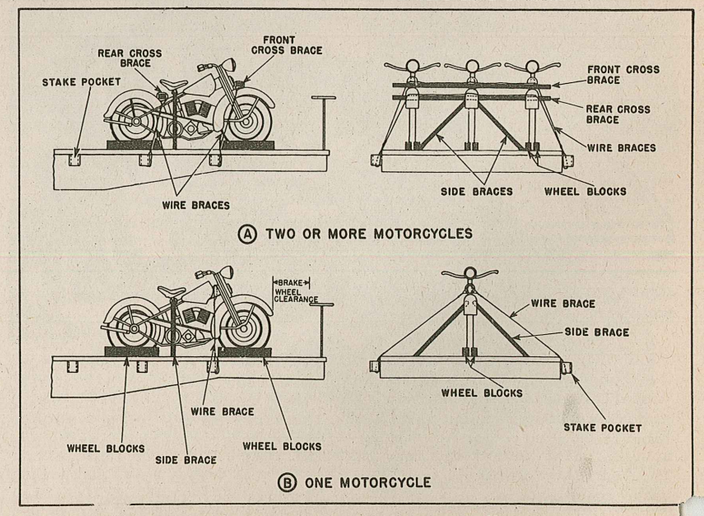


Fig. 14 - How motorcycles are fastened to flatcars. Use plenty of wood and wire. Though you can't see them from here, there are nails on the lumber for the wire to hold to.

shippin' trucks this way for the last seven years - and I ain't never had no trouble!"

Several other people sided with Frank and said (in chorus), "They had them straps pulled up too tight! Their chocks was too loose!"

Looking at the thing from all angles, and after having a special demonstration arranged for us at a considerable expense to nobody in particular, we have come to the conclusion that the strap and anchor method is a fine thing and ought to be noised around. As for Company X - well, as Frank Dabroney says in a paroxysm of rage, "I personally been shippin' trucks this way for the last seven years - and I ain't never heard of no trouble come of it!"

In closing this discussion, let us report that a *third* school of thought on tying vehicles down, just reared its ugly head and whispered, *use both* - use the wire and the strap-and-anchor method together. We say, use your own judgment. The strap and anchor isn't regular issue and will probably have to be bought as a local purchase by interested organizations in the field. (P.S. - The metal anchor plates are called 'Acme Anchors'.)

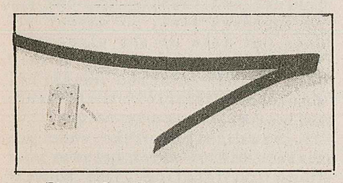


Fig. 15 - The metal strap and one each of the anchor plate and the drive screw.

Another good idea that just occurred to us, is that you don't have to throw the strap and anchor away. Each driver can keep it as part of his tools and equipment It doesn't take up much room.

Summarizing the whole business of blocking and chocking, we'd like to say it's fine when you have the equipment. But if you're ever out in wild country where they never heard of blocks and chocks and you've got orders to move by rail, don't have a nervous breakdown. Use your brains. Chop down some trees and use them for chocking. Just be careful and follow as close onto our directions as you can. Remember moving vehicles by rail can be easy or dangerous, it depends on you.

For some time now, we've been hearing vague rumors about 'brinneling' of the wheel bearings, in vehicles shipped by rail. This simply means that the upper parts of the body constantly jarring up and down on the wheels, breaks down the film of grease on the wheel bearings (remember there's no rotating of the wheels to redistribute the grease over the bearings) and finally ruins them.

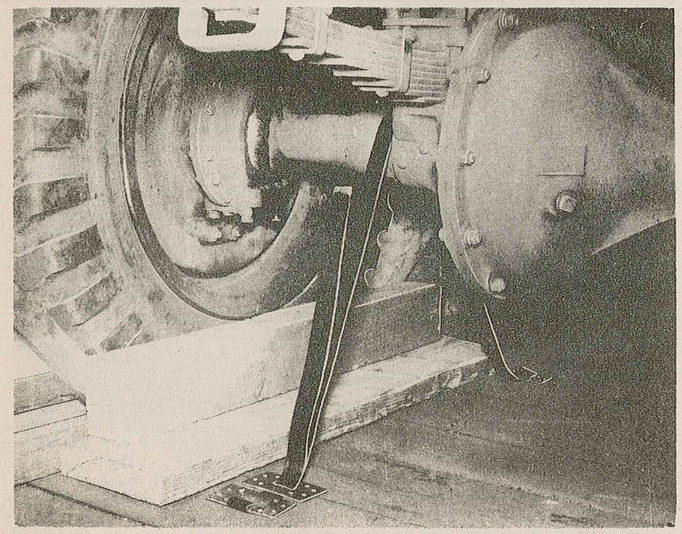


Fig. 16 - The celebrated strap-and-anchor method of securing vehicles to flatcars. Leave about 3/4 of an inch of play in the strap and get those chocks in tightly beneath the tires.

So far we haven't been able to pin anybody down on this 'brinneling', and we haven't run into anybody these last few years who's actually had this trouble. But the rumors got so strong that Holabird Engineers went to work on the case.

Vehicle manufacturers who were questioned about it said that they weren't bothered with brinneling because their cars and trucks, when shipped by rail, were shipped unloaded. They suggested that maybe military trucks loaded with equipment would come down heavy on the wheel bearings, thus breaking down the grease and brinneling the bearings. But they weren't sure.

Holabird Engineers collectively scratching their heads, thought maybe blocking the vehicle up off the floor would remove the danger to the bearings. But admitted that maybe this was a little too tough and risky. Then they thought maybe a wooden block placed between the axle and the load, in some way, would stop the bouncing on the bearings. But this is also a hard and uncertain job.

Finally, the Engineers said, give us a little more time and we'll work something out. So that's what we're doing - but in the meantime, if there's anybody within the sound of our voice who's had any experience with brinneling of the wheelbearings and has an idea on what to do about it, let's hear from you.

Personally, we think it a fairy tale.

Vehicles will have to be arranged tastefully over the tops of the flatcars with particular regard to the matter of clearance. A half dozen front ends lapping over the side of the car, or the top of a truck waving gayly on high will most assuredly pick up a few dents now and then as the train rushes through tunnels or swishes by other trains on adjoining tracks. Speaking of clearance, be sure that no part of the cargo is closer than six inches to the car brake wheel. A little more clearance than this will be heartily appreciated by the guy who might have to jump for the wheel should trouble turn up.

Watch the load capacity of the flatcar, and the distribution of same. You'll notice the 'capacity of the car' stenciled on the side of the car and next to it, the 'light weight of car.' This is to be subtracted from the total weight of *the car and the*

(continued on page 348)

LEAD WIRE *Lunacy*

Haggerty, a svelte figure in greasy dungarees and floppy hat, watched Tech. Sergeant E. Z. O'Flaherty approach from the far end of the shop. When the Sergeant had come just abreast of him, Haggerty put out a warning hand and said, "Whoa."

O'Flaherty stopped working the large piece of cut plug around in his jaw and squinted suspiciously, "Now what?" he said.

"Hey," said Haggerty darkly, "you know that there item you showed me in that there Army Motors magazine last month?"

"Not grammatical," murmured O'Flaherty, "but substant-i-ally correct. You mean that item about the lead wire for measuring the clearance between the con rod bearing and the crankpin journal?"

"Yeah," said Haggerty, "where you lay the wire on the journal, put on the rod cap and tighten it."

He snorted, "The wire is supposed to get squeezed flat and by miking how flat it gets squeezed, you get the clearance."

"What about it?"

Haggerty curled his lip in scorn, "It's a fake."

O'Flaherty groaned heavily and shifted his chaw to the other side of his face, "Fake," he said, "what do you mean 'fake'?"

Haggerty didn't answer. Giving the Sergeant the jaundiced eye, he turned and strolled over to a partially disassembled engine. O'Flaherty shrugged and followed after - the hollows beneath his eyes visibly deepening.

From a table beside the demounted engine, Haggerty picked up a small bag and emptied, onto the table, a half dozen lead wires resembling pieces of sewing thread.

"You watching?" he asked O'Flaherty.

"I'm watching," said the Sergeant.

"Just like the item said," sneered Haggerty, "I lay one of these here wires on the journal, put the bearing and the rod cap back on and tighten it down proper."

"Right," sighed O'Flaherty.

"Now I take off the rod cap again and take out the lead wire which is squeezed flat. I mike the wire....and I get....uh....uh....ah.....0035."

"Thank God," said O'Flaherty, mopping his brow with a large piece of waste, "that's what the manual calls for. Can I go now?"

"Wait a minute.....wait a minute," Haggerty cried, "not so fast, not so fast - I'm coming to the fake part."

He picked up three more lead wires, "Look, I put another wire over here, another over here, and another over here." He distributed them gingerly in various places between the bearing and the journal, "Now I put the rod cap back on and tighten it up. And what do I get!"

"What do you get?" groaned O'Flaherty impatiently.

Triumphantly, Haggerty took off the rod cap, picked up the flattened lead wires and miked them one after the other, ".0035 on one, .0035 on the next, .0035 on the last two."

"So what?" said O'Flaherty, puzzlement growing on his face.

"So what?" roared Haggerty, "I add 'em all up and I get - .0140! *.0140 clearance!* I could keep putting on these here fake wires until I get an inch clearance! Maybe if I got nothing to do some Sunday, I could come in here and keep putting on wires 'till I get a foot clearance! Lead wire! Newfangled gadget, 'at's what it is!"

Haggerty's arms stopped flailing around and came to rest on his hips. He glared at the Sergeant, awaiting an answer - if any.

There was a stunned silence from the Sergeant. Somewhere in the sunny rafters of the shop, a bird that had been singing, stopped. A mouse hustled along the floor and out a hole in the wall.

Over O'Flaherty's coarse features came a look of abject disgust. He said quietly beating the fist of one hand against the palm of the other for emphasis, "I once knew a guy who was the champion dope of the U.S. arms and services. But you, Lunkhead, are the winner and new champion."

Haggerty's full-blown eyebrows raised up in hurt and surprise. Doubt crept ever so slightly over his face.

"To think," O'Flaherty continued, "that anybody with a brain the size of a poppyseed like you got, could live just like the rest of us human beans! The horror of it."

Haggerty recovered quickly, hitching up his pants, "You," he said, spitting on the floor, "You know what you can do. Here I try to go and give you a straight steer - and what thanks do I get?"

"Straight steer....thanks..." repeated O'Flaherty weakly. He mopped his forehead with the piece of waste then blew heartily the noseful that emotion generated. Beads of sweat started out on his brow. "Oh well....why should I aggravate my stomach ulcers. I give up, I'll explain. We've all got a cross to bear." Then to Haggerty, "Try real hard, fathead, gather your brains up into the size of a small pea and listen close."

He picked up one of the lead wires, "This here wire," he said, "is soft. It is lead. When you put it between the bearing and journal and tighten the rod cap, it squeezes flat, it *gives*. It does not take up any clearance. It does not act like a shim."

"Yeah?" snarled Haggerty, suspicion, disbelief and challenge galloping across his face.

"Yeah. Just like when you sieze a bit of water between your thumb and forefinger and squeeze it down. It gives under the pressure. The same way with the lead wire - it flattens down under the pressure and does not take up any of the clearance."

Horrible disbelief twisted Haggerty's features. He was a man undone, struggling against the inevitable. He blinked his eyes, he spat nervously on the floor once, twice and then again. His left ear, a prime specie of cauliflower, twitched enthusiastically of its own accord.

"So even if you do stick a couple of lead wires between the bearing and the journal, the Sergeant continued, "they'll all measure the clearance without affecting it none. Get it?"

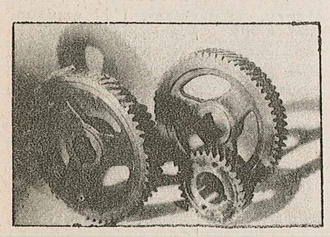
His last words went unheard. Haggerty's eyes, wide-open and glazed, dwelt in the distance. From between his lips unintelligible noises filtered.

O'Flaherty, fascinated, watched Haggerty's ear twitching all by itself. Then he tore himself away, "I knew it would happen," he said to a Sunnen honing machine. "I knew how it would be when them draft boards started bringing in them 4-F's".

He shook his head and shuffled off down the floor. "I really should of known."

Button up your TIMING GEARS

One of the accompanying pictures shows three mangled gears that are prime examples of what can happen when a minor adjustment is neglected. They are timing gears that once were the proud heart of a powerful Hercules engine.

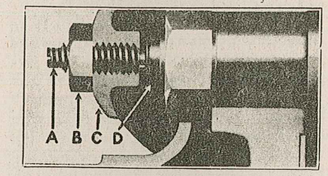


You don't have to look very close to see that these gears are good for nothing but salvage.

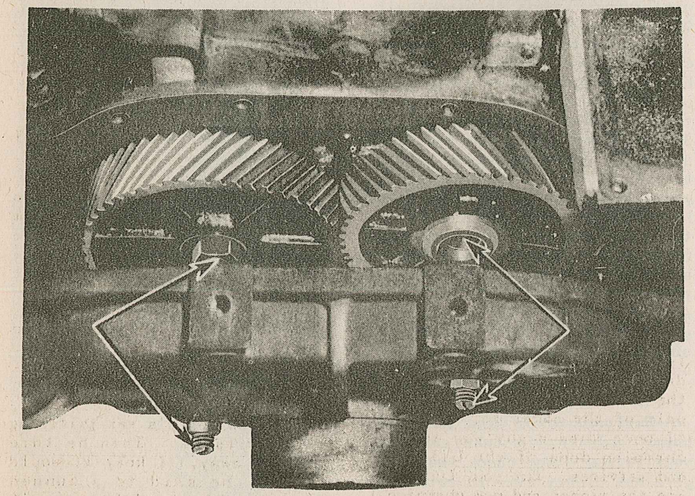
All somebody needed do was tighten the thrust button adjusting screws, back them off an eighth of a turn and tighten the lock nuts.

Yes, it's as easy as saying it; just about ten minutes work that's clearly explained in TM 10-1605. But nobody *looked* at the manual and nobody diagnosed the knock correctly. They did everything from replace timing gears to install new connecting rod bearings. And this, gentlemen, is *not* an isolated case. These engines have been flooding fourth-echelon shops all over the country, presenting major repair problems and costing thousands of dollars in time and money that is sadly needed for more excusable repairs.

Excusable is the right word, because it is absolutely unforgivable for a man to neglect this particular adjustment. Long before any serious damage is caused, these gears knock like burnt rod bearings and make enough noise to rouse a regiment.



A is the adjusting screw. B is the lock nut. C the gear case. D is the shaft thrust-button.



You are now looking straight down on a set of timing gears with their matching thrust-button adjustment screws. You pull 'em up tight, then back them off an eighth of a turn.

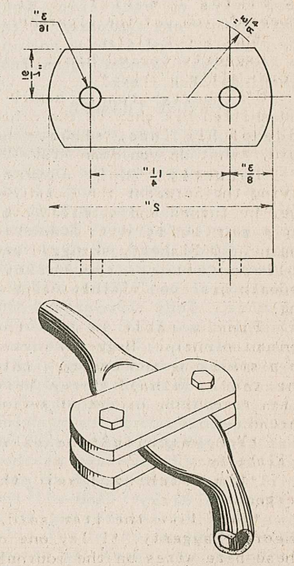
Being honest with ourselves, we'd all have to admit we'd never permit such things to happen to our own cars. We'd stop at the first sign of trouble and have a competent garage man fix us up. Why don't we get wise before it's too late? Why don't we realize that every truck that stays on its job is helping to wind up this shindig so we can go on home to stay?

Turn to page 357

Steam Relief Tube

Condensation is a common engine ailment under certain circumstances. Recently, GMC reported that the 2-1/2 ton GMC (models 352 and 353) operating in chilly temperatures (say below 60° F.) will probably run into this trouble.

Condensation in an engine makes it as pleased with the world as you would be with water on the knee and brain - with aggravation of the kidneys thrown in for good measure. Oh, your



The steam relief tube causes engine condensation - this little clamp will clean it up.

Copper Lead BEARINGS

WHAT HAVE THEY GOT THAT BABBITT AIN'T GOT?

BASED ON MATERIAL SUPPLIED BY GEORGE A. ROUND, CHIEF AUTOMOTIVE ENGINEER, SOCONY VACUUM OIL COMPANY.

"Once upon a time, a man was hanged for a crime he didn't commit. Some of his friends who had come to see him off, cut the rope and began to tidy things up. The executioner, his job finished, hitched up his pants and went home. Suddenly the hanged man got up. He stretched his arms and yawned - rubbed his neck where the rope had chafed it and walked away all by himself."

People who read this story are amazed. (Me too.) They just can't believe it - say it must have been a divine act. It's just natcherly impossible for a man to drop twenty feet, have his neck snapped like a buggy whip and live to tie his own necktie.

