

The **A** **A** **M** **O** **T** **O** **R** **S**

VOLUME 1

NUMBER 10

JANUARY 15 1941

THE HOLABIRD QUARTERMASTER DEPOT

MOTOR TRANSPORT SCHOOL

BALTIMORE MD.



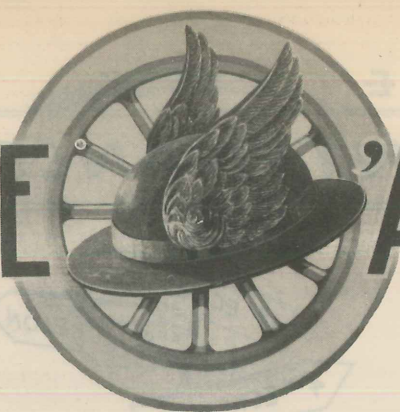
TABLE OF CONTENTS

A Guide Through The Maintenance Maze.....	239
Safety Rims.....	243
<i>"Service Reporter"</i>	
New Angles On Old Cans.....	246
Streamlined Service.....	247
<i>"The Ethyl News"</i>	
Shock Service.....	249
<i>"Motor"</i>	
Lube Lunacy.....	252
<i>"Motor Age"</i>	
Good Brakes+ Good Fluid = Quick Stops.....	254
<i>"Automobile Digest"</i>	
The Knack Of Ironing.....	255
<i>"Automobile Digest"</i>	
The Gas Analyzer.....	257
Help!.....	265
Digests - And Comments - Of Current Technical Magazines.....	267
Acknowledgments.....	270
Back Cover - Like Bats Out Of Hell.....	
<i>"Smash Hits"</i>	

Original articles are welcomed.

Address all correspondence to "The Editor, The Quartermaster Motor Transport School, Holabird Quartermaster Depot, Baltimore, Maryland".

THE 'AM



VOLUME I

JANUARY 15, 1941

NUMBER 10

WE HOPE YOU HAVE A HAPPY NEW YEAR!

128 PEOPLE WON'T!

THEY MET VIOLENT DEATH ON THE HIGHWAY NEW YEAR'S DAY — THE FIRST DAY OF WHAT EVERYONE HAD HOPED, AND STILL HOPES, WILL BE A YEAR WITH A MINIMUM OF WRECKS AND COLLISIONS. IT DIDN'T START VERY WELL, THOUGH. IMAGINE WHOOPING IT UP WITH ALL THE FELLOWS OF YOUR COMPANY OR TROOP ON NEW YEAR'S EVE, AND WAKING UP NEW YEAR'S MORNING TO FIND THEM DEAD. 128 PEOPLE IN ONE DAY!

AND THIS DESPITE THE FACT THAT THE UNITED STATES IS NOT AT WAR. NOBODY HATED THOSE PEOPLE; NOBODY WAS QUARRELING. IN FACT THEY WERE PROBABLY ALL FEELING PRETTY SATISFIED WITH LIFE, AND YET THEY ARE DEAD. IT'S NOT A PARTICULARLY CHEERFUL WAY TO START THE NEW YEAR, BUT THE MEMORY OF THESE 128 PEOPLE MUST STAY WITH US, IF THROUGH THE YEAR TO COME WE ARE TO PREVENT SIMILAR EPISODES.

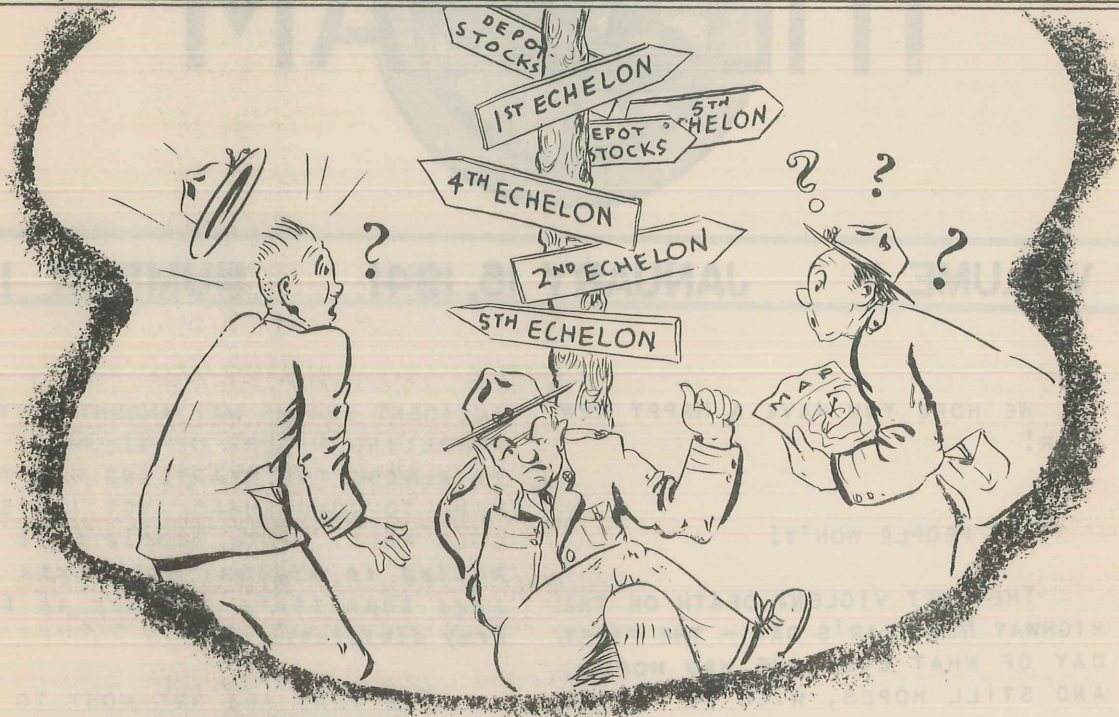
ONE HUNDRED AND TWENTY EIGHT DEAD MOTORISTS IS NOT *too* ASTOUNDING WHEN YOU THINK THAT BEFORE THE CHIMES PEAL OUT A WELCOME TO 1942,

ACCIDENT DEATHS MAY AMOUNT TO THE APPALLING FIGURE OF 41,396. IT IS ALMOST TOO STARTLING FOR THE MIND TO COMPREHEND, YET IT IS A COLD FACT: *more people will be killed in highway accidents in 1941 than there are men in two army divisions.*

THE DEAD ARE NOT MOST TO BE PITIED. THE LIVING TOO WILL SUFFER — THOSE RESPONSIBLE FOR THE UNNECESSARY DEATHS MUST FACE THE TRIALS OF COURT AND CONSCIENCE.

THERE WILL BE OVER 1,200,000 INJURED (MORE THAN THE ENTIRE MANPOWER OF THE UNITED STATES ARMY) TO ACCOMPANY THE 41,000 DEATHS. THESE ARE THE SUFFERERS, THEY AND THEIR FAMILIES, THOSE WHO MUST GET ALONG AS BEST THEY CAN AFTER THEIR MEANS OF SUPPORT HAS BEEN DENIED THEM, THOSE WHO MUST CARE FOR THE MAIMED AND CRIPPLED, THOSE WHOSE LOT IT IS TO GRIEVE THE DEATHS THAT NEEDN'T HAVE HAPPENED. THINK OF THIS: *One person in every hundred* IS SLATED FOR SUDDEN DEATH IN 1941 OR — EVEN WORSE — A PERMANENT, CRIPPLING INJURY! ONE PERSON IN EVERY SIX WILL IN SOME WAY BE AFFECTED BY THESE CASUALTIES. THINK ABOUT THIS THE NEXT TIME YOU'RE DRIVING. DRIVE WITH "CARE, COURTESY AND CONSIDERATION".

A GUIDE THROUGH THE MAINTENANCE MAZE



by
Howard P. Leary
1st Lt. Q.M.C.

Recently, while trying to point the way on the "Echelon System of Maintenance" to a class of officers attending a refresher course at The Motor Transport School, somebody popped up and asked how the second echelon or company mechanic receives the parts necessary to make repairs. That started the questions rolling and in they came: "How does the unit commander (truck company) or motor pool C/O get authority to dispatch vehicles to a unit needing transportation? What paper work is needed?.."