But nobody considers it the least bit unusual that the bearings in a truck engine survive similar hangings as often as 3000 times a minute. Spinning crazily up and down, snapped to a quick stop twice on each trip, four times with every explosion of the gas mixture - and with no nothin' to keep their slender necks from breaking. Tsk...tsk...

TORTURE CHAMBER

Only their own toughness and the oil in the crankcase keep the bearings in shape for the toughest job in the engine. And if you think it isn't so, squint at these grim statistics: Rod bearings take a load of over two thousand pounds per square inch under normal conditions, often a lot more. They spin around the crankpins as fast as 1/3 of a mile a minute. They have less than a hair's breadth to wiggle around in. With every explosion they get a sock in the puss from the crankpins; not to mention that centrifugal force tries to tear them off sideways as they whirl around fast enough to make a pinwheel dizzy. And all the time they're sweltering in a hot-oil shampoo.

But do you care? Is it any skin off your nose? Of course not. Why should you worry about somebody else's troubles, *you* do *your* part. Sure, every bit of it; you drive carefully, you hold out your hand when you're gonna make a turn and sometimes you even give pedestrians a head start.

Well, tell me this, do you let the engine warm up at a slow idle so the oil can get all around the bearings, or do you give her the gun and make her pull a load while she's shivering with cold and hungry for oil?

WORST DEGREE MURDER

Do you check the crankcase oil-level when you're supposed to, or do you attend to it immediately as soon as you hear the rods tearing their guts apart? Did you ever see a rod like the one shown at right? Neither did the guy who wrecked the engine. He told the Sergeant he had put in *3 quarts of oil* just a few minutes before. "Then, whaddya think Sarge, all of a sudden the engine tore itself to pieces all by itself widout me doin' nuttin."

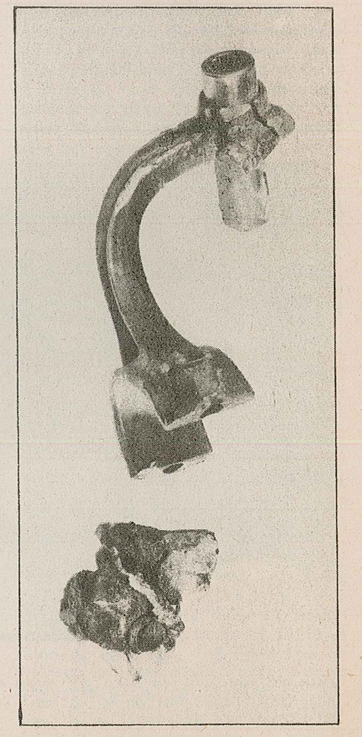
Sure he put oil in it. Nobody called him a liar, but why did he have to put *3 quarts in all at once?* You guess - an engine takes 6 quarts; he had to put in 3 which means the engine had been suffering along on only 3 quarts of oil. Low tide! And he wasn't goin' very fast either - he said he didn't do over forty-five on the whole forty-mile trip. He neglected to mention those hills he came down in third speed - which means the engine spins the equivalent of over *a hundred miles an hour!* He should never suffer the punishment he dished out to that engine.

COPPER LEAD BEARINGS

But you're not like that, we hope - you really take care of your jalopy. You check the oil, give her plenty time to warm up, and not only that, you change the filter cartridge before your oil gets even the least bit dirty. You're not like the guy who raved to a Motor Sergeant the other day, "My oil has stayed so clean I haven't had to change it now for twelve thousand miles. Same oil in that baby they delivered her with - that's sump'n to be proud of!"

"Well ain't that nice," grated the Sergeant. "Sump'n to be proud of? Sez you! Why you're just feedin' your engine slow poison, that's all. You leave the oil in 'til it's so acid it's eatin' away the flywheel." The Sergeant mopped his head, "It's a good thing you're here instead of out in Bataan where the boys have to know how to nurse a piece of equipment along 'til it dies of old age. Or else."

This ham-head wasn't guilty - you're not guilty - nobody's guilty! But facts are facts. And if nobody's doin' anything wrong, *why is the bearing life of Quartermaster vehicles an embarrassed secret,* while commercial truck operators get as high as a quarter-million miles out of 'em?



IT KNOCKED ITS BLOCK OFF! Why? because it was not given oil! A classic example of stupid neglect.

Maybe if we all knew more about what makes 'em tick we'd be a little more careful. O.K., remembering that Army trucks use either copper-lead or babbitt bearings, let's go back to the headline: What have copper-lead bearings got that babbitt ain't got? Or vice-versa.

In order to find out, let's see in the first place what babbitt's got. Babbitt is a mixture of around 90% tin with about 5% each of copper and antimony. By varying the proportions slightly we can make it either harder or softer. There are also so-called high-lead babbitts made up of 75% to 92% lead with varying percentages of tin, antimony and copper. Let's cut into a piece of babbitt and see what it looks like. At first glance it seems like a perfectly uniform material, but t'aint so.

Under a powerful microscope, it's a mass of big and little crystals, mostly little. The big ones are hard and strong, the little ones softer and weaker. Take a look at Figure 1. It's a section of babbitt bearing-liner magnified 200 times. Although they're too small to see in this picture, the dark spaces, too, are filled with crystals, but the big ones looking a bit like Christmas tree tinsel show up plainly.

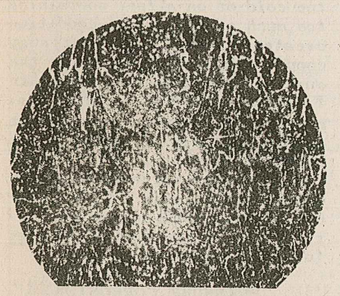


Fig. 1- Not a Christmas tree, but babbitt magnified 200 times to show the crystals, big and little.

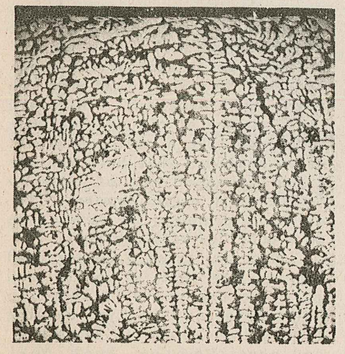


Fig. 2- Here's coarse copper lead magnified 100 times. Copper photographs white; lead, grey or dark.

BABBITT'S CHARACTERISTICS

While the various babbitt mixtures perform differently, they all have similar characteristics. Being relatively soft they try to conform to the irregularities of the shaft and will flow, or 'wipe' a bit if they're fitted too tightly, so that the high spots rub down and the bearing eases itself without damaging the shaft. If a piece of dirt gets into the bearing, it can easily imbed itself in the babbitt and not cut the shaft as it would if the bearing metal were hard. This is all good stuff.

Second, they are not attacked by any of the acids that sometimes get into oil. So when they look pock marked, it's because they've had dirt *pounded* into them. This also is a good feature. One thing more - babbitt is kind to crankshafts. They don't have to be hardened to work with it. If a bearing melts or burns out it doesn't seize and cut unless, of course, you run it without oil. Then the shaft comes down onto the steel shell and it's 'curtains' and soft music for another badly needed engine.

Now let's look at the bad angles. Babbitt compounds are relatively weak and lose strength rapidly as their temperature goes up. One grade of babbitt, for instance, will stand a load of 12,000 lbs. per square inch at 70°F. But at 212°F, it will support only about 6500 lbs., at 300°F, about 4000 pounds. And it melts at 465°F!

That's why it's so important to keep temperatures down. That's why you've got to keep your cooling system clean. A partially clogged radiator, a loose fan belt, late timing, a clogged exhaust, in fact anything that boosts oil temperatures, shortens the life of babbitt bearings. Knocks 'em out on their feet.

We once used solid, thick shells of babbitt but have learned now that thinner liners last much longer and don't crack as easily. So the modern bearing is a steel shell with a thin face of bearing metal about 15 to 20 thousandths thick. In some of the latest bearings the face is as thin as three thousandths thick, which is spreading it *very* thin. Yet, this type lasts longest if it is well lubricated and kept clean.

That's the brief but fairly complete story on Babbitt. There are other good bearing liners, but most of them are essentially cadmium alloys which at present are hard to get; so as long as most manufacturers are turning to copper-lead as being 'best yet', we can omit a comparison with the others.

MEET COPPER-LEAD

You're going to be working with copper-lead bearings more and more, so do yourself a favor and read this carefully - when you've finished, read it again and then put it where you can find it when you need it.

Copper-lead, as it is used for bearing liners, is not what you'd call an alloy. The copper is spongy in structure, in fact you can get a clear picture of the metal by imagining it as a copper sponge with lead in all the little holes. Figure 2 shows a cross section of coarse-grained copper-lead. Figure 3, while not as highly magnified, shows fine-grained copper-lead as it looks after being poured onto the steel shell.

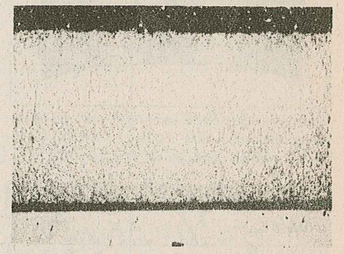


Fig. 3- Fine-grained copper lead. Steel back is solid white, copper above is light, lead darker.

There is no practical difference between the coarse and fine-grained types, they are made according to the manufacturer's conception of the job they have to do. You know how it is, some people like blondes, others prefer brunettes. Ordinarily, though, there's about 70% copper and 30% lead. But the mixture can vary considerably and still serve the same purposes.

The important thing to remember is that the lead merely fills the holes in the copper; the two metals are held together only by the interlocking of their irregular shapes. If a piece of lead were in a hole at the surface, it could, and sometimes does drop out like a filling from a tooth.

Copper-lead bearings have been in use for quite a long time

in marine, truck, bus, tractor and airplane engines. They have proved highly satisfactory because of their ability to give maximum performance under severe loads. But because of their unusual characteristics, these bearings must be fitted with extreme care.

ADVANTAGES AND DISADVANTAGES

Learning the following good and bad points of copper-lead as a bearing metal will help you do a better job of maintenance if you are a mechanic, a better job of preventive maintenance if you only drive 'em or boss 'em.

Copper itself is much stronger than babbitt or cadmium. Its strength doesn't decrease materially when it is subjected to heat in the normal bearing temperature range. Its melting point is 1981°F. and that of lead, 621°F. - both much higher than babbitt, which melts at 465°. So it's obvious that copper-lead bearings will stand hard service better than the softer metals.

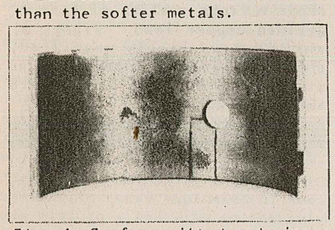


Fig. 4- Surface pitted, and pieces coming out, due to oil acids. No oil change was made for 10,000 mi.

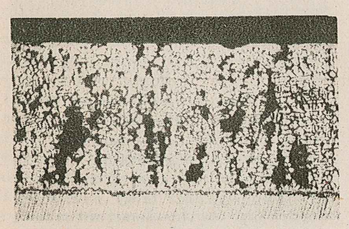


Fig. 5- A slice of acid-corroded bearing. Lead is partly eaten out, pieces of copper broken off.

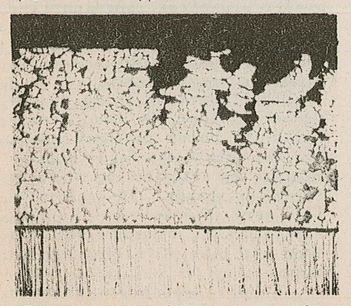


Fig. 6- Part of Fig. 4 magnified 100 times. All lead eaten out down to steel. Ready to fall apart.

Copper alone is not a good bearing metal. It is quite hard and won't conform to the shape of the shaft. If the oil supply is cut off, it heats up quickly and welds to the steel, tearing and cutting things up. This is especially true if the shaft isn't hardened. It also causes more wear than the softer metals when it isn't well lubricated. Dirt can't imbed itself in copper very easily so it's more likely to stay on the surface of the metal and cut up the crankshaft. To cut it short, copper by itself just ain't up to scratch as a bearing liner.

But when you add the lead you have a perfect team. As the bearing heats up, the lead expands more rapidly than the copper and oozes to the top providing a softer surface for the shaft to rub on. You'd be perfectly right in calling it a solid lubricant. By being present at thousands of points on the surface

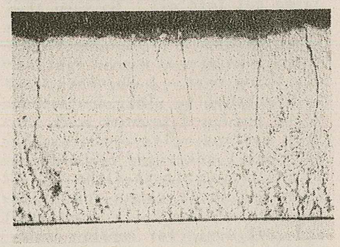


Fig. 7- Cold or copper corrosion. Heavy black deposit on surface, no lead gone but surface pitted.

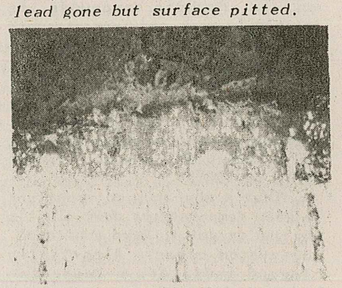


Fig. 8- Here's Fig. 7 magnified 5 times. Lead at surface...no oil-acid attack. It's cold corrosion.

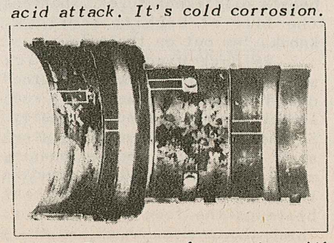


Fig. 9-These came from engine with broken oil line. Not oil-acids. Just pressure and heat. See Fig. 7.

of the bearing, this lubricating effect of the lead offsets the poor bearing quality of the copper. Hence the combination of the two metals in conjunction with a hard shaft gives you satisfactory bearings for extremely hard service if you'll just treat 'em half way decently. (The A.R's would drop the 'if' and the 'half way')

THE CORROSION PROBLEM

The corrosion dagger is always hanging over copper-lead liners, ready to bump 'em off when you slip. It can strike in several ways.

First, the lead can be dissolved by acids developed in the oil itself as a result of prolonged use or at high temperatures ...especially during the break-in period. See Figures 4, 5, 6, Once the lead is gone the copper structure is left unsupported, and it too goes to pieces. This is called hot acid corrosion, because it is due to breakdown of the oil that occurs only at high temperature.

A different kind of acid corrosion results from running *too cold* or on *a fuel containing too much sulfur*. This condition creates acids which...eat away copper and leave nothing on the surface but lead, as shown in Figures 7 and 8. This same effect also results from the use of sulfur-treated oil-filter elements. However, if your bearings are acid-corroded, you can be reasonably sure it isn't the oil filter, because the sulfur-treated type has been prohibited for Army vehicles.

PRESSURE CORROSION

This difficulty, along with the other bearing killers, is an all echelon problem. Pressure corrosion is just another name for various kinds of abuses. It is caused in all cases by the bearings being excessively overheated. Bearings that are too tight will overheat. Bearings that run shy of oil will get hot and pinch like a bunion on a wet day. Bearings that have the tar (lead) pounded out of them by reving up an engine unmercifully, drifting downhill or warming up on a cold day will overheat.

When you treat a copper lead bearing like that, it sweats lead just the way you will when the Motor Sergeant shows you bearing liners like those in Figure 9, and says, How Cum, Bud? Yes, when a copper lead bearing gets real hot, it sweats and loses lead at the hot spots. Sometimes you can see it smeared on the surface.

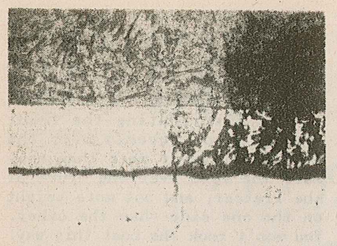


Fig. 10- Lead loss and no lead loss. So, it's pressure corrosion. With oil-acid, lead goes uniformly.

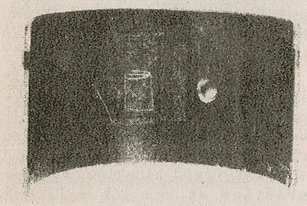
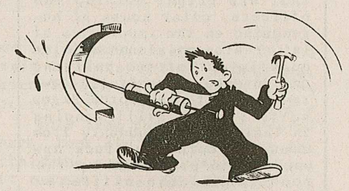


Fig. 11-Cold corroded bearing. Has heavy black tarry coating in holes and all over. Looks moth-eaten.

TESTS YOU CAN MAKE

We can't make a bearing expert out of you in five pages. Until you can pick up a liner and tell with a squint what happened and why, you're still a grease-ball. But here are some tips:

To be a copper-lead Sherlock, all you need is a magnifying glass, a good sharp jack-knife or a needle. No, not that kind of needle - just something to scratch the bearing surface with.



Now lissen, buddy, lead is white when you scratch it. So is a new copper lead bearing. But a copper lead bearing that has lost lead is copper colored when you scratch it down as deep as the lead has been lost, clear to the bottom in Fig. 6, part way in Fig. 5. Make a flat cut on the edge and take a gander - all white? No lead gone, bearing may be OK. Part copper colored with black holes in it, white below or maybe all copper and holey - lead is gone, too bad.

Now, instead of any more jive about fatigue and corrosion and bonding, we'll just slip you these cause and effect tests. They aren't guaranteed to put you in the white coat class, but they're fairly reliable spot checks, better than a lot of wild guesses you've made. Sorry we're not at your elbow when you start scratching.

TROUBLESHOOTING CHART

The chart, which follows, is a good substitute for having a real expert looking over your shoulder when you analyze a set of liners.

The main causes of bearing failure, listed on the left, are the primary faults that may (and usually do) remain undiscovered until you take the pan down for some other reason. In most cases

	COLUMN 1 GENERAL APPEARANCE	COLUMN 2 SCRATCH TEST SHOWS	COLUMN 3 POSSIBLE CAUSES	COLUMN 4 EFFECTS	COLUMN 5 REMEDIES
COLUMN A ABRASION	Figs. 12 & 13. Surface pock-marked. Bright ridges around dents. Scratch in direction of rotation, mainly around oil holes. Grit imbedded. Use magnifying glass to inspect.	If trouble is abrasion alone, scratching surface will show white line indicating no lead loss. If scratch line is copper colored, abrasion is combined with other trouble.	Grit put in with oil. Pieces of metal from other failed part circulating with oil. Dirt left in engine after overhaul or bearing failure.	Abrasives, embedded in bearing, wear and cut shaft. Dirt in oil circulates everywhere. A few small scratches and dents in surface do no harm if not filled with grit.	Keep oil clean. Keep cans, funnels, spouts clean. Wash out and blow out oil passages after bearing failures or engine overhaul.
COLUMN B OIL-ACID CORROSION	May be any color from light copper to black with or without heavy rough deposit. Surface breaking up (see fig. 4). Bearing may look perfect but be loose on shaft.	Scratch in any part of surface shows copper. (See figs. 5 & 6). Cut at edge of bearing (see fig. 4) shows copper. Material feels chalky; good bearing is hard to cut.	Wrong type oil; using oil too long particularly in a new engine; clogged crankcase breathers; extreme overheating.	Quick increase in bearing clearance, loss of oil pressure; noisy engine, rapid failure of bearing.	Use right type oil; change oil as prescribed by manual; keep crankcase breather system clean; avoid overheating.
COLUMN C PRESSURE CORROSION	Looks pitted and burned where shaft bears on it OK elsewhere. Streaked and highly polished areas. May be badly broken up. See fig. 9. Small patches of lead on surface.	Scratch test shows no appreciable lead loss in areas where shaft does not rub appreciably, considerable lead loss elsewhere. See fig. 10.	Liners too tight; poor contact between liner and shell; dirt behind liner, low oil, or oil-pressure; loose mains; extreme overloading (racing engines down grade); overheating.	Bearings loose and noisy; loss of oil pressure; short bearing life; maybe wrecked engine.	Maintain recommended clearances; see that liners have full clean contact with shell; watch oil pressure; don't race down grades or during warm up. Watch the oil level.
COLUMN D COLD CORROSION	Liners pitted and heavily coated with rough black deposit. See fig. 11.	Scratch Test shows no lead loss in any part of surface. Knife cut at side of liners shows white at surface of liners.	Cold operation with fuel high in sulphur; filters containing sulphur.	Quick increase in bearing clearance; loss of oil pressure; short bearing life; noisy engine; possible wreck.	Use Army specification fuel and filters; keep engine temperature up in cold weather.
COLUMN E MECHANICAL FAILURES	Chunks of metal near parting line. Metal only cracking at one side. Liner streaked and polished. No copper left. Back of liner shows spotty shell contact.	Scratch Test shows lead loss only in heavily loaded areas or none anywhere.	Shell out of round; cap pushed sideways. Insufficient oil; extreme over-speeding; dirt between liner and shell; poor bond; liner not firmly fitted in rod, cap or crankcase.	Short bearing life.	Check rod for roundness; use proper wrench to tighten cap-nuts; avoid over-speeding; clean liner and shell; fit liners properly. Preventive maintenance.
COLUMN F GOOD USED BEARINGS	Color - light chocolate to smooth black. No rough, heavy, black coating. Surface smooth, maybe some light scratches and dents. No highly polished copper appearance in streaks.	Scratching surface lightly anywhere gives white line. Flat cut on edge shows only white surface.	The right oil, clean oil, expert driving, good maintenance.	An engine that doesn't fail when your neck is out, wins the war.	Dumb drivers, dirty oil, bum oil, poor maintenance, neck off, lose the war.

the condition becomes steadily worse until that stomach-sinking-knock drums the news. Even then it isn't too late to save all but the noisy bearing if only the boys'll learn to pull over and stop when they hear the first rap.

But we've got to stop wishful thinking - until the fellows behind the wheel get wise and start cooperating, all we can do is fix 'em and fume at 'em. So when you use the chart for trouble shooting, bear in mind that a liner whose suffering started as a mild case of 'Hot-Acid Corrosion' is probably in its last agonies from all five by the time it falls into your palsied mitt.

Remember...if patience and training won't teach 'em the value of a dependable truck, their first taste of shrapnel will. Give 'em time.

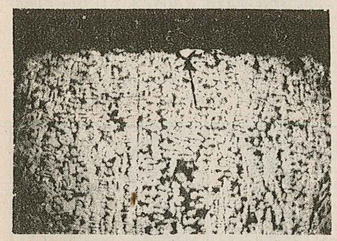


Fig. 12- See the piece of steel bedded in the bearing surface? Sand is even better!

Truck LAYS BOLT

The "C" course, in case you haven't heard, is a brand new course at Holabird familiarizing our top-ranking officers with the deeper mysteries of trucks, truck engines and preventive maintenance. The course is alive with Generals and Colonels.

Anyway, the story goes that one bright morning the officers, after hours of haranguing on the importance of 1st echelon maintenance, filed quietly out of the building and marched thoughtfully down the road, with the words "keep bolts tight", still ringing in their ears. Suddenly from around a corner a truck appeared and proceeded up the road toward the officers. Just as it passed the solemn group, a slight tinkling noise was heard and the truck laid - not an egg - but a body bolt that hadn't been tightened.

"Harrrummph," said a General to another General.

"Harr-harrumphh," said the General to a Colonel."

"Ummmm-harr-harrummpphh," said the Colonel to a Major.

"Say," the Colonel in charge of the course said hoarsely to a Captain, "What do you think the Dodgers will do this season?"

P.S. The best laid plans of mice and men gang aft agley.

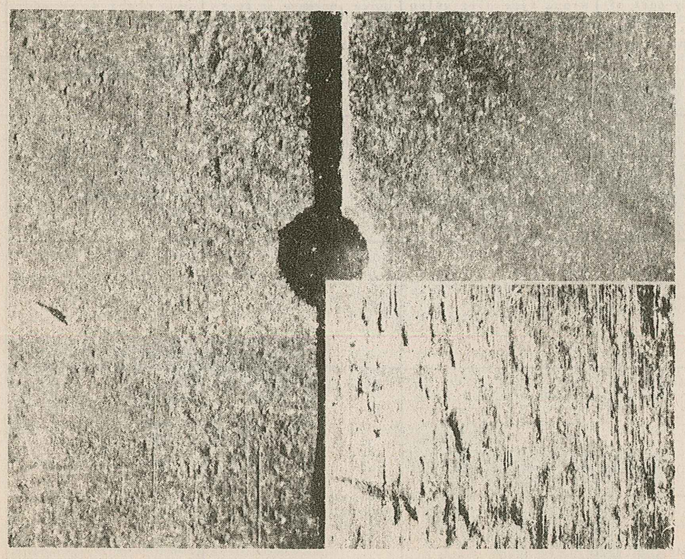


Fig. 13- Grit, buddy, grit. Sand put in with the oil started the dirty work. Pieces of metal helped too. Result, cut shaft and ruined bearings. Look for imbedded pieces at left. See what they did enlarged at right.

MOTOR MARCHING BY RAIL

continued from page 341

load together, and will give the 'permissible weight of the load'.

In distributing the load, spread it out evenly over the entire car never more than one-half the load over one truck of the flatcar, and not more weight on the one side than the other. You won't rock the boat this way. In every case, don't forget to examine the floors of your flatcars. Some of these floors are less than three inches thick. Make sure they're sound and good and strong. There have already been reports of vehicles breaking through these floors.

Setting the ramp up and fixing the vehicles can be worked out by anybody - it's that simple. But why not appoint a permanent crew, wherever possible, to do the loading and blocking. Constant practice at the job will make them smooth, efficient and fast, whereas a new crew everytime has to dilly around figuring things out.

Certain simple precautions are necessary to guarantee a bon voyage for vehicles traveling rail. Put the gears in re[illegible] and set the brakes. Tie [illegible] the canvas and head the vehicles in the direction the train is going. See that the anti-freeze will protect the cooling system to about 15 degrees below the lowest temperature you expect to run into. A 60% solution of prestone offers the maximum protection (62° below). Anything below this demands that you drain the system.

Lock up loose property; tops, end and side curtains; tarps and cushions better be secured against wind and weather. Close windshields and windows, lock and lash doors. Disconnect your batteries. To be really scientific about it, make a 'check chart' covering all the points to be attended to.

Vehicles traveling in open flatcars are exposed to all kinds of hazards. One hazard is the sparks flying back from coal-burning locomotives. Stage frequent inspections.

But in any case, if you ever travel by rail and expect a hot reception at the other end, be sure your vehicles are ready to go the minute the train arrives at your destination. And in detraining, don't back your vehicles off. This strictly invites trouble. Run your vehicles off head first.

P.S. - Don't forget to put your ramp up first.

OVERLUBRICATION

. . . The truck and the sergeant get a pain in the rear

The two small pieces of metal on Mr/Sgt. Pete Gillich's desk looked like a pair of elongated dice - or maybe a couple of slugs that had been pulled out of somebody's body.

Actually they *had* been pulled out of a body - a mechanical body, the rear axle of an Autocar tractor.

Sergeant Gillich tapped the two pieces of metal sadly, "Ruination," he said, "and believe it or not, it wasn't caused by too *little* lubrication - it was caused by too *much* lubrication. If you can believe it."

He leaned over and spat expertly into the cuspidor beside his desk, "The two main troubles we're gettin' in the shop right now, is the overlubrication of the chassis units and the underlubrication of the engine. Take underlubrication of the engine - you know we got enough ruined con rod and main bearings out in the shop to fill a barrel. Look in the crankcase of the trucks they came out of and you'll see that the oil is either too low, or dirty and sludgy as a bucketful of mud. You can blame it on the average driver - he sure don't know what the hell the oil gage up on the dash is supposed to tell him."

The sergeant took another quick aim at the cuspidor then changed his mind, "All that the oil gauge on the dash will show, is that there is some oil in the crankcase. It will keep on telling him that there's oil in the crankcase, until it's all gone. It won't show how dirty or how low the oil is. What these drivers want to do is to get out and look at the dipstick."

"But about this *overlubrication*, I was talking about. Look at these. He picked up the two small pieces of metal from his desk, and pointed to their square, shiny sides, "These here used to be a couple of rollers in the side bearings of the primary reduction gear in the rear axle of an Autocar tractor. Yes, I said rollers out of a bearing, even though they do look like a couple of square cough drops."

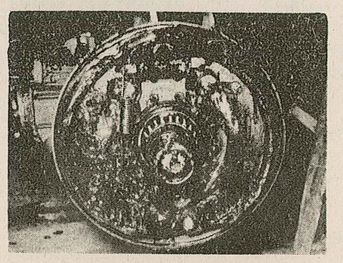
This time the Sergeant reared back, took aim, and spit over the rim of the cuspidor, "And, believe it or not, *overlubrication* was what caused it."

He waited a while to let this sensation sink in.

"Overlubrication caused it because some greaseball went and pumped too much grease into the lubrication fitting of the brake camshaft. The grease rolled right on into the wheel and all over the brake lining. After a while it got gummy and closed up the slight clearance between the brake lining and the drum. This had the same effect on the bearings in the rear axle that these rollers come from, as though some screwball driver was running along with his foot partly on the brake. (Fortunate, the heat generated, went into the grease - it didn't ruin the lining).

It overloaded the entire power train from wheels to engine. Just by chance this bearing was the first thing to go. It got real hot and lost its temper. Instead of crumbling as you would expect the rollers to, they got soft and slid around in their race. That's how come they wore to this shiny square shape."

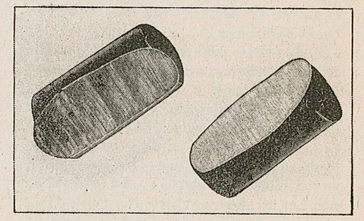
The Sergeant rocked back contendedly in his chair, "That's what I mean by too much lubrication ruining a bearing."



Speaking of overlubrication.. here's one that's had a half-keg more than it should have.

"Now wait a minute," he said suddenly, "let's don't give anybody the idea that there's too damn much lubrication going on in the Army. Sure we want lubrication - we ain't going to get very far without it. But let's do it right. Like on the front axle universal housings. There's a filler plug in the end of the axle either above or below - and a correct level plug above or below on the axle housing."

"You got to pump grease into this filler plug - but also you



got to keep your eye on that correct level plug to know when to stop. Otherwise, sure as hell, you're gonna fill that hub up with grease."

A soldier walked in, laid some papers on the Sergeant's desk and walked out again. The Sergeant ruffled through them briefly then looked up again. "Another thing - grease expands powerfully when it gets hot - and it sure gets hot when it's worked around in a closed housing. In the differential housing for instance. There's a vent on the housing to let the pressure out when the grease gets too hot. But take a walk around and look at some of them vents. Why two times out of three, the vent is so clogged up with dirt, it never lets the pressure out. The only thing left for the hot grease inside to do, is break through the oil seals and run on into the wheels. I guess you've seen enough grease soaked wheels without me telling you about them. They're getting to be a trade mark on Army trucks. All

Care and Feeding of BATTERIES

Based on material furnished by E. F. Grothe, Electric Storage Battery Co., Manufacturers of **Exide** Batteries.

What's in that black, ugly box they call a battery? It has no chrome, it's not streamlined, and it's got practically no sex appeal. What's in it?

A miracle, that's what's in it. No moving parts, there's no noise from it, and yet it produces lightning - all right, electricity. What's it got and what goes on inside there?

That is a long and thrilling story and it goes back to the years around 1780 and a man named Galvani. Galvani lived in Italy and was one of those curious souls who throughout the ages continually hack away at the veil of ignorance. One bright day, in a fit of scientific fervor, this Galvani hung a pair of frog's legs on a brass rod and tickled them with a zinc stick.

A silly enough enterprise for a grown man you might say, but when the frog's legs leaped convulsively and almost giggled out loud, Galvani was delighted. He tried it again and again - and then after a while, he sat down and thought about it. In a little while he knew that he had discovered one of God's great secrets.

Galvani discovered that when two different metals are linked by a liquid conductor, an electric current will flow. The two different metals were the brass rod and the zinc stick, the liquid conductor was the fluid in the frog's legs.

From this peculiar beginning, comes the present day storage battery in your truck. It gives you electricity in exactly that same old way - not frog's legs tickled with a zinc stick, but two dissimilar metals in a liquid conductor. It's a black, ugly box containing a miracle.

Don't, however, get the impression that the battery is the box of juice that runs the truck all by itself - the ignition system of the truck alone consumes enough electricity to choke a horse, and the powers of the battery are limited. The point we want to make is that after a while the battery exhausts itself and must be revived. This exhaustion is a result of the very chemical process that produces the electricity. Something must be done to rejuvenate the battery - and fortunately your truck has just the machine to do it. That little machine is the generator. Besides rejuvenating the battery it delivers electricity to the hungry ignition system, operates the lights, the horn and the radio.

You've seen it - it's that cylindrical thing up near the front of the engine run by the fan belt. Since the fan belt doesn't operate unless the engine operates, you realize that the generator generates only when the engine is running.

Well then, you ask, if the generator furnishes all the electricity needed to keep the truck running, where does the battery come in?

To answer that question, we'll ask you a question. How does the truck get its electricity when the generator isn't working? And remember the generator doesn't work when the engine is stopped. You must have electricity to start the engine and you know you can turn on your lights, blow your horn and play the radio with the engine off. Where does the electrical power needed come from?

Last one that guesses it is a bum. The answer is, the battery.

The battery comes across with the electricity when the generator is off duty. That, in a nutshell, is its function. With the generator off, it starts the engine, lights the lights and blows the horn.