ECHELON MAINTENANCE

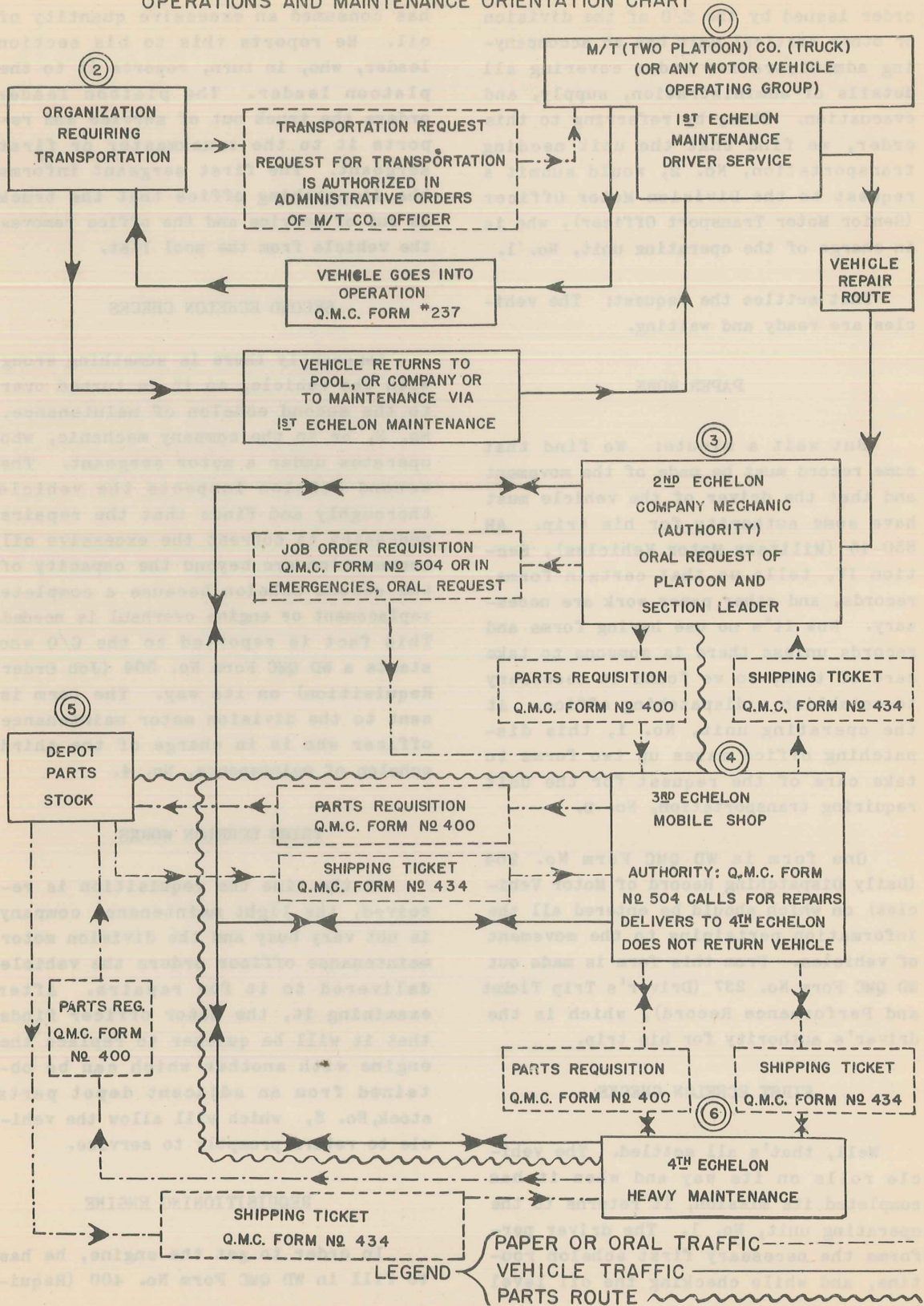
Apparently the echelon system of maintenance is pretty much of a maze and I realized that my ideas weren't going over. Instead of giving the officers the dope, I was doping them with information that didn't mean a great deal.

So - I went back to the beginning and started over again. When the dust had settled we came up with the accompanying chart of what happens to vehicles, tools, paper work, etc., when they start roaming from one echelon to another in a motor transport unit. The chart helped us, and other officers of the school, so I am giving it to you with the thought that it might help you find yourself in the maintenance maze.

BUILDING THE CHART

We started building the chart by placing on it a motor truck company, No. 1, or motor pool, the operating unit; then came No. 2, the unit requiring transportation. No. 1 had the trucks, No.2 needed them to move troops. How to get the two together was the problem.

OPERATIONS AND MAINTENANCE ORIENTATION CHART



In motor field operation, the field order issued by the C/O of the division or other tactical unit has an accompanying administrative order covering all details of administration, supply, and evacuation. Thus, by referring to this order, we find that the unit needing transportation, No. 2, would submit a request to the Division Motor Officer (Senior Motor Transport Officer), who is in charge of the operating unit, No. 1.

That settles the request: The vehicles are ready and waiting.

PAPER WORK

But wait a minute: We find that some record must be made of the movement and that the driver of the vehicle must have some authority for his trip. AR 850-15 (Military Motor Vehicles), Section IV, tells us that certain forms, records, and other paper work are necessary. Now it's no use having forms and records unless there is someone to take care of them, so we found it necessary to establish a dispatching office. At the operating unit, No. 1, this dispatching office makes up two forms to take care of the request for the unit requiring transportation, No. 2.

One form is WD QMC Form No. 254 (Daily Dispatching Record of Motor Vehicles) on which should be entered all the information pertaining to the movement of vehicles. From this form is made out WD QMC Form No. 237 (Driver's Trip Ticket and Performance Record), which is the driver's authority for his trip.

FIRST ECHELON CHECKS

Well, that's all settled. The vehicle rolls on its way and when it has completed its mission, it returns to the operating unit, No. 1. The driver performs the necessary first echelon routine, and while checking the oil level

in the crankcase finds that the engine has consumed an excessive quantity of oil. He reports this to his section leader, who, in turn, reports it to the platoon leader. The platoon leader orders the truck out of service and reports it to the truckmaster or first sergeant. The first sergeant informs the dispatching office that the truck is out of service and the office removes the vehicle from the pool list.

SECOND ECHELON CHECKS

Apparently there is something wrong with the vehicle, so it is turned over to the second echelon of maintenance, No. 3, or to the company mechanic, who operates under a motor sergeant. The second echelon inspects the vehicle thoroughly and finds that the repairs necessary to correct the excessive oil consumption are beyond the capacity of the second echelon because a complete replacement or engine overhaul is needed. This fact is reported to the C/O who starts a WD QMC Form No. 504 (Job Order Requisition) on its way. The form is sent to the division motor maintenance officer who is in charge of the third echelon of maintenance, No. 4.

THIRD ECHELON WORKS

At the time the requisition is received, the light maintenance company is not very busy and the division motor maintenance officer orders the vehicle delivered to it for repairs. After examining it, the motor officer finds that it will be quicker to replace the engine with another which can be obtained from an adjacent depot parts stock, No. 5, which will allow the vehicle to return promptly to service.

REQUISITIONING ENGINE

In order to get the engine, he has to fill in WD QMC Form No. 400 (Requi-

sition), ordering one engine assembly of the type needed. The parts depot ships this engine to him on WD QMC Form No. 434 (Shipping Ticket). The light maintenance company places the engine back in the vehicle and sends it on its way back to the motor pool where it is placed in service in the shortest possible time.

ENGINE OVERHAUL

The engine that was taken out of the vehicle still has to be repaired. It so happens that the third echelon is not equipped to make such unit repairs, so the division motor officer makes out WD QMC Form No. 504 (Job Order Requisition) and forwards this to the fourth echelon, No. 6. When the fourth echelon is ready to receive this engine for repairs, they notify the division motor officer and he sends it to them.

ALTERNATIVE METHOD

Now there is another way that this repair could be handled by the fourth echelon, No. 6. If it happens to have too much work to do and if, in the opinion of the officer in charge, the third echelon, No. 4, is capable of doing the necessary work, the division

motor officer would be told to requisition the parts necessary for the overhaul from the heavy maintenance company, No. 6. The motor officer would make a requisition on WD QMC Form No. 400 (Requisition), and the heavy maintenance company, No. 6, would ship the necessary parts to him on WD QMC Form No. 434 (Shipping Ticket).

HOPE IT HELPS YOU

Of course it's probably much easier to follow this chart if you start with it from the beginning instead of landing in the middle of it and trying to figure it out from there. I know by the time we finished with it, the blackboard was covered with squares, scribbles, lines showing the various channels through which paper and material flowed, etc. When I stood back and took a gander at the blackboard, I thought perhaps I had confused the class rather than helped them; but no, they all seemed to agree that the chart was much clearer than pages of words could possibly have been.

So, as I said before, I'm turning this chart over to you for what possible advantage you can squeeze out of it.

Hope it helps you!



When repacking the U-joint on a Dodge or Plymouth truck, don't fill the leather boot with grease. It's not intended to hold the grease in but to keep the dirt out. The weight of the grease in the leather covers will soon rip them open or slip them out because considerable force is exerted when the propeller shaft revolves at high speed. A U-joint can soon be ruined by doing this because a lump of grease in the boot can unbalance the propeller shaft and seriously strain the bearings.

Grinding the teeth from a broken hack-saw blade and making both ends flat gives a neat flexible "drift" to remove the upper half of insert-type main bearings.

After replacing and tightening timing gear cover gaskets, it's always a good scheme to run the engine a few turns before replacing the radiator. If the oil slinger rubs against the timing gear cover, you can make the necessary adjustment without extra work.



Figure 1
Cross section of tire and rim

You are probably going to hear a great deal about the "safety rims" that are being introduced on some of the new 1941 passenger vehicles. The job of changing these tires will very likely come your way before long so it mightn't be a bad idea to understand the How and Wherefore of it before you tackle the work.

Here is the principle of the safety rim. A small hump, formed into the rim, about .050" in height, is located between the outside vertical portion of the rim and the drop center section. It is so located that the tire bead just fits into the space between the outside of the rim and the hump. (See Figure 1.) When the air is suddenly removed from the tire at high speeds, because of centrifugal force, the tire does not immediately go flat and the humps on both sides of the rim keep the beads from sliding down in the drop center section. When the speed of the car

drops to below 25 miles per hour, the tire gradually goes flat, but the humps still do not allow the beads to fall into the drop center section, thus preventing the tire coming off the rim.

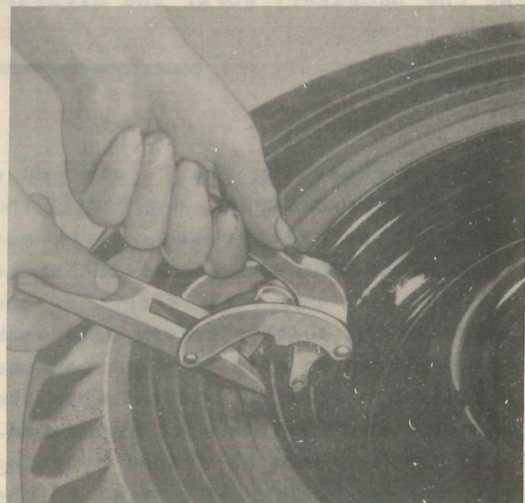


Figure 2

TIRE CHANGE

The first step after removal of the wheel is to completely deflate the tire. Removing the valve core is the quickest way. Thoroughly clean the roller of the tool and the section of the wheel where the roller will contact to avoid scratching the finish of the wheel. Then with the wheel on the floor, insert the jaws of the tool between the tire and the rim, pushing the jaws in as far as possible, then apply the roller to the outside of the rim flange. Fig. 2.

Then with the left hand holding the lower portion of the tool flat against the tire, with the right hand push the lever back, thus forcing the wedge jaws in between the rim and the tire. Tool will lock in place. Fig. 3.