The next question is, how does it do it? Being of sound mind and body, you realize that you just don't set a pair of frog's legs up in business or stick two different kinds of metal in water then sit back and count the volts. There's more to it than that. The amount of electricity produced this way, you could stick in your ear. What you need is a hotter process that will pony up electricity faster than nine electric eels on Saturday night. And that's what you have in the battery in your truck. A hot process: two different lead plates in a solution of sulphuric acid and water. The sulphuric acid and water is known as the electrolyte (pronounced "electric light" by the poolroom crowd) and it attacks the lead plates something fierce. The by-product is *electricity*.

As we warned you before, the whole thing is a miracle. We'll go into it deeper farther on.

The lead plates - usually in groups of from thirteen to twenty-one - live together with electrolyte, in a hard rubber or composition jar. The jar is called a "cell."

There are three cells to the battery in your truck - because of a very peculiar reason. The reason is that no matter how big the cell is, whether it's as big as a house or as small as the end of your nose, it'll only produce two volts. That's all: two volts per cell.

Since your truck has a six volt ignition, lighting and starting system, it takes three cells to supply it. And that's what you've got: a three cell battery.

The three cells are contained in that black, ugly box we were talking about and the box itself is resistant to acid and mechanical shock. This doesn't mean you can lob it up against the wall for exercise. And it doesn't mean that you can let it jingle along loosely in its cradle in the truck. It must be kept tight and frequently inspected for spilled acid that might corrode the metal of the cradle.

The plates, though bunched cozily together in groups of positives and negatives, are each separated from the other by wood or hard rubber separators. These separators are porous to allow a free flow of electrolyte and are grooved to allow for the escape of gas bubbles that arise during charging (rejuvenation of battery). They also let any material that flakes off the plates, fall to the bottom. If and when these flakes fill up the space provided for them at the bottom of the plates and then actually touch the plates, a short circuit results and pop goes the battery. Old batteries frequently run into this trouble.

Primarily, however, the separators are necessary so that the electricity can be properly milked off. Without separators, the plates would touch and short-circuit, spilling electricity all over the place. To milk the electricity off properly, there is a little "lug" or stump at the top of each plate that acts like a cow's spigot and directs the electricity off to the main channel: the "terminal" or "post." You'll notice two of these posts to each cell, one to handle the electricity from the positive plates, the other to handle it from the negative plates.

Anything on the truck that needs electricity from the battery, tosses a line to these posts (via a cable) and gets it from them.

That little manhole cover between the posts is where water is added to the cell. It also has a tiny vent hole to allow the gases to escape. This vent hole must be kept clear of dust and dirt.

But about that miracle of producing electricity from two kinds of lead plate immersed in a solution of sulphuric acid and water - the story goes something like this:

When the cell is fully charged, one of these plates - the negative - is grey, metallic, spongy lead. The other - the positive plate - is brown peroxide of lead. The electrolyte contains its maximum of sulphuric acid. Both plates are very porous, the electrolyte is very strong (comparatively speaking). A cell in this fully charged condition is rarin' to go and will produce its full quota of electricity through the chemical reaction between the electrolyte and the plates.

When the circuit is closed - when you step on the starter or turn on the lights - the cells start discharging or giving up their electricity. The chemical process that takes place during this discharge changes the lead of both the positive and negative plates to lead sulphate. The sulphuric acid in the electrolyte combines with the active material of the plates. As the discharge continues, both plates change more and more to lead sulphate and the sulphuric acid keeps on combining with the active material of the plates. And all the while, electricity is pouring out.

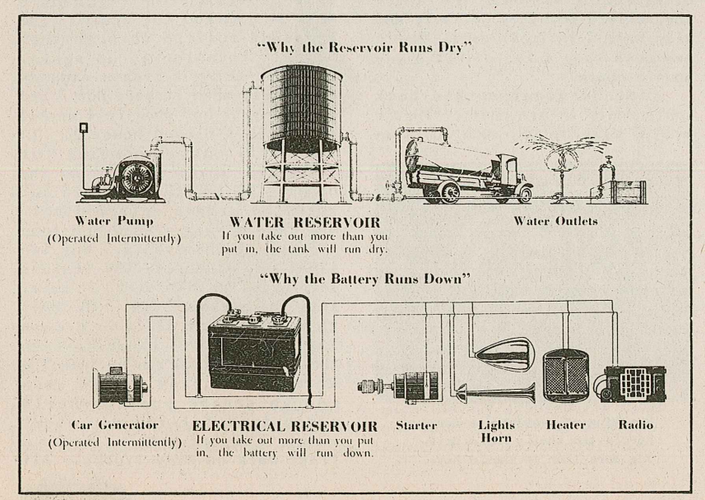
This, of course, could keep on 'til the plates were changed entirely to lead sulphate. Then it would stop because there would no longer be two dissimilar plates, both plates would have changed to the same substance: lead sulphate.

Under the eye of a careful driver this is not allowed to happen. What does happen is that the cells discharge for a short time - say, while the starter is being used - then the truck runs along and the generator rejuvenates them up again, by throwing a direct current into them. The feature is that the chemical action between plates and electrolyte, is reversed: the lead sulphate on the plates starts becoming grey spongy lead and brown peroxide of lead again on the positive and negative plates respectively, and the sulphuric acid returns to the electrolyte. You might say that charging, by reversing the chemical process, replaces the electricity in the battery.

Some of the water, during charging, is broken down by the electric current into gas bubbles that rise and float away. This water must be replaced in the cells about every week or so.

The generator - a mighty machine is he - is able to supply electricity to the ignition system, the lights, the radio and even have some left over to charge the battery as described above. However, all this can be too much of a burden for even the generator, mighty or no mighty. The best practice is to go easy on the electrical accessories and let the battery get all the juice it needs. Furthermore, plates changed entirely to lead sulphate won't be revived at all. Not being "two different metals," they won't respond to the charging current from the generator. The rule about "dissimilar metals" works both ways.

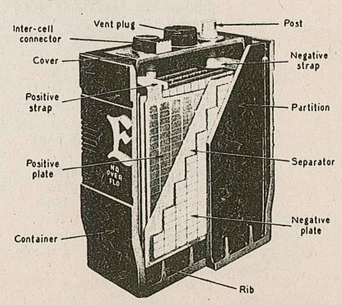
The capacity of the battery to produce electricity depends on the conditions it operates under. At a high, continuous



WHAT DO YOU THINK?

Lieutenant Richard H. Peter of the Army Air Base at Windsor Locks, Connecticut, thinks it might be a good idea to stamp an expiration date on the operators' permits now being issued. He says, "A periodic re-examination would be insurance against present day holders of emergency permits being in the driver's seat until they're feeble old men and no longer capable of split second reactions."

We agree with Lieutenant Peter 100%. Even one year can make a lot of difference in a man's physical and mental condition. Not only that, but why not have every man in Motor Transport pass the driver's exam so a truck will never lie idle for lack of a driver.

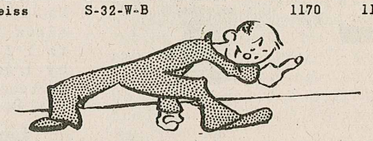


Continued on page 365

Latest Complete List of TECHNICAL MANUALS

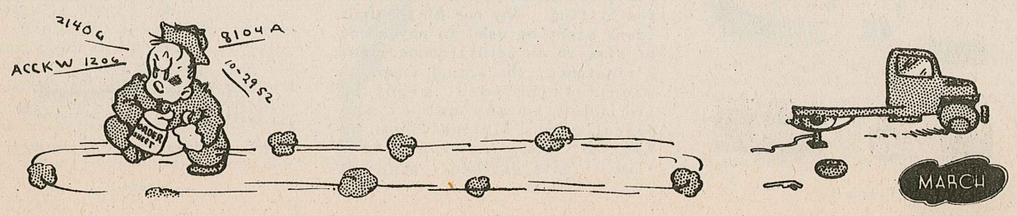
You can junk that old list we ran in December - this is the one to tack up in the shop. It includes all the maintenance and parts manuals for '40, '41 and '42 QM vehicles (except some few additions we'll give you from time to time). Although initial distribution of Parts Lists and Maintenance Manuals is made automatically to depots and maintenance organizations by Holabird, additional copies of these publications should be requested in the same manner as other Technical Manuals. That is, from the Adjutant General's Office through the proper channels as set up in AR 310-200.

MANUFACTURER	MODEL NUMBER	PARTS LIST TM NO. 10-	CHANGE NO.	MAINT. MAN. TM No. 10-	CHANGE NO.
A. Bantam	1/4-Ton 4x4, BRC	1204		1205	
Autocar	5-Ton 4x4 COE, U-5044	1160		1160	
"	5-6-Ton 4x4 Ponton Trk. U-8144-T	1118		1119	
"	4-5-Ton 4x4 Tractor Trk. COE, U-7144-T	1116		1117	
"	2½-Ton Tractor Trk, COE U-4044	1390		1390	
"	2½-Ton 4x4, COE, U-4044	1396		1396	
"	2½-Ton Chassis COE, 4x4 U-2044	1392		1392	
"	2½-Ton Chassis 4x4, COE U-2044	1394		1394	
Ben-Hur	1-Ton 2 Wh Trailer, 41-120	1318			
"	1-Ton Cargo Trailer 41-33	1324			
"	250 Gal. Water Tank Body, K-WT	1212		1212	
Chevrolet	1½-Ton 4x4, G-7105-06-16-07-17-13-27	1126			
"	1½-Ton 4x4,G-7105-06-07-13-16-27-33-17			1127	
"	1½-Ton 4x4, G-4105-13-52-62-63-65-74	1430		1431	
"	Pass.Cars & Trucks, 1941 Shop Manual			1301	
"	Pass. Cars, 1941 Shop Manual			1303	
"	Trucks,1941 Shop Manual			1305	
"	1942 Sedans, L.H. Drive 73-K, 73-L, 73-M	1132			
"	1942 Pass. Cars, B.G.			1133	
"	½-Ton 4x2 Carryall, 3101 Series	1306			
"	½-Ton 4x2 Cargo & Tel. Maint.,3101 Series	1308			
"	1½-Ton 4x2, Stake & Express, 4109, 4103 and 4409	1310			
"	1½-Ton 4x2, 4104, 4109	1310	1*		
"	1½-Ton 4x4, G-4112	1202		1203	
"	1½-Ton 4x4, G-4103,COE	1202	1*	1203	2*
"	1½-Ton 4x4 Tel. Maint. G-4112	1202	2*	1203	1*
"	1½-Ton 4x4 Airfield Serv. Trucks, G-4112	1202	3*	1203	
"	1½-Ton 4x4 Tractor Truck G-4112	1202	4*	1203	
"	1½-Ton 4x4, G-4112 YP Tel.Maint. Special Equip.	1202	2*	1203	3*
"	Tractor Truck 4x2, 6-Ton 4103-AR	1316			
"	Master Parts Price List 1929 to 1941	1312			
"	Pass. Cars and Trucks, BL-3/4-Ton, MR-1½-Ton	1166			
"	3/4 & 1½-Ton 4x2, 3604 and 4107			1167	
"	1/2-Ton 4x2 (LC)Telephone Maint., Suburban & Cargo 3103-04-16	1250		1251	
"	1/2-Ton 4x2, 3103 & 3105	1164		1165	
"	1½-Ton 4x4 COE, Series 7123	1130		1131	
Chevrolet	1½-Ton 4x4, 7105-06-16-07 17-13-27-33	1126	6		
"	3/4-Ton 4x2 Panel, 3605	1286		1287	
"	1½-Ton 4x2 Dump, 4103 (31-B)	1298		1299	
"	4x2 Ambulances, 4105	1364		1365	
"	Cars & Trucks R.H. Drive BG & BK	1128		1129	
"	3/4-Ton 4x2 Pick-up Box 3604 R.H. Drive	1162		1163	
"	1/2-Ton 4x2 R.H.Drive 3116			1247	
"	1½-Ton4x2, 4109 (31-D)	1340		1341	
Corbitt	6-Ton 6x6 Prime Mover 50-SD-6 (Special Edition)	1158		1159	
"	6-Ton 6x6 Prime Mover, 50-SD-6	1108			
Diamond T.	4-Ton 6x6, 967	1602		1603	
"	4-Ton 6x6, 967 (Parts Price List)	1602	1*		
"	4-Ton 6x6, 968-969-970	1604		1605	
"	4-Ton 6x6, 968-969-970 (Parts Price List)	1604	1*		
"	4-Ton 6x6, 968A-969A-970A	1606		1607	
"	4-Ton 6x6, 968A-969A-970A (Parts Price List)	1606	1*		
Dodge	1½-Ton 4x4, VF-401-402-403	1192		1193	
"	1½-Ton 4x4, VF-404-405-406-407	1178		1179	
"	1/2-Ton 4x4, VC-1,2,3,5 and 6.	1180		1181	
"	1½-Ton 4x2, WF-31	1156		1157	
"	1/2-Ton 4x4, VC-1,2,3,4 and 5.	1210		1211	
"	1/2-Ton 4x4, WC-1 Thru WC-10	1122			
"	1/2-Ton 4x4, WC-1 Thru WC-10	1122	1*		
"	1/2-Ton 4x4, WC-1,3,4,5, 6,7,8,9,10, and 11	1120		1123	
"	1/2-Ton 4x4, WC-12 Thru WC-20	1200			
"	1/2-Ton 4x4, WC-4,6,7,8, 9,10,11 and WC-12 to WC-20			1201	
"	1/2-Ton 4x4, WC-4, & 6 to 20			1201	1*
"	1/2-Ton 4x4, WC-4,6,7,8, 9,10,11	1198		1201	
"	1/2-Ton 4x4, WC-21 to 27 40 & 41	1152		1153	
"	1/2-Ton 4x2, WC-36 to 39 Incl.	1154		1155	
"	1/2-Ton 4x4, WC-1 & WC-3 Thru WC-11			1123	1*
"	1/2-Ton 4x4, VC-1 and VC-5	1194		1195	
"	1/2-Ton 4x4, WC-12,13,15, 16,18	1368		1209	
"	1/2-Ton 4x2, WC-47, 48, 49, 50	1378		1379	
Federal	4-5-Ton 4x4, COE, 94x43	1106		1107	
Fruehauf	Semi-Trailer, Gas. Tank YO-2-DF Special	1184		1184	
"	Semi-Trailers, 10-Ton, 220-S	1294		1294	
Ford	1/4-Ton 4x4, G.P.	1100		1101	
"	1/4-Ton 4x4, G.P. (Two & Four Wheel Steering)	1100	1	1101	
"	Chassis, Cars and Trks. 1938 to 1941	1342			
"	1½-Ton 4x2 Stake & Dump 134" Wheelbase	1138			
"	1½-Ton 4x2, 134" Wheelbase	1328			
"	1½-Ton 4x2 Tractor Trk. 134" Wheelbase	1256			
"	1½-Ton 4x2 Cargo Body 134" Wheelbase, Body Parts Price List only	1474			
G.M.C.	2½-Ton 6x6, CCKWX-353	1104		1105	
"	1½-3 Ton 4x4, COE, AFKX-352	1400		1401	
"	2½-Ton 6x6, CCKW 352-353	1500		1501	
"	2½-Ton 6x6, CCKWX-353, (Numerical Price List)	1104	1*		
"	1½-3-Ton 4x4 COE, AFKX-352	1136		1136	
"	1½-3 Ton 4x4 COE, AFKX-352	1226			
"	2½-Ton 6x6, ACKWX-353	1232		1233	
"	2½-Ton 6x6, ACKWX-353, Serial No. 5067 to 5517 5549 to 6018			1241	
"	1½-Ton 4x2 COE, CF-351	1702		1703	
"	1½-3 Ton 4x4, CCK-353			1265	
"	1½-3 Ton 4x4 COE, AFKX-352			1231	
"	2½-Ton 6x4,COE, AFWX-354	1262			
"	2½-Ton 4x4, AFKX-502	1238		1239	
"	2½-Ton 4x2, AC-723 - AC-725			1261	1*
"	Trucks 1939 and 1940, AC & AF-500-550-600-650-700-800-850	1260			
"	2½-Ton 6x6, ACKWX-353	1232	1*		
"	1½-Ton 4x2, AC-AF-100 to 450	1258		1259	
"	4-Ton 4x4, COE. AFKX-804	1700		1701	
"	2½-Ton 6x6, CCKW-352-353	1146		1147	
"	2½-Ton 4x2, AC & AF 500-850			1261	
"	1½-3 Ton 4x4, COE, AFKX-352	1214		1215	
"	4-Ton 4x4, COE, AFKX-804			1291	
"	2½-Ton 6x6, CCKW-352 and 353 (Price List)	1146	1*		
"	5-Ton 6x4, CCW-353	1222		1233	
"	2½-Ton 6x6,CCKW-353			1253	
"	2½-Ton 6x6,CCKW-352 and 353	1268			
Harley-David.	Motorcycle Solo, 1942 W.L.A.	1174		1175	
" "	Motorcycle Solo, 1940 and 1941, W.L.A. 45	1352		1359	
" "	Motorcycle Solo, 1941 W.L.A. 45			1361	
Harley-David.	Motorcycle Solo & Sidecar, 1930 to 1940 W.L.A. UA LE	1354			
" "	Motorcycles Solo & Sidecar, 1940-1941 W.L.A. 45 1940 UA 74" & 1940 LE	1350			
" "	Motorcycle Solo, 1940-41-42 W.L.A.			1177	
Heil Co.	Portable Gas Dispenser T-1022-6	1134		1134	
Highway Trailer	Semi-Trailers 6-Ton Vans & Chem. War Vans, S.K.D.-1742A- 2043F	1168		1168	
Indian Motorcycle	Motorcycles Military 340 with sidecar	1282		1283	
"	Motorcycles Military 45-640B (Second Edition)	1280			
"	Motorcycles Military 45-640B	1276		1279	
"	Motorcycles Solo, 741 B	1490		1491	
"	Motorcycles Solo, 340 B	1332			
"	Motorcycles Solo, 741 B	1490	1*		
International	2½ Ton 4x2, K-7 (Contract 9268)	1140		1141	
"	2½-Ton 6x6, M-5-6	1504		1505	
"	2½-Ton 4x2, K-7 (Contract 10615 & DA-26)	1114		1115	
"	5-Ton 4x2, KR-11	1144		1145	
"	2½-Ton 4x2 Dump, K-7 (Contracts 10788 & 10797)	1172		1173	
"	2½-Ton 4x2, K-7 (Contract 10973)			1173	1
Mack	2½-Ton 6x4, 1940 NB	1188		1189	
"	Prime Mover 6x6. NM 1940	1182		1183	
"	5-6-Ton 4x4 COE, JNU-1 & NJU-2	1704		1705	
"	Prime Mover 6x6, 6-Ton NM-3 (1941) for A.A.Gun	1600		1601	
"	2½-Ton 4x2, EES	1190		1191	
Nash-Kelvinator Corp.	Trailer 1 Ton 2-Wheel "A"	1370		1370	
Plymouth	Sedans, P-11 (Preliminary)	1148		1149	
"	Sedans, P-11 (Second Edition)	1150		1151	
Reo Motors	2½-Ton 4x2, 21 BHHS & 21 XHHS	1270		1271	
Studebaker	2½-Ton 6x6, US-6	1502		1503	
"	2½-Ton 6x6, US-6	1502	1*		
Willys-Overland	1/4-Ton 4x4, MA	1102		1103	
"	1/4-Ton 4x4, MA	1102	2*		
"	1/4-Ton 4x4, MB	1206	4	1207	3
"	1/4-Ton 4x4, MB (Price List)	1206	5**		
"	1/4-Ton 4x4, MB			1207	1*
"	1/4-Ton 4x4, MB			1207	2*
Winter Weiss	6-Ton Semi-Trailer S-32-W-B	1170		1170	



*To be used in conjunction with basic publication. Example: Studebaker TM 10-1502 Change 1. Should be used with TM 10-1502.

**Parts Price List inserted in back cover of TM 10-1206 Change 4.



BRASS FITTINGS *You've got to have the right connections*

Based on material furnished by the Imperial Brass Manufacturing Company.

Brass fittings - those little connections used to hook up copper or steel gas and oil lines have been bothering some friends of ours in the field. Now, there's so little you have to know, to know *all* about the four most widely-used types of these fittings, that it's a shame to go around in the dark any longer.

So give eye, for here's the brief but complete story of these four types of fittings (and some of their relatives). They've got Federal Stock Numbers and they're in the Parts Common Manual. Understand them now and you'll never have trouble again.

In the first place, remember that we use *brass* fittings because they're rustproof; in the second place, our brass connections are leakproof - we'll tell you why, later on.

The four types of fittings are:

Compression (also called "solderless" compression)
Double Compression
SAE Flare
Inverted Flare

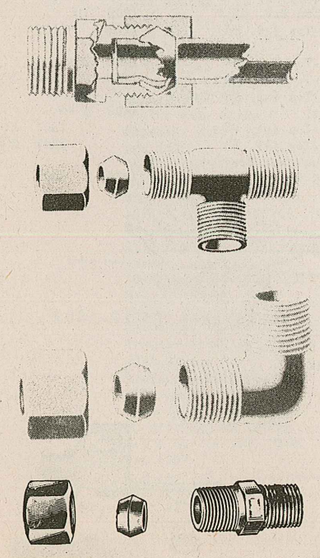


Figure 1

The first type, *Compression*, (Fig. 1) consists of a Body, a Sleeve and a Nut. The tubing runs into the body and is held securely by the sleeve and the nut. The trick is that the nut (which, you can see, has an inside shoulder) draws the tapered sleeve up to the body and this in turn, catches the tubing by the neck, holds it firmly and seals against the escape of fluid. As a matter of fact, once you use that sleeve, you probably won't ever get it off again except with an ax.

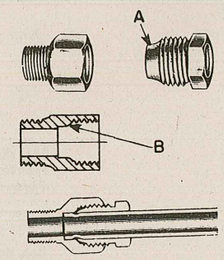


Figure 2

Compression fittings come in a variety of sizes from 1/8 O.D. (Outside Diameter of the tubing being used) to 3/4 inch O.D. We don't have the room to list them, so to get the exact sizes that this and the three other types of fittings are available in, look in your Parts Common Manual. If it'll help you any, sizes run like this: from 1/8 to 1/2 inch, the sizes increase by 1/16's; from 1/2 to 1, they increase by 1/8's.

Before going any farther, keep in mind that each of the four types of fittings we are listing and describing, represents a principle, that is, it shows the scheme or theory behind the fitting. Any one of the four ideas might be used in any shape or size in an actual connection. F'rinstance, the actual Compression fitting idea, might be included in any one of the miscellaneous fittings shown in Fig. 1. from an "elbow" to a "tee." It's all beer, see, but it comes in different cans. Same way with the Double Compression and the two flare-type fittings.

The second type of fitting, *Double Compression*, (Fig. 2) consists of two parts; a Nut and a Body. The nut has a male thread with a thin tapered end (A) extending beyond the threading. The body has a female thread to receive the nut, with a tapered belling (B) at the base of the (inside) thread.

In this case, the nut screws into the body and its thin tapered end catches the tubing and compresses it firmly. The sealing point is where the tapered end catches the tubing by the neck. As with the other types of fittings, look in the Parts Common Manual for sizes. Both of the fittings just described stand on their own feet - you don't have to do anything to the tubing to make them work. The next two types of fittings, are going to need "flaring" - you'll have to spread out the end of the tubing like a funnel to get them going.

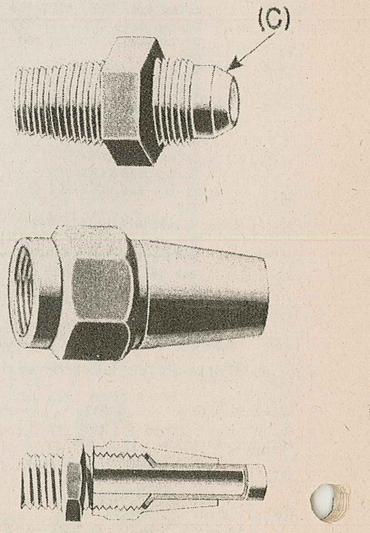


Figure 3

The flaring tool shown in Fig. 9 does this.

The third type of fitting, *SAE Flare*, (Fig. 3) consists of a Body and a Tapered Nut. The trick to remember here is that the body has a "seat" or a "face" (C) and that the tubing used, as we just said, has to be flared. This flare then sits on the seat of the body and the nut is screwed on. The nut has a shoulder and the flare gets sandwiched firmly between seat and shoulder.

You can see yourself that this fitting is right and tight - it aims to please. The sealing is done by the "sandwich."

The fourth type, *Inverted Flare*, (Fig. 4) consists of a Body and a Nut and also requires that the tubing be flared. The thing to remember here is that the seat for the flare is on the inside of the body (D) and that the nut has a slight bell (E) on the end. When the nut is screwed in, the bell sandwiches the flare against the seat.

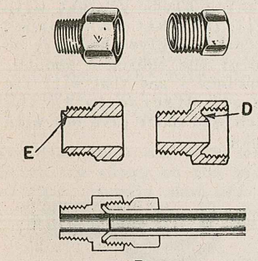


Figure 4

The seal then, as in the SAE Flare, is at this "sandwich."

Well, that's them: the four bright ideas in brass fittings.

As we said before, the fittings are leakproof and don't need packing or gaskets. In the old days, they did use a kind of packing, string-like material that had to be wound around the threads. But it was a nuisance and today - praise Allah - our fittings are made so that they don't need packing.

Of course, this doesn't go if the fittings are damaged. For instance, a chewed up seat on a flare type of fitting will leak like a moth-eaten beer barrel. A new fitting is the only thing that will do the job.

You won't have to kill yourself tightening brass fittings either. Just listen for the squeak. An old brass fitter with a grey beard and bloodshot eyes tells us that when your fitting is tight, it squeaks once - that's the signal to take your wrench off.

Of course if you're trying to hitch the wrong kinds of threads up, you won't get a squeak - you get a squawk.....from the guy whose truck you're working on, when the connections start leaking.

Threads must be of the same kind, diameter and pitch. The pitch is the number of hills (or valleys) in an inch of length; the diameter is not so easy to discover - you'll have to learn to tell by just looking.

Probably you already know that threads are either straight or tapered. (Fig. 5). For them as don't know: straight threads are of the same diameter all the way along the length of the threading; tapered threads, known as IPT or Iron Pipe Thread, get progressively larger along the length of the threading. The idea behind tapered threads is that when they're screwed into something, they'll jam tight - like a wedge entering a hole.

To show you the difference in the work done by the straight thread and the tapered thread, take a case where a brass connection attaches a hunk of tubing to a fuel pump (Fig. 6). The connection has two ends - end "F" screws into the fuel pump - to do this it has tapered threads. As the connection is screwed into and tightened up in the pump, these tapered male threads seat firmly against the tapered female threads in the pump, and act as a seal against leakage of fluid.

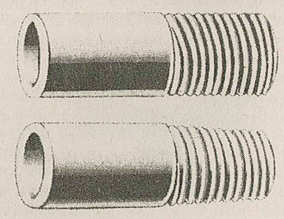


Figure 5

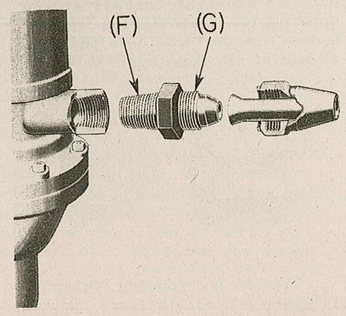


Figure 6

The other end of the connection, "G," has straight threads. These only support the tubing, that is, they bring the tubing into the connection but they don't do any sealing. The sealing against leakage is done by one of the four types of fitting ideas we have explained: compression or flare.

One warning though: in certain cases - some carburetor or other fragile parts - tapered threads are taboo. The wedging action of the tapered threads is likely to crack the part. Straight threads have to be used. In this case, some other method of sealing is needed - maybe a gasket.

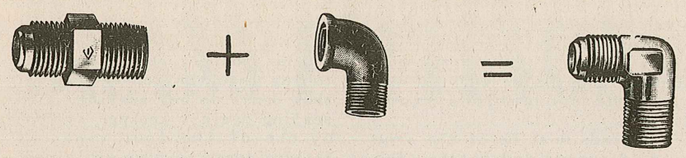
Anyway, remember that tapered threads will seal - straight threads won't, except with packing of some kind.

Now that you know something about brass fittings, you'll want to know something about the tubing they connect. There's copper tubing, steel tubing and sometimes brass tubing. The sizes of these, commonly used in automotive work, are 1/8, 1/4, 3/8 and 5/16 inch. Automotive iron pipe is usually 1/8 inch - and here's an odd fact you might tuck away in the back of your skull: pipe that is referred to as 1/8 inch pipe, is not actually 1/8 inch in diameter - that's only the name it goes by; it might just as well be called Mike or Pete or Joe. The *actual size* of 1/8 inch pipe is a lot different. (All right so it don't make sense! But that's the way it is.) Now remember we're talking about iron pipe, not tubing. 1/8 inch tubing is actually 1/8 inch in outside diameter.

As with brass fittings, you'll soon learn to tell the various sizes of tubing, just by looking.

A couple of hints in working with tubing: seamed steel tubing won't flare or bend satisfactorily - the seams open up. Copper tubing is hardened by bending or any other manipulation. The same goes for brass tubing. To soften both of these for purposes of bending, heat them red hot and let them cool.

Going back to brass fittings, here's a couple of tips for young bucks with short horns: When you come across a fitting with a tubing connection on one end and a pipe thread (tapered and made to go into a fixed part) on the other (Fig. 6), fasten the pipe-thread end first - then work with the loose tubing connection. Or if you want to tighten up the pipe-thread end of this kind of a



Street Elbow
1/4" O.D. x 1/8" I.P.T.* 1/8" I.P.T. x 1/8" I.P.T. 1/4" O.D. x 1/8" I.P.T.

*I.P.T. - Iron Pipe Thread

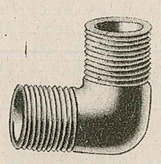
Figure 7

connection, loosen the tubing connection a half turn or so, then tighten the pipe thread end. You'll work more freely this way and won't twist up the tubing while trying to tighten the pipe thread.

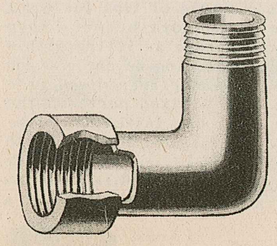
Put a drop of oil on any threaded surface to lessen the friction of dry threads in tightening. This'll shortcut the chance of stripping threads.

In an emergency, when you don't have just the right fitting you need, don't tear your hair out. If you're smart and know how, you can often use two other fittings to take the place of the missing item. Example: (Fig. 7).

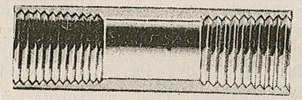
Just to give you a smattering of ignorance about the various kinds of animals you're likely to run into in the brass fittings jungle, run your eye over the following menagerie:



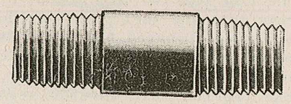
This is an "ell", or "elbow". It is used to conduct liquids around corners to avoid making sharp bends in tubing and collapsing same. As for threads on the ends, well, it's likely to have straight threads on both ends, or tapered (pipe) threads on both ends - or even a pipe thread on one end and a straight thread on the other. As for sizes, you can get it in any combination of sizes. (See your Parts Common book.)



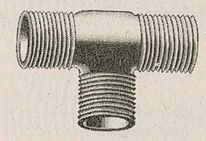
This is a 'street ell' (bottom, first column). Guess what it's used for? (Okay, the female takes a male connection coming in; the male takes a female going out - or vice versa.) *Comes in any combination of sizes.*



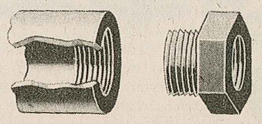
This is one variety of "sleeve coupling". It's got pipe threads at both ends and connects up a couple of males.



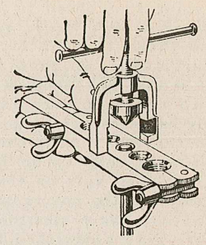
This is a "nipple". It's got pipe threads at both ends which are of the same size. The thing comes in different lengths.



This is a "tee". It can have pipe or straight threads at any opening, it doesn't give much of a darn. And it can have any size at any of the openings.

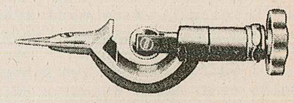


This is a "reducing bushing". It makes a small threaded opening out of a large threaded opening.



This is a flaring block, you can't flare tubing without one. You'll need one in working with the two types of flare fittings.

Of course, you may have seen some old time brass fitter with a grizzled puss take the end of an ice-pick and flare the end of a piece of tubing with it. But don't ever try it. Tubing flared with an improper tool like an ice pick or something, is full of microscopic hills and valleys and when it's fitted into the brass connection, will produce more leaks than a rusty sieve. The flaring block you get with your fittings kit is designed specifically to give the flare on the end of the tubing a smooth, clean surface - one that will lie neatly and discreetly in the 'sandwich' and won't give out with any leaks.



This is a tubing cutter. If you don't have one, you can cut tubing with a hacksaw then file and ream the end to make it neat.

Well, there you have it, the brass fitting situation well in hand - in a loose moment you might even call it the basic course. Although it's not everything you'll possibly ever get to know about fittings, it should see you through any trouble with them you'll ever encounter around a truck.

If you've been worrying about "flexible" (fabric or rubber outer covering) lines or tubing, stop now because there's nothing you can do about changing the fittings on them. The tubing and the fitting come inseparably together, you can't take them apart without busting them. If a change is needed, the whole unit has to be changed: line and fittings.