The extension handle is then installed over the end of the single jaw lever and is pushed toward the outside of the tire. Fig. 4. The leverage is sufficient to force a portion of the bead over the hump. The rest of the bead can be pressed over the hump by stepping on the tire. Fig. 5.

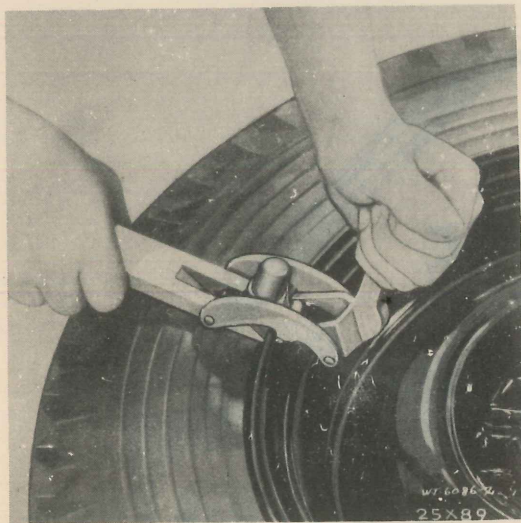


Figure 3

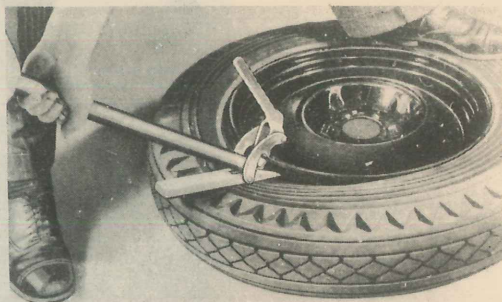


Figure 4

Turn the wheel over and repeat these operations on the inside of the tire.

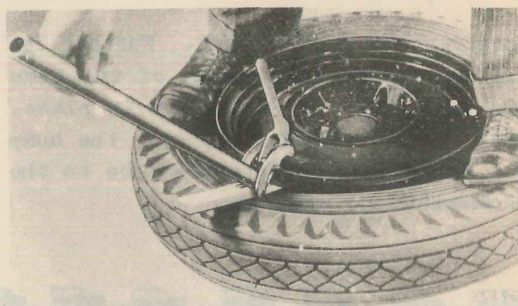


Figure 5

The tire will then be free from the rim and may be removed from the wheel with the use of a tire tool in the usual manner. Fig. 6.

WHEN INSTALLING A TIRE

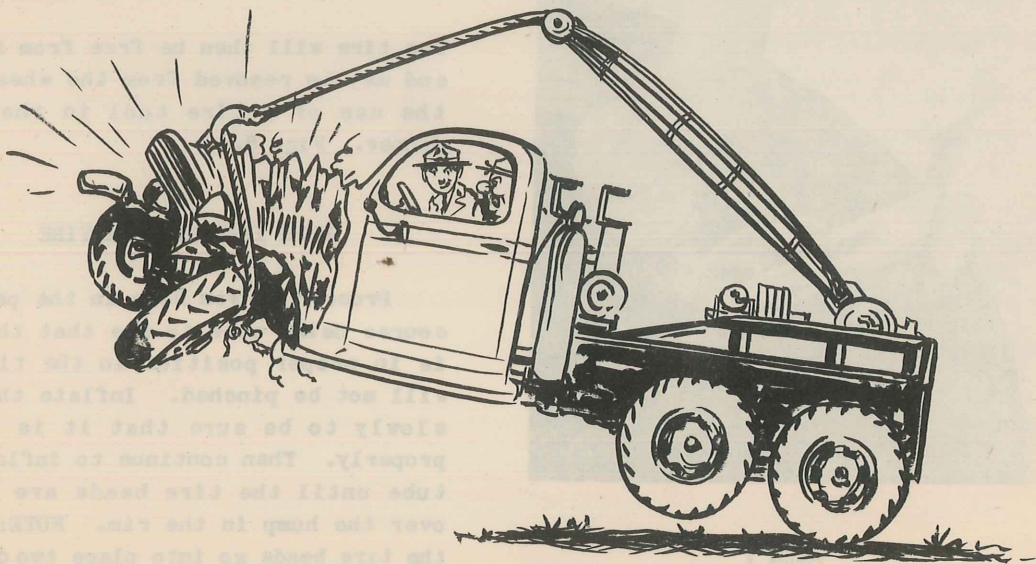
Proceed as you have in the past, of course using care to see that the tube is in proper position in the tire and will not be pinched. Inflate the tube slowly to be sure that it is seated properly. Then continue to inflate the tube until the tire beads are forced over the hump in the rim. NOTE: When the tire beads go into place two distinct,



Figure 6

sharp reports can be heard. Further, an examination of both sides of the tire will show when the beads are in place. After the tire beads snap over the hump then inflate or deflate the tube to the recommended air pressure.

Tests are being conducted by the Engineering Section to determine which tool of this type is most suitable for army use. When the decision has been made, a suitable tool will probably be included in the appropriate tool sets.

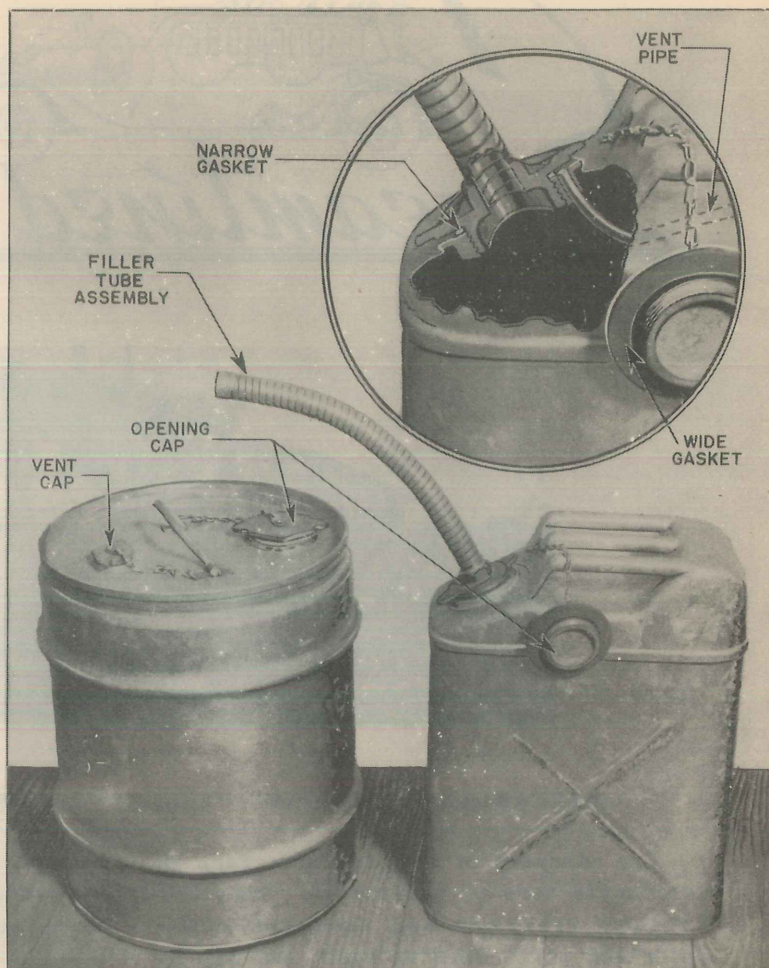


NEW ANGLES ON OLD CANS

Recent purchases of Motor Transport Equipment include a 5-gallon liquid container for handling gasoline. These containers, one of which is shown in the illustration, are designed for ease of handling, compact storage and durability. Their built-in handles and approximately rectangular section permit them to be piled in tiers and layers.

The filler tube assembly for this container is the same as that supplied for the round 10-gallon drums with the exception of the gasket. A study of the illustration will show that the new container requires a narrow gasket in order to clear the end of the air vent tube when the filler tube is in place. The wide gasket on the opening cap covers the air vent when the tank is in storage.

For the proper use of old filler tube assemblies on 5-gallon or 10-gallon containers, the original wide vellumoid gasket should be replaced by Stock #33-G-1300 Gasket, Rubber, Synthetic, 5/32" thick by 2-1/2" outside diameter, for Filler Tube Assembly, which can be



requisitioned from the following depots:

Schenectady General Depot,
Schenectady, New York.

Holabird Quartermaster Depot,
Baltimore, Maryland.

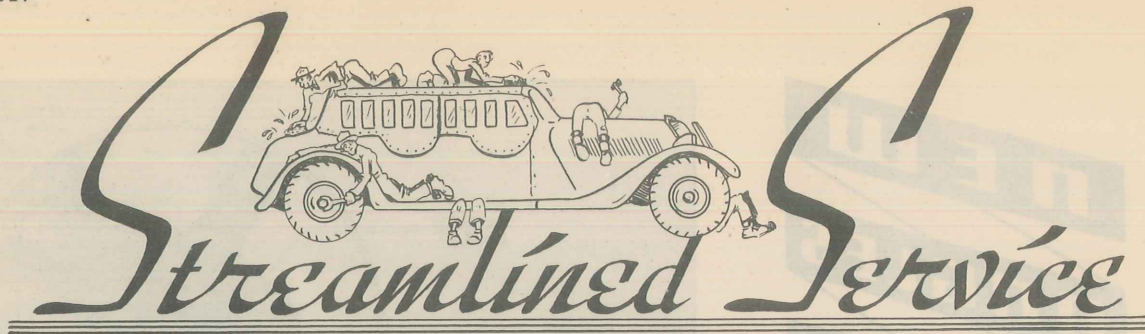
4th Corps Area Quartermaster Depot,
Atlanta, Georgia.

Quartermaster Motor Supply Depot,
Fort Wayne, Detroit, Michigan.

7th Corps Area Quartermaster Motor
Supply Depot, Fort Crook, Nebraska.

Normoyle Quartermaster Depot,
San Antonio, Texas.

Quartermaster Motor Supply Depot,
Oakland, California



Streamlined Service



STREAMLINED SERVICE

The managers of a 40,000 acre farm in California were up against it. They had fifteen tractors and numerous other motorized units working night and day to cultivate and irrigate their farm. All their machines were being serviced from "trapwagons" by hand pumps and buckets, a method which was as costly and difficult as it was old fashioned.

Searching for some solution to their difficulties, the president of the company went into a huddle with a large oil refiner and designed and built the service station on wheels shown in the photographs.

The service station is maintained on an all steel bed of a 1-1/2 ton cab over engine, 4 x 2 (4dt) truck. Special gears give it six speeds forward and two in reverse, which enable the vehicle to travel over the plowed land and other rugged terrain that would stop an ordinary truck.

LOOKING ALONG THE TRUCK BED

from the cab to the rear, the first pieces of equipment to catch the eye are two adjustable floodlights. These are essential for night servicing, as the farm is operated on a 24 hour basis.

Five 65 gallon tanks are mounted across the bed. Two of them contain engine oil, which is pumped from the tanks through totalizing meters by power pumps. The oil passes through hose 20 feet long, equipped with control nozzles.

The third tank contains water, which is delivered to the tractor under ten pounds of air pressure. The water goes through 30 feet of 3/4 inch hose, equipped with a shut off valve.

The fourth tank holds chassis lubricant, which is delivered to the service hose by a heavy duty power gun. Another power gun delivers gear lubricant from the fifth tank to its service hose through a totalizing meter.

A large round tank of 500 gallon capacity carries gasoline and a smaller 300 gallon tank is used for Diesel fuel. To speed up delivery, both fuel tanks are under ten pounds pressure and deliver at the rate of 16 gallons a minute. All fuel deliveries are metered.

On the rear of the truck is a tank for 72 octane gasoline and an air cleaner bath pan. The high octane gasoline is used in the engine driving the air compressor and, when necessary, to start Diesel engines. All hose reels and service leads are accessible from the left side of the truck for the convenience of the driver.

SERVICING

The traveling service station is loaded daily from large storage tanks at the ranch headquarters. When a piece of farm machinery needs refueling or other service, the truck is run beside it without loss of time. Tractor driver and service man follow a definite procedure, depending on the service needed. Crank and gear cases, fuel tank and radiator are inspected and filled. Air cleaners and crank case breathers are

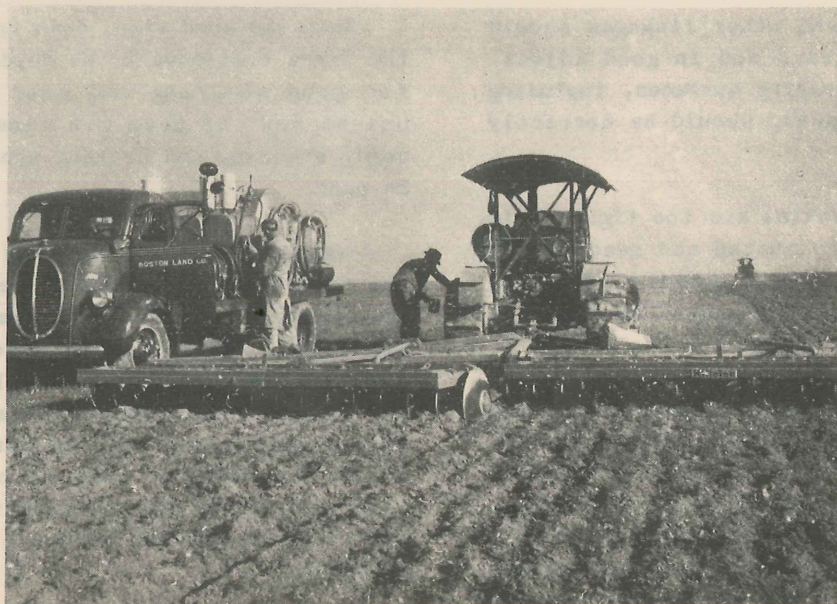
washed, blown dry and oiled afresh. The service man reads all meters both before and after these operations are performed, recording the number of gallons and pounds discharged. These totals are later transferred to the individual record sheet kept for each tractor.

The traveling service station requires only fifteen minutes to service each tractor as compared to the hour and a half necessary with the old method. This saving of time is equivalent to putting an extra tractor to work.

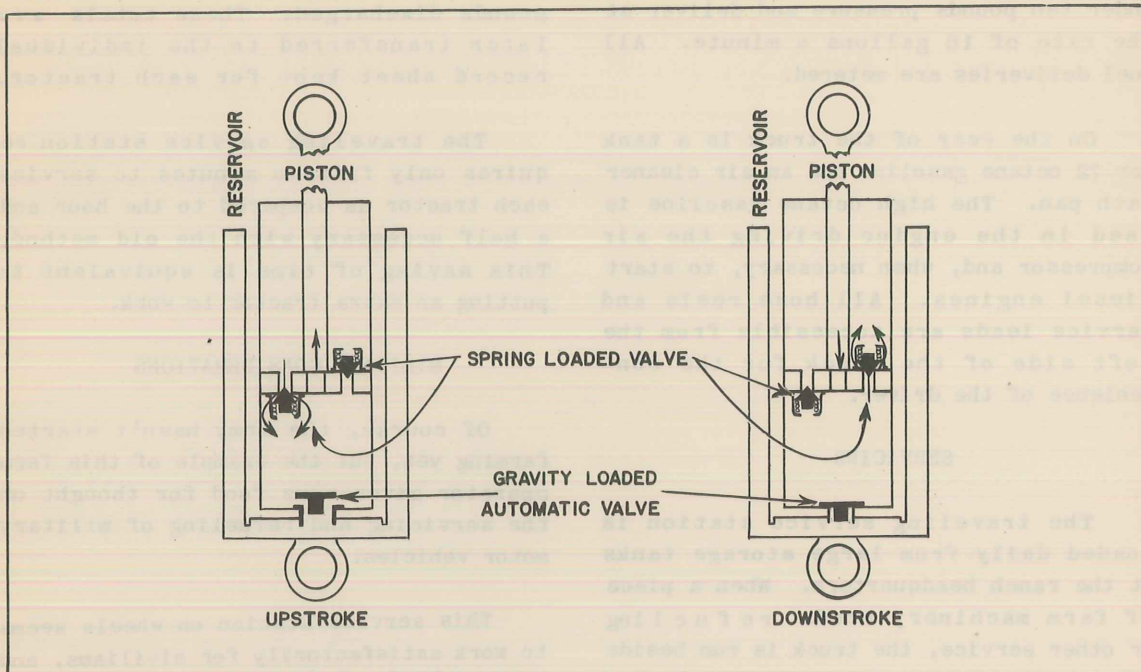
MILITARY CONSIDERATIONS

Of course, the Army hasn't started farming yet, but the example of this farm operator gives some food for thought on the servicing and refueling of military motor vehicles.

This service station on wheels seems to work satisfactorily for civilians, and with certain modifications and a bit of planning and engineering, it might be adapted to military needs. It's something to think about, anyway, especially from the point of view of an emergency mobile service station.



SHOCK SERVICE



When you roll one of the new "babies" off the highways and across country, you'll probably wind up with an aching liver if your shock absorbers are in anything but the best condition.

Shackles and other linkages should be free from wear and in good adjustment and all wearing surfaces, including the spring leaves, should be correctly lubricated.

If the shackles are too tight or if the springs are rusted and need lubrication, you'll get plenty of rough riding even on what should be a smooth road.

If shock absorber adjustments are too tight you'll get a jolting on the boulevards; and if they're too loose, your back teeth will fall out at high speeds on the best roads and at any speed on rough roads. Poor ride control

can be expected when shock absorbers are so worn that new units and new parts are needed.

STEERING AND BRAKING

When you come right down to it, it's the tires that have to be depended upon for good steering and good braking. Unless you can keep the tires on the road, steering and braking are bound to be poor.

Maximum adhesion between the tire and the road is obtained by keeping the springs and shock absorbers in good condition. Tight spring shackles may prevent the springs from holding the car to the road; and shock absorbers with insufficient rebound control can allow the vehicle body to bounce so high that there isn't enough weight on the tires to provide adequate steering or braking.

Side play in the shackles or in the front end linkage reduces steering accuracy because it allows the front wheels to wander laterally with respect to the vehicle; naturally the rear wheels, when not held in place by shackles and shock absorbers, also have a tendency to do a "hop, step, skip and jump".

When a tire rides over a bump the springs are compressed. As soon as the spring starts to rebound it kicks the body and load upward, which carry the springs with them above their normal position. The body then settles down on the spring and compresses it again, and the up-and-down cycle is repeated several times.

A SHOCK ABSORBER

is a spring brake that is meant to "even out" these up-and-down spring bumps. It does its work by forcing oil through small holes. The diagrammatic illustration shows how they work. On the up stroke of the shock absorber piston, a gravity-loaded automatic valve opens to allow oil to flow from the reservoir to the shock absorber cylinder.

When a compressed spring begins to expand after a tire has hit a bump, the shock absorber piston rides up with the cylinder and smacks against the oil, which has no place to go except back into the reservoir through the small holes controlled by spring loaded valves.

When the spring has reached the top of its rebound stroke and starts settling down, the shock absorber piston softens the upward motion and the oil rushes through the spring loaded valves back into the top of the shock absorber cylinder.

That, briefly, is the "Why and Wherefore" of the shock absorber.

SHOCK FLUID

The fluid level of shock absorbers should be checked about twice a year to make sure that they are giving proper control. A shock absorber can operate at its maximum efficiency only when the compression chamber contains a full supply of fluid. Manufacturers have set rigid specifications for the viscosity and pour point of the fluid to be used in their units and the use of the wrong fluid often results in shock absorber failures. In addition to checking the fluid, the unit should also be checked to make sure that it is not loose where it fastens to the frame and that there are no leaks. Shock absorber linkage should also be checked for wear.

FILLING

To refill shock absorbers other than the direct acting type, it is only necessary to remove the filler plug and insert fluid with a clean funnel or a filler gun designed for the purpose. Instructions for filling direct acting shock absorbers, which must be removed from the car, are included in the manufacturer's manual for each shock absorber. Before removing the filler plug, clean all dirt from around it with a wire brush and wiping rags to prevent any dirt from dropping into the reservoir. It is important that all air pockets created by refilling be eliminated. If this is not done, the control valves cannot operate as they should and refilling is just a waste of time.