But you'll learn these things just knocking around. You'll be a brass fitter before you know it.

STEAM RELIEF TUBE

Continued from page 343

engine will be tickled to death.

Agreed, then, that condensation is undesirable in any engine, GMC is happy to report a good way to shut off the flow of water through their steam relief tube. It consists of placing a clamp on the section of rubber hose at the upper end of the tube.

On today's blue plate special, you have the cherce of two: you can either requisition the makin's of the clamp from Ft. Wayne QM Motor Base, Detroit, Michigan; or you can make your own clamp.

Order from Ft. Wayne as follows:

2 Parts No. 2173449 Clamp Plate
2 Parts No. 159674 Bolt (8-32x1)
2 Parts No. 10392 Nut (8-32)

If you roll your own, what you will wind up with is two pieces of flat metal held together on the rubber hose by a couple of nuts and bolts. It will look like our diagram and the recipe goes like this:

Two pieces of flat mild iron (hot rolled) stock 1/8" x 7/8" long with two 3/16" holes 1-1/4 inches apart drilled on the ter line in each piece of ck.

Two 8x32 bolts one inch long.

Stick the clamp on the steam relief tube, it will shut off the flow of water - and condensation won't bother you.

Windjammer

The Editor
Army Motors

Dear Sir:

I am sending you a drawing of this handy little tool I made here at the shop. This tool has been used for cleaning breather lines in motorcycle oil tanks, and for pumping oil from 55 gallon drums during cold weather. The copper line on the end can be used for blowing out carburetors and gas lines. This tool can be used for many other jobs requiring air pressure. The vent cap in the middle is a cast iron one from a drum.

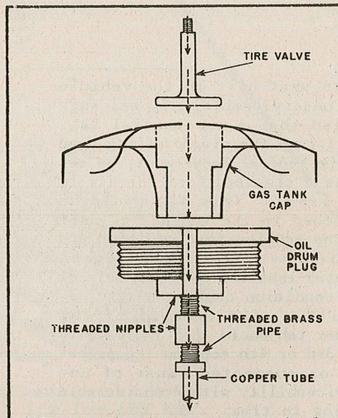
Sincerely yours,

Pfc. Fred Brod,
Troop E, 104th Cavalry,
Indiantown Gap, Pa.

EDITOR'S COMMENT: The drawing of invention by Pfc. Brod shows how it should be assembled. Solder the tire valve to the gas tank cap. (If you're going to use the tool for motorcycles only, have the motorcycle gas tank cap soldered on.) Next solder this to the oil drum plug, and solder the plug to the line connections. The threaded nipple and pipe should not be soldered on to the threaded pipe but should be removable.

Trouble will get you if you don't watch out when using this tool. In attaching the chuck of the air hose to the tire valve, you should watch your step. Use just the right amount of air, not too much, or -- and take our word for it -- you'll blow something apart! The next caution is in using the tool for gas tanks. Here you should take care to disconnect the fuel line from the gas tank. If you don't, we'll be tempted to call you a dope; for then you'll clean the tank, but blow all the dirt into the line. Troublesome....isn't it? In using the tool for the oil drum, here again be sure to watch your air pressure. If you use too much, you'll find that instead of forcing the oil out through the spout, you'll have it coming out of the seams of the drum, and out of the sergeant's left ear (right if he's right handed). The last caution is to be watched when you're using the tool to clean the fuel line. Attach the line from the pump end to the threaded nipple on the tool. Then disconnect the line at the gas tank end before turning on the pressure. You know why...so it will not blow any dirt into the gas tank.

From all appearances and minor tests, this seems to be a practical instrument which can prove itself a useful timesaver.



Shoot the ozone to me, John boy and use this artful air tool.

Rushins

Are you a Rushin?

We don't mean one of Uncle Joe Stalin's boys - we mean are you a *Rushin*, one of those guys who, when he has to go, has to go fast. A Rushin is a guy who gets in a truck and tears up the road forty-fifty miles an hour to return some empty Coca-Cola bottles. He gets fifteen cents back on the bottles but he wastes sixty cents worth of rubber rushin' along. A Rushin. Haste makes waste.

You'd think with the desperate shortage of rubber and all, that some of these Rushins would smarten up. But no, no matter how trivial the errand, they tear along like the back of the truck was trying to bite the seat of their pants off.

Next time you see a Rushin, snatch his ears off, will ya?

Checker Game

In a letter to Army Motors, Lieutenant Peter B. Hale, Motor Officer of the 813th Tank Destroyer Battalion, says he doesn't know how many organizations are using a similar system but here's what they're doing:

Every day a battalion mechanic takes an air compressor to each company and supervises while company mechanics inflate tires on all vehicles.

Twice each week the Inspection Sergeant checks each tire for cuts, bruises, wear and proper pressure.

Once each week the Battalion Motor Officer checks up on all the previous checkers.

EDITOR'S COMMENT: We don't know either, Lieutenant, but if they are we're surprised; if they aren't, they should be; if you keep it up you're doing a swell job.

TECH MANUAL ERRORS

American Bantam, 1/4 ton, 4x4, Model BRC Parts List -- On page 41, under subgroup 0607, Headlamp Assembly, LH, Part No. R-11056, is incorrect. Change the Part No. to R-11506. Make the change in the index.

* * *

Dodge 1/2 ton, 4x4 Maintenance Manual, (TM 10-1201) -- The torque for tightening the connecting rod bolt, shown on page 182, is wrong. It should be 45-50 lb. ft. (as on page 122 of the manual).

CONTRIBUTIONS

MEMORANDUM TO: Commanding Officer,
Holabird QM Depot.

1. On a visit to Fort Jackson, some time ago, various problems in connection with motor maintenance during the First Army maneuvers were discussed with 4th echelon maintenance personnel. Two items proposed by officers of that echelon are worthy of further consideration.

a. During the maneuvers many major units were turned in to the 4th echelon shop for rebuilding in a partly disassembled condition, resulting from efforts of 2nd and 3rd echelon personnel to determine the cause of the failure. Engines were delivered to the 4th echelon with broken engine support brackets, resulting from the bouncing of the engine in a truck body. Transfer cases were delivered with the cover removed and thrown loosely into a truck. Since the cover and case are matched parts, the loss or breakage of the cover demands a complete replacement of the transfer case housing, an item which costs $55.00. It was suggested that a light practical metal box or stand be developed for handling major units between the 2nd echelon and the 4th echelon. Many such stands for engines had been constructed by the local Quartermaster in the area during the maneuver period, but since they were made of wood, they were never returned but were always burned for fire wood.

b. Another source of difficulty for the 4th echelon was a complete absence of information as to the cause of unserviceability of units and parts delivered to them for repair. It was occasionally found that a unit such as a transfer case would be completely disassembled and then found to be in serviceable condition, and that occasionally, complete vehicles which had been picked up by the 3rd echelon from the 2nd echelon, were delivered to the 4th echelon by personnel who had no information whatever as to what unit in the vehicle was unserviceable. It was suggested that a substantial tag, similar to the diagnosis tag used in the Medical Department, be set up as a standard form for use in the Field. This tag would be attached to the vehicle or unit by the echelon turning it in and would have along its edges, printed tabs for the diagnosis of the condition causing unserviceability. The removal of the proper tab would then indicate to the 3rd or 4th echelon the probable or suspected cause of unserviceability with a considerable saving in time.

C. C. DUELL,
Lt.Col. Field Artillery,

* * * * *

The Editor
Army Motors
Dear Sir:

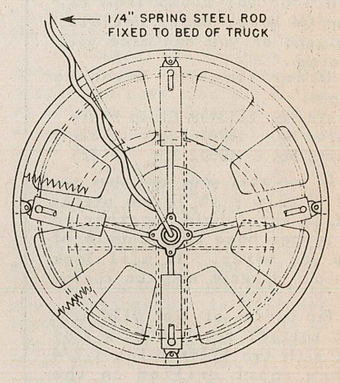
You've been crying for a portable air compressor for some time. This looks like a nightmare but maybe it will give you a new line to work on.

The gadget shown can be readily attached to any wheel. It can be used to inflate the tire on the wheel to which it is attached, or it can be used to do work in the body of the truck. A pressure tank is all that is required to make a truck with this compressor the air supply for the unit.

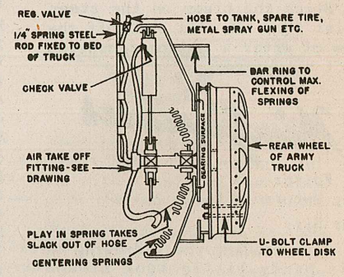
This eccentric pump might be mounted on a 2-wheel trailer cart along with the air tank. At the end of the day's march the trailer could be unhooked and taken to any location for use. Or, the pump could be mounted on a boom to swing up away from the road when not in use.

Since the rotative speeds are not high, the construction requirements are not great. Most of it is simple stamping and press work. The price should not be great.

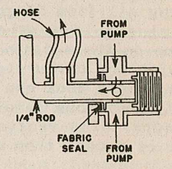
Large capacities are obtainable simply by adding more pump cylinders.



Wheel and Pump Cylinders



Side View of Pump on Wheel



Air Take-off Fitting

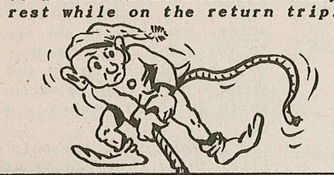
The foregoing letter and diagrams are the brainchild of Private J. D. Hamahu, Co. K, 56th Q.M. Regt. at Ft. Leonard Wood, Mo.

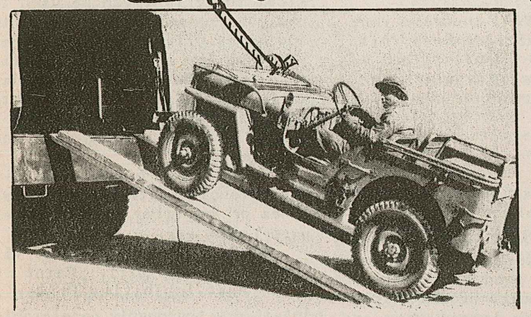
EDITOR'S COMMENT: Basically, an

Turn to page 360

Lieutenant John R. Mitchell of Co. L, 47th. Q.M. Regiment, may not have known about the paragraph in the AR's but he certainly carried out the idea to a nicety.

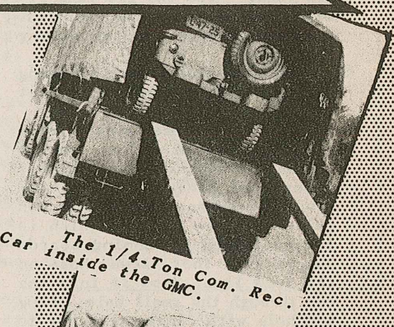
He says, "When we're deadheading, we save tires, gasoline and trucks by putting the little ones in the big ones. Convoy length is reduced and so are accident hazards. Many of the drivers can rest while on the return trip."



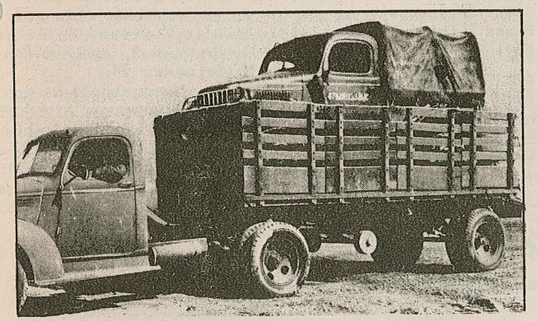


The 1/4-Ton Command Reconnaissance Car going up the ramps into a 2-1/2-Ton LWB GMC. Note that both the 1/4-Ton and the 1/2-Ton can drive in under their own power.

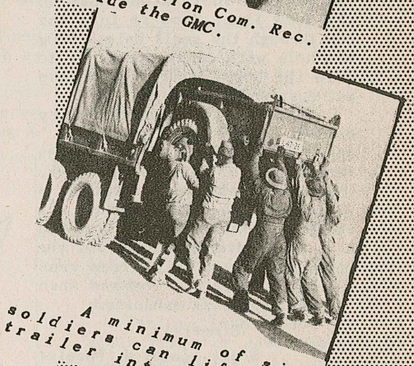
AR 30-945 paragraph 6 says, under conservation of space: The smaller vehicles will be doubled up with the larger ones, e.g., Doubling up: Whenever practicable, e.g., motorcycles with side cars or light passenger cars or trucks with the top down and the windshield removed can often be loaded in the body of a large truck.



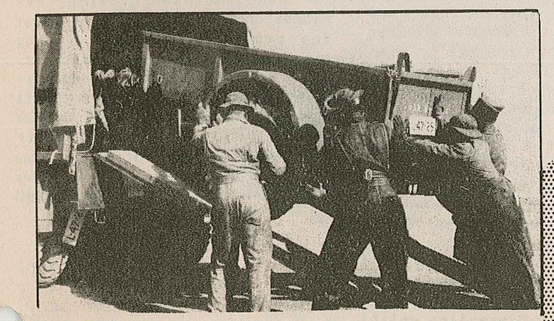
The 1/4-Ton Com. Rec. Car inside the GMC.



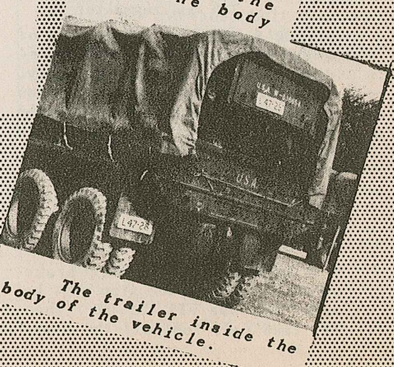
1/2-Ton Dodge Pickup within the trailer.



A minimum of six soldiers can lift the trailer into the body



The 1-Ton trailer being pushed up the ramps into the body of the LWB 6x6 GMC.



The trailer inside the body of the vehicle.

CONTRIBUTIONS

Continued from page 358

idea with good possibilities. Simplification, and general refinement would make this a handy device. However, in its present design it is too bulky. The trailer required to haul Private Hamahu's device and its storage tank might just as well be used to carry a standard small portable compressor.

* * * * *

The Editor
Army Motors

Dear Sir:

Frequently, when operating in bushy country the gas feed lines on some of our trucks have become broken, either in the line itself or where the line connects on the gas tank. Also the gas tank itself might be punctured, particularly under war time operating conditions.

We have found the following method very satisfactory "to get the vehicle in:"

If tank has been punctured or if the feed line has become broken: Disconnect the fitting, bring feed line up between the cab and body and over to the ten gallon reserve gas can which is fastened on the running board. Insert four foot vacuum hose on the feed line, drop it into the can through the small hole. Plug the hole with canvas or a rag to hold the hose in place and keep out dust and dirt.

This method is commonly called, 'putting on the nipple.' Approximately twenty-five minutes is required for the change-over. Once, last summer we brought a truck in over 125 miles on its own power after the feed line had been snapped when it ran off the road. The ten gallon gas cans can be refilled or changed when the gas supply is exhausted.

Sincerely,

S/Sgt. James M. Wheeler
Hq. and Hq. Co.
7th Quartermaster Bn.

EDITOR'S COMMENT: This type of suggestion shows genuine resourcefulness and practicability. As an emergency measure this has vital importance, and should be well remembered for use in field work.

* * * * *

The Editor
Army Motors

Dear Sir:

One thing on an air brake outfit. If a sudden stop must be made, release all the air, that is, take your foot off the brake pedal a split second before you stop dead. This will keep the truck from rocking back and forth after you are stopped, and prevent breaking the axle studs. This rule should be followed with any and all types of brakes. Although hydraulics don't give so much play in the pedals, the same smooth stop can be made.

Sincerely yours,

Pvt. Steve Tisak,
Co. "B",29th. MTB,
Camp Grant,Illinois.

EDITOR'S COMMENT: Raise your hand if you already knew this. We thought so. This is one of the fine points of driving, noted particularly by better drivers.

* * * * *

The Editor
Army Motors

Dear Sir:

Here's a valuable tip I would like to have passed along.

Plain ordinary G.I. paint thinner is as good a solvent as there is to squirt around sticky valve stems to loosen them so they'll come out without bending.

Sincerely,

Pfc. R. R. Ruehlman
121st Engineers
H and S Co.
Fort Meade, Md.

EDITOR'S COMMENT: We agree the G.I. paint thinner is an excellent sticky-valve solvent. Many of the higher quality paint thinners are exceptionally good in this respect.

BrakeLINES

Out of the wilds of Panama the other day came a bulky envelope. We felt it, shook it and held it up to the light. Finally we got up enough courage to open it. Inside were two small, well-rusted lengths of tubing. "It's a bomb," somebody whispered hoarsely over our shoulder.

It wasn't a bomb - it was merely a couple samples of steel brake line sent to us by Sergeant Edwin O. Redlich, 72nd CA out at Fort Randolph, in the Canal Zone. The line had been used only three months but the salt spray and tides of Panama had completely ruined it. Many a time, said Sgt. Redlich, a brake line split wide open and the only thing that saved lives was the driver's quick use of the hand brake. Sergeant Redlich gnashed his teeth and said why don't they put aluminum or copper tubing on vehicles - or something like it that won't rot in damp and salty climates! Brake lines are lined inside and coated outside with solder and they're not supposed to rot - but if they do - they do. But about copper and aluminum - today they're worth their worth in uncut stones - no can do.

In this case, the only practical thing that can be used to protect exposed steel, is paint. Our Gloss Olive Drab Enamel has stood up for a mighty long time in a tough salt-spray test down in the Chemistry Lab. Up to date the Lab. test equals at least 8 months on a vehicle in even the *saltiest* climates.

So all you birds that got rust trouble (with brake or gas lines or any other exposed steel parts) give ear.

Scrub your steel clean of all rust, scale and dirt. Paint it with 'Rust-Inhibitive Primer', let it dry thoroughly (preferably overnight) then finish off with 'Gloss Olive Drab Enamel' (both are on the Indefinite Quantities Contract). If you're in Zone 1, 2, or 4, you purchase this material against Contract Bulletin No. 104; in Zone 3, against Contract Bulletin No. 94.

This treatment should be good for at least 8 months - although you better give it an inspection about every 4 or 5 months. Maybe you'll have to pull out your brake lines to give 'em the treatment - or maybe you won't. We'll leave it to you.

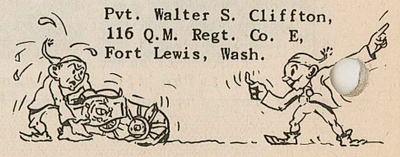
The Editor
Army Motors

Dear Sir:

Find enclosed drawing, explanation, and snapshots of hoist for removing and installing transmissions and transfer cases. This has been entirely satisfactory in use. Height over all when lowered should be as low as practical to make it. Other dimensions may be varied to some extent. I hope everything in my explanation below is clear enough to follow.

Sincerely,

Pvt. Walter S. Cliffton,
116 Q.M. Regt. Co. E,
Fort Lewis, Wash.



EXPLANATION OF TRANSFER CASE AND TRANSMISSION HOIST

FIGURE 1 shows the main frame of the hoist. It is constructed principally of 2" angle iron. Base A is about 30" long and 10-1/4" wide. Three wheels made from 3 inch pipe carry the frame. Two wheels are mounted on a solid axle welded to the rear of the frame The third wheel pivots for ease of handling.

The upper part B is 24" long and it's pivoted on 1/2" bolts at the front of Base A. Both A and B have crossmembers, shown D and E, made from 1" rod or 1" x 1/4" strap. Crossmember E is raised above B by angle iron lugs welded to B. An iron plate, F, is shaped to fit base of a small car jack, C - similar to that furnished in 1/2 ton Dodge trucks - and welded to a 4" piece of pipe of 1" inside diameter.

G is a 1-1/2" length of 1-1/2" iron pipe with a 3" length of 1" inside diameter pipe welded across one end. H is a crossmember of angle iron welded to sides of B, 10" from upper end, and having a 5/8" hole drilled in the center. The lug lettered I is a continuation of the support which is attached to A, and on which B is hinged. (Note that on the other side of the frame, the lug is attached to A, and it stops at B. On the far side, I is a longer lug which will hold a turnbuckle to be explained later.)

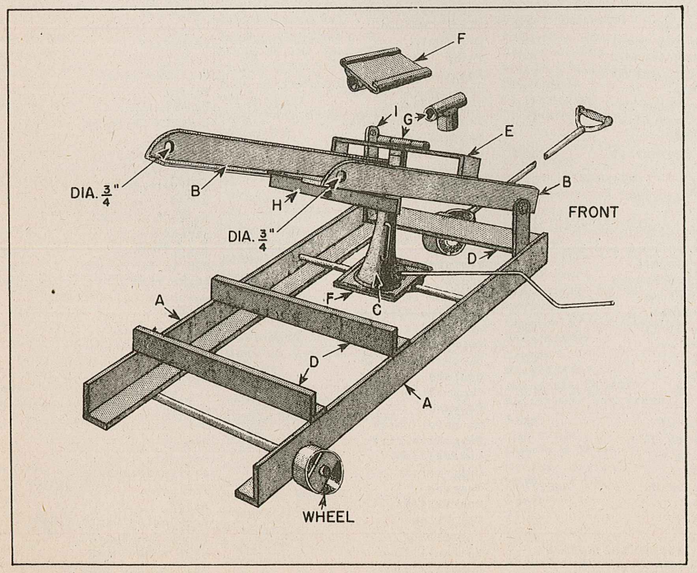


Figure 1

FIGURE 2 shows the saddle (A) for use with the old style 2-1/2 ton GMC transfer case. It is constructed of angle iron and is 9-1/4" inside width and 14" long with a lug of 3" iron welded in the center at the lower end. Welded in the center below this lug is a 5/8" U.S.S. nut. B is merely an end view of A to illustrate how the members are welded together. C is a 5/8"x5" U.S.S. bolt threaded to head.

FIGURE 3 is a saddle for removing and installing transmissions. It consists of two 5/8" iron rods (A) curved to fit the bottom of a 2-1/2-ton GMC transmission case. These curved rods are spaced 10" apart by a 5/8" rod which is welded to a 3/4" inside diameter pipe (B) 10" long. C, an iron strap, is welded to one end of this pipe in an upright position. Then a 3/8" hole is drilled in this strap 4" above center of pipe.

FIGURE 4 consists of two 5/8" iron rods (A) curved to fit bottom of Banjo type transfer case used on late GMC 2-1/2 ton trucks. These are welded to pipe (B) of 1" inside diameter and 10" long. C, an iron strap, is welded upright in the same manner and with same measurements as the one in Figure 3.

FIGURE 5 is merely a rod and turnbuckle of the same length as points X and Y in Figure 6.

Figure 6, the turnbuckle unit (shown in Figure 5) is placed with one end bolted to the lug X.

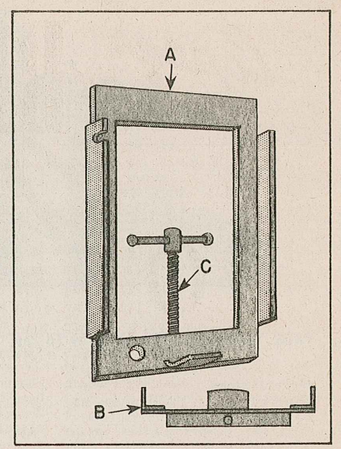


Figure 2

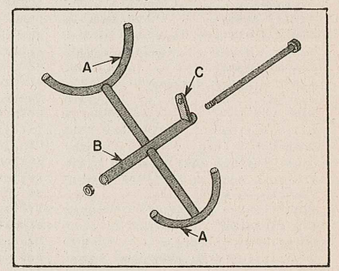


Figure 3

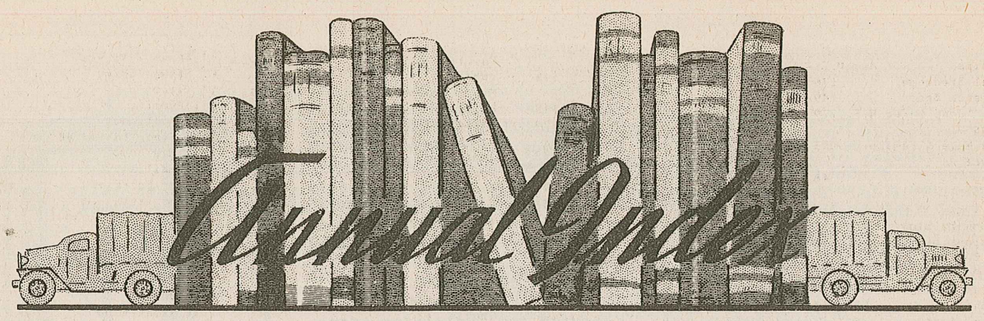
At the other end, the turnbuckle is attached to Y (this arm is the same as C in Figures 4 and 5). With this turnbuckle, the points X and Y must be adjusted so that they form a parallelogram. If this adjustment is made, the rods C which hold the transfer case will always remain level, no matter how high the case is raised, or lowered. You can easily see how this works in the small insets on Figure 6.

For use in handling the old style transfer case the device shown in Figure 2 is placed between sides of B in Figure 1, with the threaded bolt C passed through a hole in H of Figure 1 and threaded into the nut welded on Section A (see explanation of Figure 2). B is raised to proper angle by the jack, and then exact height is attained by tightening or loosening the threaded bolt C.

For use in removing and installing transmissions, the device shown in Figure 3 is placed between sides of B in Figure 1, and fastened by passing the bolt through the hole in the end of B (Figure 1) and then through pipe B in Figure 3.

To use the apparatus in

Continued on page 368



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Valve Cover

Somewhere around February 1st MTTSB M-11 told you to write away to the Fort Wayne depot for new valve covers for your 2-1/2 ton GMC 6x6's (on model 270 engines between engine numbers 270-43082 and 270-71802).

Seems that the valve covers originally delivered with these models were 'the air cleaner type' - that is, they had a small breather cap on them. The first thing you knew, condensation trouble within these valve covers set in and quickly established itself as a first class nuisance to all concerned. Then along came MTTSB M-11 and said, "Write away to Fort Wayne for a new type of valve cover and send your old one back to GMC." Just like that.

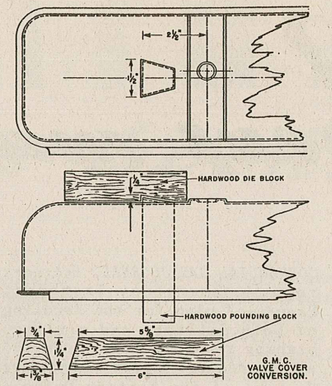
Now, however, it develops that the new valve covers won't be available for the next couple months, for the simple reason that steel don't grow on trees in this country - there's a shortage.

So until the time comes when you do get your new valve covers, you'll have to fix up your old one to do the work.

The new type of cover, when you get it, will have a couple of louvres on top to serve as breather holes. What you'll have to do with your old valve cover is knock a couple of louvres in it, thus making it a reasonable facsimile of the new-ones-to come.

Follow these simple directions: take your valve cover off'n the engine and drape it over a round steel support at least 4 inches in diameter. Then take a sharp chisel and cut slots at both ends as indicated in our diagram. Make yourself the hardwood pounding block and the hardwood die block also shown in the diagram. Put the valve cover on the die block (as it would look if you turn the lower drawing upside down) and just as though you were a power press on the good old assembly line. Smack the pounding block a solid wallop. This will raise the lip of the slots you have cut, into a 'louvre'. Plan it so that these louvres point toward the rear of the vehicle, when you put the valve cover back on.

The 'converted' valve cover is now all set to go - but before you put it back on the engine, clean off any rust that formed in



the cover, valves or valve springs due to the condensation.

If you have followed directions, your valve cover should work very nicely. But just as a double check on the idea, how about dropping us a line and letting us know.

Drain Plug

A bunch of the boys in the field have been complaining that the male drain plug in the bottom (rear) of the ½ ton Dodge 4x4 transmission case, gets knocked off in rough cross-country work. Rocks and stumps kinda reach up and take a chunk out of the plug.

The remedy for busted drain plugs in this case, is so simple that it's almost laughable (ha-ha-ha-ha). There's a *female* (called 'female' because it has a recessed socket for a wrench) filler plug up higher on the case and around on the right hand side. All you've got to do is interchange the male with the female plug. Put the female plug down in the drain hole and put the male plug up in the filler hole. That way there won't be any projections to get knocked off.

* * * * * *

OVERLUBRICATION

Continued from page 349

a driver or maybe a second echelon greaseball has to do is clean them vents up on all the closed housings on the truck. It don't take long - there ain't so many of them."

The Sergeant reached restlessly for the papers on his desk, "God knows, the whole setup is easy enough to remember. Just watch out for too little lube in the engine and too much lube in the chassis. It ain't hard is it? Or am I crazy?"

He spit conclusively into the cuspidor and gave himself to his papers.

Col. Walter C. Thee, 53rd QM Reg't. at Fort Bragg seems to agree with the Sergeant. In a MT letter, he says:

"Excessive issues of oil seals clearly indicates that the oil seals are being replaced due to leakage caused by overlubrication. Rather than replacing unserviceable oil seals, excessive gear oil should be drained from front axles, rear axles, transmissions, and transfer cases; and all vent holes should be kept clean in the housings of these units in order to reduce the failures and excessive issues of oil seals. The fact that an oil seal is oil soaked does not make it defective and should not be accepted as a reason or excuse for making replacements. After the excess oil has been removed, oil seapage should cease, barring a defective seal due to improper installation or grit getting on the leather."

* * * * * *

CARE AND FEEDING OF BATTERIES

Continued from page 351

rate of discharge - as in starting - the battery won't last as long as at a low, continuous rate of discharge as used by the headlights. Then again, in cold weather the battery is not as efficient as in warm weather - because like any other chemical process, the one in the battery is slowed down. As a matter of fact, at 0° Fahrenheit, the battery has only 50 percent of the cranking power it has at 80°.

The careful driver, knowing this, will keep a sharp eye on the way he mistreats his battery in cold weather. But then in warm weather, the water in the electrolyte evaporates off (besides being broken down by the charging current), so he's got to watch and see that it gets replaced. It gets you coming and going, shut the door and they come through the window.

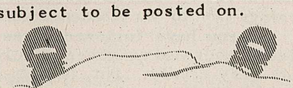
Having introduced you somewhat (we presume) to what goes on backstage in the battery, we will next month reveal to you the hitherto unexposed story (exclusive in this magazine) of "How To Sweat Every Drop of Juice Out of Your Battery" by a few simple tricks. (That's not the name of the author.)

READING REVIEW
Current magazines

THE QUARTERMASTER REVIEW, January-February 1942 - "First Army Provisional Train" - If you must miss one article, it should not be this one. For here is a genuinely informative summary of experiences met in organizing the unit for motor transportation of corps, divisions, and other units. Chock full of data telling how the battalions were formed, how the men were trained in cross country driving, in preventive maintenance, the many experiences gained...and lots of etc's.
"Protection of Motor Convoy" - The question of what protection to use, is given a brief review by 2nd Lt. E.M. Anderson. He lists methods for effective use of defensive weapons against attack from land or air.
"Fourth Corps Area 'Regional Maintenance' for Motor Vehicles" - Report on an experiment for speedier maintenance (always a welcome subject) conducted under the direction of Brig. General J. L. Frink. The improvement was the result of completely organizing the area into Regional Maintenance Shops. It's worth double the reading time, in interest and information.

MOTOR, February 1942 - "Double Reduction and Two-Speed Axles" - When in the mood for something to buckle down your technical mind, just read this article. An authoritative discussion of their operation, and proper servicing methods.

COMMERCIAL CAR JOURNAL, February 1942 - "Emergency Transport Plan" - A plan for the handling of both military and civilian highway transportation, devised at the request of the Commanding General of the Western Defense Command and Fourth Army. A good subject to be posted on.



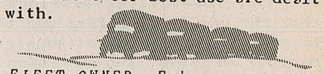
INFANTRY JOURNAL, February 1942 - "Keep 'em Rolling" - A pep talk of serious nature citing the importance of trucks to the success of Infantry. It mentions Preventive Maintenance as necessary to achieving what the title says: Keep 'em Rolling.

NATIONAL PETROLEUM NEWS, February 18, 1942 - "Tires Last Longer When Used in Cool Weather" - An often neglected factor in tire care, temperature vitally influences life expectancy of tires. Read how driving in rain, and in the cool early hours saves tires.

THE MILITARY ENGINEER, February 1942 - "London's Largest Crater" - Not Motor Transport, but interesting reading just the same. Royal Engineer Units bridge an immense bomb crater 150 feet in diameter at the hub of a busy seven-street intersection.

AUTOMOBILE DIGEST, February 1942 - "Servicing Parking Brakes" - A howtodoit for both types of brakes: the more usual rear wheel shoe type, and the propellor shaft type as used on Chrysler built cars.

MOTOR AGE, February 1942 - "Trucks With Power Brakes" - The action of this type brake system must be closely coordinated. Adjustments to be made for best use are dealt with.