After the unit is filled to its proper level, shake the car up and down several times, move all the shock absorbers and force all air from the working chambers. More fluid should then be added and the shock absorber operated again until no more fluid can be added. When the housing is properly

filled there will be a uniform resistance and no feeling of free motion. Free motion indicates that air is trapped in the working chambers.

If the shock absorber is being filled off the car, hold it in its usual position when on the car and never turn the unit on its side in order to admit more fluid. A very small air space above the fluid, usually about a half inch or so, is required for the expansion of the fluid, otherwise gaskets or seals may be blown out. When the filler plug is replaced be sure that it is tight on its seat to prevent leakage.

LEAKS

A dry or almost dry shock absorber indicates leakage which destroys the control action of the shock absorber. The leak should be located and repaired; if this cannot be done, the unit should be replaced. To locate the leak, fill the unit to its proper level and clean off the entire outside of the body with a grease solvent. Blow it dry with an air hose.

Drive over a rough road for several blocks and then inspect the gaskets and filler plug. A slight leak at the seal where the arm goes through the housing just after a shock absorber has been filled is of little consequence and is due to initial expansion. However, if there is a leak at any of the caps or valves, new gaskets should be installed and the shock absorber cleaned and tested again.

The slightest leak at the end cap will empty the shock absorber within a

few miles. Packing washers on units which have been operated with the fluid below the proper level are apt to become worn, causing leaks around the shaft. Such leaks can only be corrected by replacing the shock absorber.

LINKAGE

Noisy operation is usually caused by looseness somewhere in the shock absorber linkage. When looking for this trouble don't fail to check and tighten the entire shock absorber mechanism and linkage.

Examine all the shock absorber brackets to make sure they are tight and that the shock absorber housing is not striking or rubbing on the frame, body or axle.

Check the rubber mounting bushings and replace any that are worn.

Also make sure that the arm is tight on its splined shaft.

After it is known that the fault is not in the shock absorber, check the tire pressure and car springs before making an actual adjustment of the shock absorber control.

Lubricate the car springs, if necessary, then examine the spring shackle studs, if they are used, for indications of wear or the need of lubrication. Then if a change in the ride control is still advisable, it is best to consult the vehicle manufacturer's manual for specific instructions on the adjustments for the various types of shock absorbers.



LUBE LUNACY

In my tool cabinet over the bench I have a couple dozen oil companies' charts. But I won't bring them out, I shall just set down the problems as they have popped up since 1932. Previous to that time we mostly had light, medium and heavy, sometimes extra heavy, grades of motor oils. It was nothing in those days to put 40 or 50 viscosity oil in a motor that was brand new.

But in the neighborhood of 1932, at least in our vicinity, weights of oils took on a new significance. Somebody sold us a barrel of SAE 10. We were pretty much of the opinion it would have the same effect on a motor as a fill of straight kerosine. But we decided to experiment, and were square about it and put it in our own cars, before putting it in the customer's cars. To our surprise it seemed to do as well as the heavier grades. So we started using No. 10 oil in the motors until they started using it excessively, then moved up to No. 20, then No. 30, and so on.

That little stunt was against car factory recommendations even at that time, but a few of the oil companies backed us up in it. And we found out that a new car that had started out using No. 10 oil would "hold" it swell. Sometimes it would stay in up until 20,000, and sometimes on up to 50,000 miles. But a car that had started out on say No. 30 oil, wouldn't hold a No. 10 if it were added later, even at lower mileages. So we came to a conclusion, namely: The lighter oils were of less body and would lubricate the closer clearances without causing the necessary

wearing away of material in the motor to allow for its passage. Based on that theory we told hundreds of customers that light oil was in comparison to heavy oil as tissue paper is to cardboard, and to lessen wear, by all means use the light oil as long as the new car would hold it. This, mind you, was against the factory recommendation, but the oil men (some of them) backed us up.

We justified the factory's stand for the heavier oil by the fact that different grades of oils were encountered in the field, and as a cheap oil, or poorly refined oil wouldn't stand up in the lighter grades, they had to generalize in their suggested weights to cover all brands, and stay on the safe side. But we stayed sold on the light oil in the better brands with no trouble.

One make of car threw a scare in us, however, in 1934 or thereabouts. Due to an engineering error in judgment, there were a series of piston seizures. While searching for its cause in the field the factory representatives pounced on the light oil we were using, and pointed the finger at our midriff, telling us we had certainly bought something we couldn't eat in going contrary to their instructions. But fortunately for us other dealers in the same city had followed their instructions and also had seizures in even greater numbers, so that blew over, and they found the real cause to lie with their engineers.

During that trouble we gathered certain information on oil make-up from various sources.

That brightstock wouldn't form sludge.

That brightstock was the lubricating substance.

That brightstock was just a filler to raise the weight.

That brightstock would dissipate heat.

That brightstock would retain heat.

That brightstock would cushion shock to reciprocating parts, such as connecting rod bearings, etc., etc., etc.

All this information wasn't volunteered. We gathered it from the oil men and automobile service representatives as we went along.

Not long ago in another make of car a certain amount of bearing trouble was encountered when the car was run at extreme high speeds for long periods of time.

The bearings would be crumbled rather than burned and discolored as in the case of poor lubrication. The factory service man was called in this case, as in the other. And the finger was pointed again. We admitted that we had recommended a No. 10 oil, and the man had a pan full of powdered bearings, so our recommendation was the cause, the factory man told us. In the older cars we had got along pretty well with the light stuff, he explained, because the high heat and heavy bearing loads encountered on the new stuff wasn't found in the old car. Again it looked

like we had talked when we should have been listening.

But once more someone came to our rescue. The owner had not liked the idea of taking our suggestion against that of the factory recommendation in his manual, so he hadn't followed our light oil suggestion, and could prove it by his oil company receipts. He had used No. 30 from the beginning. The factory man said it must need a No. 40 then.

Later we read where bearings lose almost 90 per cent of their strength as motor heat runs up from 70 degrees to 270 degrees Fahrenheit. So it seemed to us that the cooling of the bearings by the oil was as important as the cushioning they received by the oil. But we can't be sure which weight of oil is the best cooling agent, the heavy or the light.

Why don't we just follow the factory recommendation? Because they haven't always been right previously, nor does their information always follow the same line as the various oil engineers! And we would like to know the reason "why".

And it does seem a lot more dealer shop confidence could be built up if the factories weren't so jealous of their secrets and would take down their hair and give us the actual sequence of their different experiments and reason for their conclusions.

After all, the mechanics in the field turn in a lot of service information that helps the factory men so why don't they reciprocate?

"DON'T GO LUBE LOONEY——"

The right lubricant in the right place at the right time does a 'right' job".



Brake fluid must possess several characteristics to function properly, especially under varying temperature conditions. Both the atmospheric and the operating temperatures vary. The energy created through contact of the lining and the drum is dissipated at the friction surface in the drum. The wheel cylinder is located on the backing plate and therefore, in a heat zone. The fluid must have a low vapor tension, or ability to remain fluid at extreme high temperatures. These high temperatures may readily occur through severe brake application.

In this case, the drum and related parts heat abnormally and vapor lock is likely to occur if use has been made of a fluid that does not possess a low vapor tension. The fluid may boil at operating temperature, to give off a vapor. This condition causes a loss of pedal. It is hard to detect in the shop because road temperatures are not likely to be duplicated. The fluid recommended by the brake and car manufacturers will not boil at operating temperatures. The rubber parts will become affected by the heat before the fluid vaporizes to cause vapor lock.

The fluid must also remain in fluid state at low temperatures. Reputable brake fluids will remain mobile at temperatures as low as 50 degrees below zero Fahrenheit. If the fluid becomes viscous at low temperatures, it loses its ability to flow. This will result in a hard pedal.

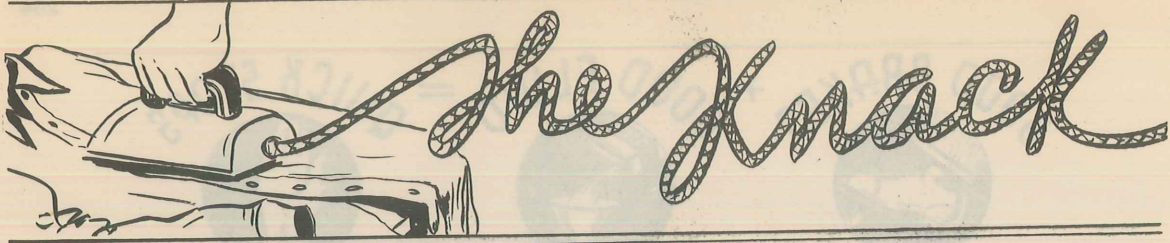
It must not affect the rubber parts in the system and must have no harmful corrosive effect on the metal parts to

cause leaks and other troubles. The rubber parts are made of special rubber and if the fluid contains any ingredients which cause any harmful effects on these rubber parts, they lose their ability to function and the system will fail at an early date.

The swelling of rubber parts must be held to a minimum, otherwise operation of the system will be affected, through sticking of the parts. A hydraulic brake system to function properly must be free from leaks and the fluid flow must not be restricted, which result from clogging of the system. If the fluid has any corrosive action on the metal parts it will also shorten the life of the metal parts.

The fluid must also have chemical stability and mix satisfactorily with other fluids. The ingredients must not separate or change during varying brake operations. If the ingredients separate, clogging of the system is sure to result. It must mix with other reputable brands since there is no way of telling what brand is in the system.

These appear to be rather extensive requirements and they are, yet these qualities are possessed by the fluids recommended by the brake and car makers. The past may have demanded seasonal changes as all-season brake fluids were not available. However, this is no longer necessary with modern fluids compounded by reputable companies. Being careful to first remove all dirt from around the master cylinder filler opening, use of a self-leveling master cylinder filler and a reputable fluid will eliminate all grief that may be involved.



The following series of illustrations should give anyone a clear idea of the ease with which even the most badly crumpled fenders or other damaged sheet metal parts can quickly be "ironed" out good as new.

Now, Figure 3, use the dolly block as a hammer to drive all deep dents nearly level. Work out the high spots with the air hammer, or if none is available, hold the dolly block in the center of each dent and work down the high spots with the dinging hammer.



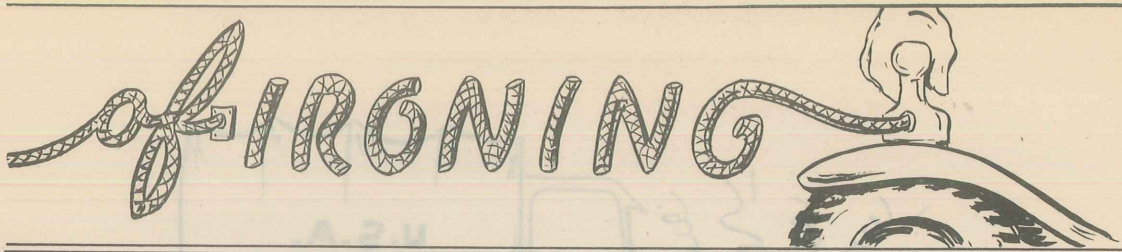
First, Figure 1, lay your tools out near at hand so, if you run across something you didn't see at first glance, you'll have the right tool for the job. Don't try to make a substitute do just as well; we all know it won't.

Clean the underside of the part, Figure 2, being careful to remove all mud, stones, gravel and road tar with your scraper. Dirt will not only ruin good tools but will make it impossible to get a smooth job.

With the fender fairly well returned to shape, it's time to weld any breaks, Figure 4. Make strong welds, especially if the break was due to vibration. Breaks of this kind show natural weakness of the part and should be made extra strong to avoid a recurrence.

Now continue with the air hammer (or dolly and hammer) Figure 5, and smooth up the entire fender. Wipe some lubricating oil over the job to make the air hammer work more smoothly. Be sure not

AIRONING



to stretch the metal by hammering too long in one spot and don't rock the air hammer or you may make some new dents.

Now if you think the job is fairly

easily be weakened by excess filing. Use the file carefully to level out the rest of the small rough spots.

Now, Figure 6, run over the whole

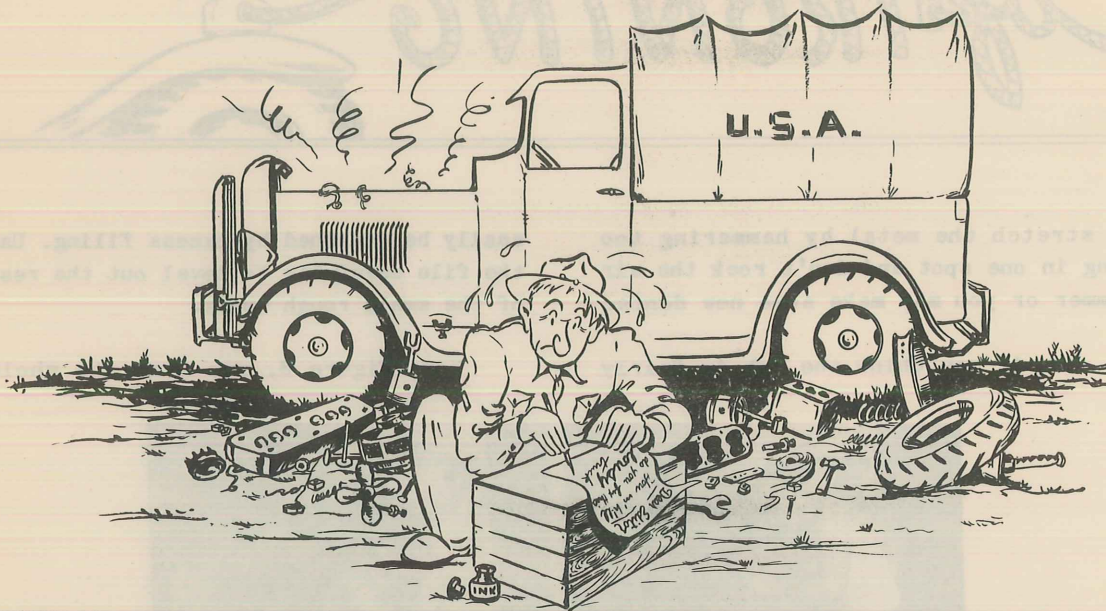


smooth, run over the surface with your disk sander, Figure 6, or with a stick of chalk held in the palm of your hand. This will show up any small depression that escaped your eye. If any such dents appear, work on them again with the hammer until the surface is smooth.

While the file, Figure 7, is an important part of the equipment, care should be taken not to use it too much. Sheet metal parts are thin and may

job with a fine disk on your rotary sander; then make a close inspection, Figure 8, to be sure the surface is perfect before painting. Remember paint will not cover up even the smallest dents; on the contrary, it will make them much more noticeable.

By following this procedure, you'll find that you are turning out work that will stand up well under the closest inspection.



THE "GAS" ANALYZER

It's been a long time since the October issue of THE 'AM appeared with the first question under "The Gas Analyzer". We put three months between the first contest and the first answer, hoping that we would receive replies from outside the United States, but we were fooled: the territories haven't shown much interest...as yet.

Probably the most comprehensive reply we received in answer to the first contest "The Tools Authorized for the First and Second Echelons of Maintenance by the Tables of Basic Allowances", was from Captain William R. Crawford, 29th Infantry (Rifle), Fort Benning, Georgia. Captain Crawford discussed the subject at great length and handled it very interestingly. A personal subscription for THE 'AM goes to Captain Crawford with our thanks. Unfortunately, we can not use all of his reply, but we are making a digest of the part of it

applying specifically to the tool equipment of the first and second echelons. The rest of it, which involved a revision of the Tables of Organization, we hope to publish in a future issue of THE 'AM.

For the purposes of the first question, Captain Crawford assumes the following additional sections for an infantry regiment:

One maintenance section for each battalion;

One maintenance section for each regiment, (rear echelon).

MOTOR VEHICLE MECHANIC'S SET OF HAND TOOLS

1. Change "Wrench, pipe, adjustable" from 10" to 6". The 10" one is too long.

2. Add 2 tappet wrenches, 1/2" x 7/16".
3. Add 1 wrench similar to "Multi-socket Wrench No. 1999 (8 openings)" manufactured by J. H. Williams and Co., 75 Spring Street, New York - or, instead of that, box end wrenches, long pattern, as follows:

1"	x 15/16"
7/8"	x 13/16"
25/32"	x 3/4"
11/16"	x 5/8"
7/16"	x 3/8"
9/16"	x 1/2"
4. Add spark plug wrench, 13/16", deep socket, 1/2" sq. drive.
5. Add 1 socket wrench, 10" long, 1/2" sq. drive. (Now in Unit Equip. Set No. 1).
6. Add 1 extension socket, 3", male and female, 1/2" sq. drive.
7. Add 1 handle, speeder, (Revolving head) 15" long, 1/2" sq. drive. (Now in Unit Equip. Set No. 1).
8. Add 1 joint, universal, male and female, 1/2" sq. drive. (Now in Unit Equip. Set No. 1).
9. Add "Set of wrenches, electric, midget, seven in set in roll". (Now in Unit Equip. Set No. 1), or set similar to Midget Electrical Set No. 1268P made by J. H. Williams and Co., New York.
10. Add screwdrivers, one size 2, and one size 3, recessed screw type (Phillips screw), (as now in Unit Equip. Set No. 1).
11. Add 1 tool, tire, valve stem fishing.
12. Add feeler stock for adjusting valves. Thicknesses would have to be according to vehicles. For our jalopies

now I'd want our mechanics to have about three strips each of .006" and .010" thick, and 12" long. The normal feeler gauge gets beaten up, and most of the thicknesses aren't needed. Might leave the feeler gauge in and add the stock.

13. Add 1 spark plug gap gauge, circular.
14. Add 1 point file (for breaker points).

The above wouldn't weigh very much nor take up much space. Most of our mechanics have added box end wrenches, Phillips screwdrivers, and some sockets to their sets anyway and think that's what they're supposed to have. Our mechanics rise when we're in the field, and so a few pounds more in the tool set wouldn't bother them.

The above sets would be for issue to motor vehicle mechanics. Now, in every one of the four Maintenance Sections recommended for the regiment there is included a Motorcycle Mechanic. He would be able to repair motor vehicles, but would concentrate especially on the motorcycles, and I think he would have his hands full. He would be issued a Motor Vehicle Mechanic's Set of Hand Tools plus a few extra things... as outlined below:

MOTORCYCLE MECHANIC'S SET OF HAND TOOLS

First, all the tools in the regular Motor Vehicle Mechanic's Set of Hand Tools, plus the additional ones listed above, and the following motorcycle tools:

1. Add a manifold wrench, open end, to fit nut 1 and 13/16". NOTE: Chisels and hammers are usually used on this particular nut.

2. Add chain tool, motorcycle.
3. Add valve cover tool.
4. Add a cylinder base wrench, 1/2" box end, very thin rim. The normal box end wrench will not go on because it wont get in the small place, it hits against the cylinder.
5. Add Cylinder head wrench, 5/8" box end, very thin.

These tools can be procured either from the Indian or the Harley Davidson Co., I imagine. Incidentally, our organization has no Harleys, we have a number of Indians. Some other tools might be required for Harleys.

Unit Equipment Set No. 1

This set to be issued to each Bn. Maintenance Sec., and to the Rear Ech. Section.