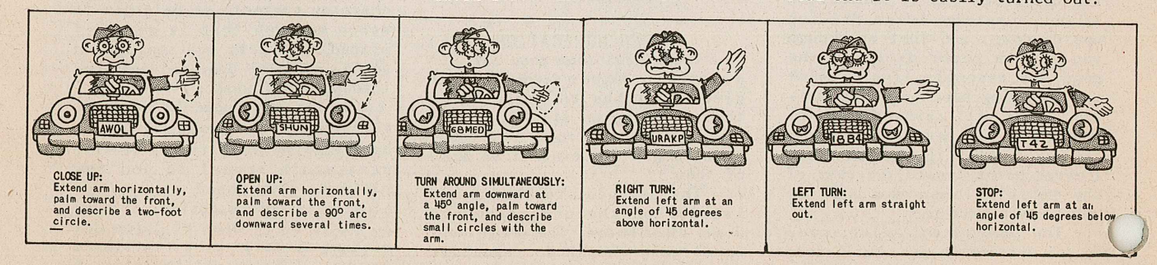


FLEET OWNER, February 1942 "Salvaging Worn Parts By Build-up With Metal" - An organized explanation of metal-spraying, one of the most amazing and spectacular methods of reclaiming worn parts. Reclaimed parts often give three times original wear. Cost: less than half of replacement.

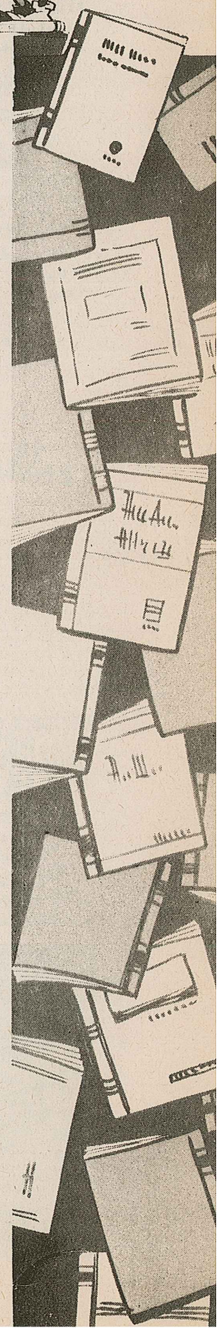
(For other articles on metal-spraying, see "Pounds To Save Tons", in *AUTOMOBILE DIGEST, February;* and "Summing Up Salvage", in *COMMERCIAL CAR JOURNAL, February.*)

"Carburetor Maintenance" - Conclusions from a survey of 265 fleet owners in almost every state and every industry reveal interesting facts and experiences.

"How to Remove Broken Studs" - A clever idea if we've ever seen one (and we have). A nut is welded to the end of the broken stud and it is easily turned out.



REVIEW
Latest books



DYKE'S SELF STARTER, by Warren A. Taussig, The Goodheart-Wilcox Co., Inc., Chicago, Illinois, Fourth Printing, 1941, $1.00.

This book is the hand-in-hand companion to Dyke's Encyclopedia, and if you want a thorough automotive education we recommend both books. Even if you presumably know your stuff, you'll find lots of holes in your knowledge when you start thumbing through the Self Starter.

The Self Starter is based on Dyke's Encyclopedia, and at the head of each lesson there is a reading assignment in Dyke's. Then come the questions based on what you're supposed to have read. Review questions at the end of conveniently grouped lessons cover the high spots of past questions, and will send you back to relearn what you might have missed the first time. The answers can either be found in Dyke's or in the back of the book for some special questions.

This self study course is divided into three sections: Elementary, running from The Automobile, Carburetion, Ignition through Tires; Advanced, running from Definitions of Mechanical Laws through Engine Performance to Arc Welding; and Repair, running from Engine Rebuilding, through Battery Repairs to Welding.

The book closes with some eminently practical pointers on things too often forgotten: "Remember that most bolts and nuts have right-handed threads, some have left-handed threads; if so, it is there for a purpose - *think.*"

Until the Army prepares a series of questions based on their motor transport texts, we don't know of any better way for anyone to learn the ins and outs of the motor vehicle.

MAN AND THE MOTOR CAR And Teacher's Manual (revised edition). The National Conservation Bureau, New York, 1941.

Most people are introduced to the fine art of swimming by being grabbed roughly from behind by a group of hooligans, loosely called friends, and hurled into deep water. After thrashing about wildly, the victim emerges - either a swimmer or a nervous wretch never again able to so much as look a glass of water in the face without flying off into a fit of the screaming mimis.

Same way with learning to drive. The pupil is laughingly given a few words of advice, the steering wheel, the brake and the clutch is revealed to him and he is headed out into a stream of traffic.

The results of such teaching methods are tragic: 34,500 killed by automobiles each year, 1,200,000 injured.

A long step away from such primitive 'driver education' is MAN AND THE MOTOR CAR. A wideawake, and well-written textbook, it studies the impact of the automobile on men and society, lays bare the problems aroused and presents the solutions to those problems.

It declares that "not merely manual skill but social attitudes and judgment" make the good driver. Bad manners are as much out of place on the highway as they are at the dinner table.

Complete as any scientific treatise and a lot peppier reading, the book ranges over the whole subject of automobiles, drivers and driving. Anything it doesn't say on the subject, you can put in a beetle's ear. For instance, in one chapter it presents a rogues' gallery of driver-types: the 'accident-prone' driver, the 'egoist', the 'egotist', the 'irresponsible' driver. Identifying poor driver types this way, it helps the military commander weed the misfits from behind the wheels of his trucks.

The 'Teacher's Manual' designed for use with the book will help interested officers in planning a course for their drivers.

We strongly recommend that our examining officers and commanders make this book available to all drivers and prospective drivers. Copies are available at cost from the National Conservation Bureau, 60 John St., New York City.

1 to 9 copies.....$1 each (postpaid)
10 to 100 copies..... 45¢ each f.o.b.
101 to 300 copies..... 43¢ each New York

DIESEL ENGINE TROUBLE CHART, by Victor W. Page, The Norman W. Henley Publishing Co., 2 West 45th Street, New York, N.Y. 25 x 38 inches, $.50 each.

Automotive diesels are still new enough to be a bit of a mystery to a good many people - even to those who work around them. This diesel engine trouble chart isn't a thing you'd carry around in your pocket, but mounted on cardboard and hung in the shop, or kept in a diesel maintenance manual it will undoubtedly prove valuable. The chart has three illustrations, a sectional line view of a typical injection pump, a front phantom view and a side phantom view of a typical diesel engine.

Continued on inside back cover

CONTRIBUTIONS

Continued from page 361

Figure 4 on Banjo type cases, attach B in the same manner as you did Figure 3. The one difference is this: here the hoist is placed crosswise under the truck. In using Figure 3, the hoist is turned lengthwise under the transmission.

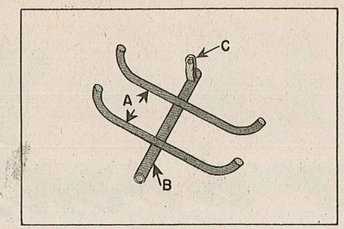


Figure 4

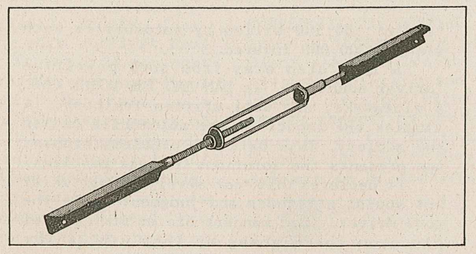


Figure 5

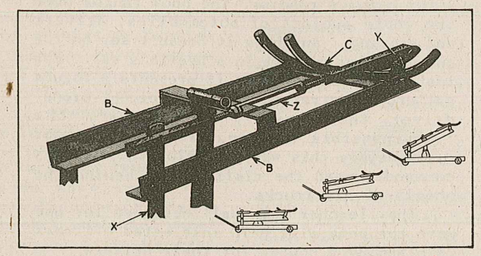
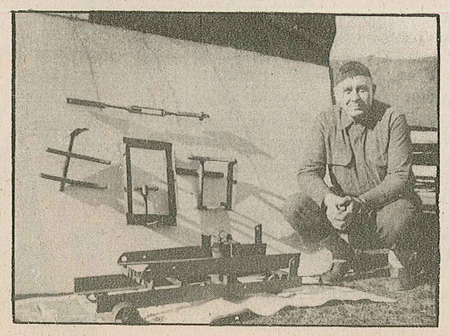


Figure 6

EDITOR'S COMMENT: This device shows a sense of practical inventiveness, and clever use of materials. Without a doubt, one of the best contributions received by ARMY MOTORS. Third and Fourth Echelon shops can give thanks for a piece of equipment like this.

* * * * *

If inventor Cliffton looks well pleased with himself in the picture below, it's because he's done a swell job and he has a perfect right to. The display board shows a complete line-up of accessories designed to make the heaviest transmission or transfer case float to the ground and back again with about the same effort Sonja Henie uses to describe a figure-8. If you build one of these jacks for yourself you'll probably find it necessary to improvise a few little extra gadgets to fit special assemblies.



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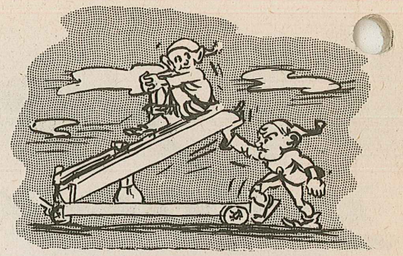
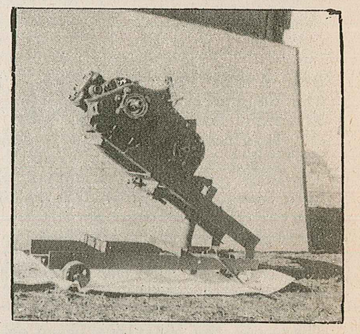
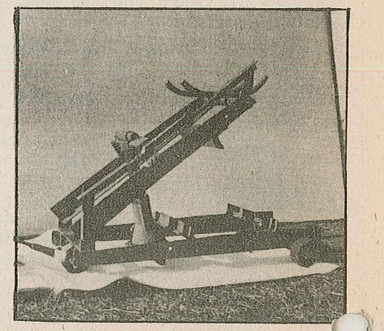


Jack gives proper angle to this GMC split-type case, screw adjusts it to proper height.



Hoist is raised, with GMC transmission saddle in place...and at the correct angle.



Turnbuckle unit keeps saddle for GMC Banjo-type-case level at any height...like we toldja.

NEWS FLASHES

Pistons

ANSWERING NUMEROUS REQUESTS FROM THE FIELD ON AVAILABILITY OF OVERSIZE ROUGH-FINISHED PISTONS, GENERAL MOTORS TRUCK AND COACH SAYS YOU'LL FIND THEM IN THE PARTS LISTS IN GROUPING #0103 AS PART #2135471-(.065 O.S. ROUGH). THE PIN HOLES ARE DIAMOND BORED FOR THUMB-PUSH FIT.

Freezup

THE FORT WAYNE DEPOT TIPS US OFF THAT SOME OF THE NEW WILLYS MODEL MA TRUCKS AND SEPARATE ENGINES ARE COMING THROUGH WITH WATER IN THE BLOCKS. IT'S A GOOD IDEA TO CHECK UP ON ANY YOU HAVE RIGHT AWAY AND IF YOU FIND WATER DRAIN IT OUT QUICK! ALSO MAKE SURE NO DAMAGE WAS DONE WHILE THEY WERE STORED OUT IN THE COLD.

Shorts

MAKE SURE THERE IS PLENTY OF CLEARANCE BETWEEN THE BATTERY CABLE AND THE BRAKE LINE AT A POINT BETWEEN THE MASTER CYLINDER AND THE HYDRO-VAC CYLINDER ON YOUR GMC TRUCKS. CONTACT AT THIS POINT CAN CAUSE THE BRAKE LINE TO SHORT CIRCUIT THE BATTERY CABLE AND POSSIBLY BURN THROUGH THE BRAKE LINE OR START A FIRE.

Blackout

TO OVERCOME THE HIGH MORTALITY OF 12 VOLT SEALED BEAM TAIL-LIGHT UNITS AND THE CORNER MARKING LIGHTS, HOLABIRD ENGINEERS ANNOUNCE THAT ALL NEW VEHICLES WILL BE EQUIPPED WITH DOUBLE-FILAMENT BULBS THAT'LL STAND UP BETTER UNDER JOLTS AND JARS. WHEN THE DEPOTS ARE OUT OF THE #67 BULBS, THE #1247 BULBS (WITH TWO ONE-AND-ONE-HALF CANDLEPOWER FILAMENTS) WILL BE ISSUED AS REPLACEMENTS.

Collapse

IF YOU NOTICE THAT YOUR COOLING-SYSTEM FLEXIBLE-HOSES ARE SLIGHTLY COLLAPSED WHEN THE COOLING LIQUID IS COLD IT IS PROBABLY BECAUSE THE PRESSURE-SEALING CAP WON'T LET ANY AIR IN THE LINE. DON'T WORRY ABOUT IT. AS SOON AS THE SYSTEM WARMS UP WATER AND AIR EXPAND AND FILL OUT THE HOSES TO NORMAL SHAPE.

Cradles

IF YOU'RE HAVING TROUBLE WITH BATTERY CRADLES CORRODING AND THE BATTERIES ARE NOT BEING OVERFILLED WITH WATER IT MAY BE DUE TO AN ABNORMAL CHARGING RATE THAT OVERHEATS THE BATTERY AND DRIVES OFF ELECTROLYTE, WHICH EVENTUALLY EATS AWAY THE CRADLE.

Wipers

WHEN INSTALLING THE UNIVERSAL WINDSHIELD ARM F.S. NO. 8-A-1500 OR ADAPTER EXTENSION NO. 8-A-600, OPERATE THE WIPER FOR A MINUTE OR TWO AND THEN RETIGHTEN THE LOCK SCREW TO SEAT THE CLAW-NUT PERMANENTLY.

Upset

IT MIGHT SEEM FASTER TO REMOVE ONLY ONE ANCHOR PLATE FROM THE STRAPS THAT FASTEN THE FRONT AXLES OF TRUCKS TO THE FLOOR OF A FLATCAR. BUT SOMEBODY'S FACE WILL BE MIGHTY RED WHEN THE LOOSE END OF THE STRAP SNAGS A STEERING KNUCKLE AND TOPPLES THE TRUCK OFF THE RAMP IN A DRY HALF-GAINOR.

READING REVIEW

Continued from page 367

Around the illustrations are grouped the various troubles that can occur, like 'Lost Power and Overheating', 'Knocking in Engine Or Fuel Knocks', 'Engine Missing On 1 or 2 Cylinders' and other headaches that go with diesel engines. The chart only covers trouble in the engine itself, not in the cooling, lubricating or other auxiliary systems.

The possible causes and remedies are under the troubles, and as far as we could see, most of them will do the trick. We don't particularly like the idea of cleaning a spray nozzle with a cloth and a piece of wood - that delicate unit needs very careful handling; but then nobody ever agrees with everybody else on anything as controversial as motor maintenance. The nomenclature is not always consistent on the illustrations.

If you have any diesels, you'll probably find this chart a big help and a time saver by setting you right and keeping you right.

Where Credit IS DUE

The cover design on the February issue of Army Motors was based on an original idea submitted by Corporal A. M. Kahn of Co. I, 53rd QM Regt. at Fort Bragg, N. C. Army Motors is grateful to Corporal Kahn for this and other excellent posters he has designed to promote PREVENTIVE MAINTENANCE.

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The cartoon-ized driver's hand signals on page 366 of this issue were drawn by Pfc. Richard Wieinert and sent us by Lieutenant Donald C. Carner, both of the 68th Medical Regiment at Camp Forrest, Tenn. This outfit pastes mimeographed copies of the strip in the cab of each truck so the operator won't have to depend on his memory to interpret hand signals. Nice work fellas.

What am I offered?

Yessiree, that's what I said. What am I offered fer this here tire? I've had her now nigh onto twenty-one year but she's good as new, and I'm agoin to sell her.

Y'see it was this away: Back in '19 when me 'n the ole woman drug home the "T" model, we was mighty proud.

But 'afore we set ary wheel outside the front yard, we set ourselves on one thing...We was agoin to treat thet air car o 'ourn... specially the tires...like as if t'was one uv th' kids.

Way back, even then, people was bein drilled on the value of tires. The salesman feller filled our heads with a lotta stat-istics. All about how a tire starts out as laytex, oozin outa trees a drop at a time, 2000 miles away in Soo-matry. Took months of teed-jus labor afore t'was clumped onta muh spare wheel.

Natcherly, knowin what we knew, we handled em gentle-like and derned if we ever hadda use that spare shoe.

So as I said a while back, me'n maw seeing as how you boys was needing tires, decided to sell this here old tire to the highest bidder. T'other four is still good for a lotta road-work...probly outlast me'n the ole woman the way we keer for 'em.

Oh! I almost forget...heh, heh...what'll we take for it? 'Taint so much, in a manner of speakin'. We're agonna let it go to the sojer thet'll care for it like it was his last jug of squeezins so's he gets the most miles out of it for ole Uncle Sam.