1. Add 1 motorcycle handlebar bender (Indian or Harley)
2. Add feeler gauge stock, 3 12" lengths each of .006" and .010".
3. Add 1 motorcycle valve lifter (Harley, I don't think Indian makes one).
4. Add drill gauge (like L.S. Starrett Co., Athol, Mass., No. 187).
5. Add an Alemite Model 6290 Water Pump Grease Gun (same as in Unit Equip. Set No. 2) Needed for lubrication man's use.
6. Add Alemite Model 6220, fibrous grease gun. (Same remark as above).
7. Add 1 vulcanizer, Shaler type. (As Now in U.E. Set No. 2).
8. Add 1 ea. drill, breast, chuck capacity 0" to 1/2" (as now in Unit

Equip. Set. No. 2)

9. Add 18 drills, twist, HS SS (2 ea. in the following sizes) 1/8", 9/64", 5/32", 11/64", 3/16", 13/64", 7/32", 15/64", and 1/4" (As now in Unit Equip. Set No. 2).
10. Add 1 gauge, vacuum, carb. adjust and fuel pump tester (as now in Unit Equip. Set No. 2). Note: compression gauge not given to the Bn. Maint. Secs., but only to Rear Ech. Maint. Sec.)
11. Top center indicator for timing L head engines without accesable flywheel markings. To be universal type, i.e., have adapters for different types "fish-ing" holes.
12. Add neon timing light for vehicles having timing markings. Preferably of a type similar to "Sun Powerlite" which projects the flash of the neon light like a flashlight beam.

Unit Equipment Set No. 2

Issued to the Rear Ech. Maint. Sec.

1. Add pneumatic power lubricator (for fibre grease) similar to the 25# air operated Powergun, Alemite model 6184. The greasing of vehicles will be done in lulls between movements probably. In other words-- when the work comes on the greasing, it will come in big bunches. Of course drivers will attempt to keep vehicles greased--- but for best maintenance vehicles will be greased by Maint. Sec. whenever practicable.
2. Add a device for checking turning radius of wheels, similar to the pair of graduated turntables No. J751 mfgd. by Kent Moor Organization, General Motors Bldg., Detroit. With power on the front wheels it is very important that the turning radius be set properly.
3. Add a small arbor press.

4. Add universal puller tool-- similar to "Complete Set CJ-66", mfgd. by Snap-On Tools Co., Kenosha, Wisconsin.

5. Add taps and dies, S.A.E., Standard, and a few pipe sizes-- set similar to the "Tap and Die set TD 9900" mfgd. by Snap-On Tools Co., Kenosha, Wisconsin.

6. Add drill gauge, similar to No. 187, L. S. Starrett, Athol, Mass.

7. Perhaps change the toe-in gauge from the type now issued to a type similar to No. J-710, mfgd. by Kent Moor Org., Gen. Mtrs. Bldg., Detroit.

8. Add tension wrench.

Unit Equipment Set No. 3

Issued to all Maint. Secs.

1. Add air dusting gun similar to DeVilbiss Type DG with perhaps 25' of hose, a T connection, an additional valve, so the air dusting gun may be permanently connected.

2. Add a pneumatically operated bench grinder-- with connections and buffing wheel.

Unit Equipment Sets 4, 5, and 6

No change.

Unit Equipment Set No. 7

As issued, tow bar is to grip an I beam front axle, not the front axle of a 4x4 vehicle. Tow bar should be modified.

1. Add light tow-bar for 1/2 ton vehicles. We have made some of these for use in our Regiment, and they are very handy.

2. Add tow-bar for towing motorcycles (with sidecar). We have made some of these also, and they too are very handy.

In the Regiment, each Company with vehicles would have Company mechanics. They would be authorized sets of hand tools the same as the other mechanics, except that outfits with several motorcycles would be authorized the motorcycle mechanics set of hand tools.

Company mechanics would not have to have transportation, inasmuch as they would normally be accompanying some of the motorized equipment of their company.

Within the regiment "Spare parts kits" should be made up for the company mechanics. These kits would include: "Fix-a-pump" kits, carburetor repair kits, permatex, tape, wire, nuts, bolts, washers, ignition wire, condensers, breaker points, plugs, hose (for getting gas from tank), etc. Strangely enough our mechanics insist that a coil be included in their spare parts. That seems wrong to me but they have had use for them.

I have allowed each Bn. Maint. Sec. a welder. (and naturally then a Unit Equip. Set. No. 5) Battalions now have sufficient vehicles to warrant this in peacetime, and naturally more so in war time. Further, I have allowed student mechanics. Trained mechanics will be sent forward from replacement centers, I suppose, but even so it is well to carry one as a student in case the replacements are not well trained. Instead of "Student mechanic" he could be called "Mechanic getting acclimated to new organization"--- or the old standby, "Pvt., basic".

The assistant drivers for the gasoline hauling trucks are really helpers. On the gas and oil truck, the driver and assistant driver do the loading and unloading of the drums, and also a man must be available to be left with a pile of drums at a D.P. while the truck goes back for replenishment. Hence the Ast. driver.

The various maintenance sections give the Commanding Officer a few replacement vehicles. At the expense of cutting out a mobile crew, the C.O. could take from a Bn. Maint. Sec. one of their 1/2 ton trucks. Or he could take one of their 1/2 ton trucks for a while, and when the replacement vehicle came forward from Q. M., then the Bn. Maint. Sec. would be back up to strength again.

This letter has been hastily written. The ideas contained herein are not hastily drawn, however-- but are the result of asking countless questions of the mechanics both on maneuvers and while deadbeating around the fire.

Originally, we had intended publishing only the winning answer, but Captain V.C. Stevens, C.A.C., The Coast Artillery School Garage, Fort Monroe, Virginia, returned such a capable answer that we thought it only fair to publish it and send Captain Stevens his personal subscription for one year of THE 'AM.

Captain Stevens' reply follows:

"It has been a long step forward since the days when our field tools consisted of assorted U.S.S. wrenches and a Blacksmith's set. I remember that the first shop I had even boasted a micrometer, which I discovered down under the paint on the fancy tool board displayed.

The present second echelon tool sets, in my opinion, fill the needs of field service. The changes that I recommend are due to the fact the new

Almost forgot this--- give each Maint. Sec. 1 kitchen fly. The poles would seldom be used but the fly itself would be useful.

I realize that my views are all obtained looking at the problem from just one angle--- so many of my ideas are probably hog-wild. However, you asked for our ideas!

I have enjoyed every copy of the "Army Motors" which I have received. Most all the men in our maintenance force look forward to getting the magazine each month. Wishing our magazine continued success.



vehicles, now being procured, require different repair procedure in some cases. I have followed the second echelon sets since their inauguration in 1936 and I find the Quartermaster has gradually made such changes. Therefore I feel that my suggestions have already been anticipated. Anyhow, here are my suggestions. (Some of these sets are not allowed all types of outfits by tables of allowance.)

I can find no fault with the following tool sets; Battery Expert, Welder, Blacksmith, Carpenter and Wheelwright, Electrical and Carburetor Mechanic, Pioneer Equipment No. 1, Sheet Metal and Radiator Mechanic, Trimmer, and Unit Equipment, second echelon sets Nos. 4 to 7 inclusive.

I recommend that the Tool Set, Body Mechanic's, be done away with, because all new vehicles have metal bodies. What

little wood work needs doing can be accomplished by using the tools in second echelon set No. 2. If any real wood work has to be done the Carpenters' and Wheelwrights' Set will fill the bill.

I also recommend that Tool Set, Vulcanizer, be deleted as obsolete.

I feel that a threading set for machine screws should be included in the Machinists' set. A combination, one inch to six inch, outside micrometer, to replace the one inch micrometer, is also needed. A telescopic, gauge type, inside caliper, for use in conjunction with the outside micrometer caliper, is also needed. All of these items can be obtained to fit in the standard tool box. These large micrometric calipers are needed to check journals and connecting rods before installing shell type bearings, work which I consider to be a proper second echelon field job.

The Tool Set, Motor Vehicle Mechanics', is a very fine set. The only changes I recommend are; the addition of a set of long socket, half inch, square drive, spark plug wrenches. I make this recommendation because the Motor Vehicle Mechanic is often required to work away from his Second Echelon Set No. 1. A round wire type, spark plug gauge is also needed.

The Tool Set, Painters', needs stencil outfits in the standard sizes. The respirator included in this set should be deleted because it is not contemplated that any spray painting will be done in the field.

I recommend that the following tools be deleted from the Tool Set, Second Echelon No. 1. (1) The Tool, headlight lens removing and installing because it is now needed on so few vehicles and it cannot be used on many vehicles because of the brush guard. (2) The spark plug

sockets. These to be transferred to the Motor Vehicle Mechanics' sets. (3) The pliers, headlight bulb. This article to be replaced by the glove type, headlight remover until the sealed beam lights come into universal use. The glove type does just as good a job and is cheaper. (4) The tool, flaring. To be done away with since most new vehicles use compression type fittings and this type should be used in all replacement cases, because of its freedom from the danger of jarring loose.

I recommend that each Standix gun be equipped with four metal, refillable cartridges. A small hand gun should also be provided for water pump grease since the Standix gun will not handle it properly. There will probably be more argument about the Standix gun than any other item, but I find it fills the field need and it is the only one pound gun that is not subject to air lock when it is hand packed. A loader for this gun might be given consideration.

The same remarks about the headlight lens and bulb tools apply to the Second Echelon set No. 2 as apply to the set No. 1. I recommend that the tube flaring tool remain, however, for the few jobs that will come up where it may be used. I also consider the following tools unnecessary; the Remover, dust and inner hub cap, front wheel, because a screwdriver does as well, and the Vulcanizer, Shaler type, because cold patching has improved to such an extent that it is now reliable. I believe the following tools should be added to the set. I believe they will all fit in the cabinet. (1) A bearing oil leak detector. I have found that this saves hours on every bearing job and I consider the replacement of shell type bearings a second echelon function if a machinist is available. (2) An S.A.E. and U.S.S. threading set. (3) A wrench more suitable than the adjustable, automobile type for adjusting brake cams. There must be

some such wrench on the market. (4) A caster gauge and a set of turning plates, because I believe that very little trouble is caused by incorrect toe-in. I fear many toe-in adjustments are attempts to make corrections for bent steering knuckles. (5) A grease gun loader, since air pockets in the grease cause trouble. Packing by hand in the field also gets dirt in the grease. (6) Several liquid dispensers for 50 gallon drums. If the air type is furnished it would not require much room. (7) A tension or torque indicating wrench. All of the new instruction manuals require the use of such a wrench. (8) A neon timing light. (9) A bearing packer, so that bearings may be properly lubricated. (10) A wrench, box, starter and manifold nut, 11/16 - 3/4". (11) A tank, pressure bleeder for hydraulic brakes. (Needed for large trucks.) (12) A carburetor service set like Herbrand No. C-20½.

The Tool Set Unit Equipment, Second Echelon No. 3 needs an extra magazine for the air operated, lubricating gun, since the light vehicles require a different chassis lubricant than the heavy trucks. The illustration in Circular No. 4 shows that this set has fifty feet of air hose, but this is not actually the case. Fifty feet of air hose is needed to service large vehicles.

All of the discussion, up to this point has been from a "field" point of view. In some instances it may be necessary to increase the allowance for certain items. For example; if an outfit is required to go into the field with many class "Y" vehicles they should be allowed more tow bars. Much time can be saved in "Garrison" and more efficient work can be done if Posts, Camps and Stations are furnished extra power and precision tools and such aids as; 110 volt trouble lamps, creepers, lifts, and dolly-jacks. These tools could furnish the nucleus of Third Echelon

Shops when expansion is desired. The tentative Tables of Allowance for Motor Vehicle Tools, as of October 1, 1936 provided tools on that basis. Recent instructions on the submitting of requisitions permit a certain amount of such tools to be procured.

The big problem is to get the Field Sets first. The other tools can then be obtained."

V. C. STEVENS
Captain, C.A.C.
Asst. M.T.O.

C.A. School Garage
Fort Monroe, Va.

Though the replies to these "Gas Analyzer's" contests are dribbling in very slowly, the ones we have received have been so satisfactory that we would like to continue the contests with the hope that the answers published here will stimulate more replies to future contests.

We have received one suggestion for the next contest which we think interesting enough to publish. It came from Captain Stevens, whose reply to the first contest is published above.

"I should like to see some discussion from the using services of the mud and snow tires." Many of you have possibly had experience this year with winter's traditionally foul weather, so let's carry the suggestion one step further and include all types of traction devices: mud cleats, chains, mud and snow tires, etc.

QUESTION NO. 4, JANUARY 15, 1941

Traction devices for mud, ice, and snow:

Do you find that traction devices

are of any real assistance for bad going?

Specifically, would you rather use chains for snow, or do you prefer to trust to the tires alone?

How about ice? Are chains and traction devices an asset or do they merely increase the tendency to side skid?

Let's hear what you think of traction devices in general. Give us your ideas and don't forget that the winners receive a year's personal subscription to THE 'AM.



The all-seeing eye of the camera is an invaluable aid to auto engineers in creating smoother, quieter, more dependable performance in motor cars. The greatest use of the motion picture and other specialized cameras is to detect faults escaping the human eye. Today automotive engineers not only see "through" steel with the aid of camera equipment, but also look inside it to find how stresses are distributed in hard working parts of a car.

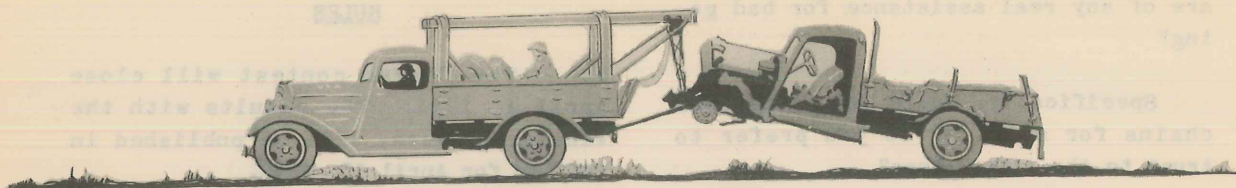
Employing transparent plastic models of mechanical parts and using polarized

RULES

1. The fourth contest will close April 1, 1941. The results with the winning answers, will be published in THE 'AM for April 15, 1941.
2. The decision of the Editors will be final.
3. No replies will be acknowledged or returned.
4. Replies will be held confidential and published under a pen name, if desired.

light, an X-ray diffraction 4-place camera photographs the indicated stress lines in the part. When no stress is placed on the part, it will photograph dark, neutral gray. But when the piece is bent, or otherwise stressed, bright bands of color appear, like miniature rainbows. Exact location of these color lines gives an accurate picture of the internal stresses in the piece. From this knowledge engineers can eliminate useless metal in parts, and be better able to know how to strengthen and improve them.





HELP!

A fan belt is a fairly insignificant thing and easy to forget. Generators, however, are almost universally belt driven and a loose fan belt can cause a lot of generator trouble if the engine must be operated at high speed before a generator can reach its maximum charging point. Complaints about low battery capacity or continual under-charging can often be traced to a loose fan belt.

You can check a loose belt by two methods; checking the deflection of the belt between the fan and generator pulleys; or checking the tension at the generator by a spring scale.

FIRST TEST

In the first test the deflection in the belt will depend upon the size and length of the belt between the pulleys. It will vary from 1/2 to 1 inch with thumb pressure, measured with



In making adjustments on voltage regulators, some electricians get into trouble because they connect the voltmeter leads on their volt-amp testers to the "gen" terminal on the regulator instead of "bat" terminal. This produces a high voltage reading because there is a considerable voltage drop in the regulator windings.

the straight edge placed over the belt strand. This deflection will usually just permit the fan to be turned with the belt held stationary. The straight edge can also be used across the face of the pulleys to check the pulley alignment. A loose or misaligned belt can cause a noise similar to a spark rap at high speed.

SECOND TEST

In the second test a spring scale is hooked to the generator after all the mounting bolts are loosened. A straight pull on the scale will register a certain amount of tension. The tension, usually 25 or 30 pounds, should be maintained while the mounting boards are tightened.

Remember: too tight a fan belt will cause excessive wear on the water pump bearings and, eventually, lead to water leaks.

With the extreme tooth angle on late model differential gears, very little adjustment tolerance is allowed for the pinion setting. Setting the gears by feel is a thing of the past.

In an emergency an acetylene torch can be used to case harden small steel parts.

The Motor Transport Technical Service Bulletins are published, when the necessity arises, to keep those concerned with Army Motor Maintenance up to date on the latest changes, revisions and recommendations on the technical features. They contain information that has been omitted, for one reason or another, from the manufacturer's maintenance manuals and service bulletins.

The bulletins have recently been considerably overhauled by changes No. 11 and 12. A change in these technical service bulletins, in case you don't know, is a revision sheet published whenever necessary to correct or rescind existing bulletins or add new bulletins to those already published.

One of the latest bulletins to come out is Bulletin No. U-1 on "Metal Corners for Cargo Body Top Bows", a tip on which was given on Page 223 of the December 'AM. In case you missed it, the article told how to bend the top stave and use the new metal bow corners described in that bulletin.

Bulletin B-5 is another one of the latest revisions. B-5 covers the lubrication of transmissions, driving axles and hypoid drive gears. Lubrication,

as you have probably learned if you read this month's article on "Lube Lunacy" is a subject that can always stir up a good fight, but B-5 does its best to settle as much of the uncertainty and disagreement as possible.

With all the new trucks coming into the Army, Bulletin Z-5 is probably a good one to know about. It deals with the defects and deficiencies of new motor vehicles and tells how to receive, inspect and break them in. It also has a draft of a form which shows the correct procedure for reporting any defects or deficiencies which you might find in new motor vehicles.

Bulletin H-1 "Steering on Dodge Model VC 1/2-ton Trucks" tells how to eliminate shimmy and improve the steering on these trucks. It is easy to do the trick if you follow instructions carefully.

This is just a quick digest to give an idea of what the technical service bulletins contain. Motorized organizations can obtain a complete file, with index and subsequent changes, of these Motor Transport Technical Service Bulletins upon official application to The Quartermaster General, Washington, D.C.



Advantages of hydraulic valve lifters claimed by engineers are:

1. They automatically maintain constant zero valve clearances.
2. Valve timing is never changed by valve clearances increasing or decreasing for any reason.
3. They are quiet.
4. Since valves are lifted and seated at precisely the correct instant, better performance re-

sults, and longer life for the valves is obtained.

Cut out the ring groove at the top of the cylinder before removing the piston from the engine. The piston not only catches the cuttings before they get into the engine but it saves broken ring lands when it is pushed out.

Dipping the hammer in engine oil or covering it's face with a bit of chamois saves the paint when working on a small dent in metal that is not to be repainted.

digests

C U R R E N T

"AUTOMOBILE DIGEST" December 1940

"Carbon Monoxide". A knowledge of the source, performance and effect of carbon monoxide is important to a mechanic so he can guard himself from the injurious and sometimes fatal effects of this dangerous gas.

"Quick Service Notes on 1941 Models". Service information on the many changes incorporated in the new models.

"Accuracy Pays Off". Extreme accuracy must be the word if the tune-up job is to work and give satisfaction. There is no tune-up where there is no accuracy.

"How to Check Car Wiring". A doctor, before he can tack "M.D." on to his name, must know the arteries that carry blood to all parts of the human body. If you want to be an "M.D." (Mechanical Doctor) you had better learn about the arteries that carry the spark of life to all parts of the motor vehicle.

"Quick Checks on Circulation". There is a minimum temperature at which the engine functions efficiently. If the circulation of the cooling system is incorrect, the engine under or overheats and its efficiency is cut way down.

"Quiet, Please!" There is rhythm in engines. When the rhythm is off, something is wrong. Know how your engine sounds when it's running sweetly. The

slightest off-beat will warn you that something is haywire in the innards.

"Problems in Truck Spring Service". The life of a truck spring depends on maintaining the continuous alinement provided by tight U-bolts and properly adjusted shackles.

"Automobile Digest Index, 1940". A useful page to keep handy when you run into trouble and want to find a ready reference to solve a problem.

"COMMERCIAL CAR JOURNAL" December 1940

"Shop Hints". Hints on a tire chain ramp; an armature cleaner; and a brake gauge.

"A Spinner Speaks". A West Coast truck driver, talking from experience, offers some constructive criticism on on gauges, windshields, brake pedals, horns, steering wheels and the position of transmission levers.

"Piston Ring Friction and Drag". The results of these tests show that expander rings with high unit wall pressures do not cause more drag than the snap type.

"New Truck Engines". A discussion of the new Mack, Hercules and Autocar engines.

"Truck Specification Table". Up to date specifications for standard domestic

COMMENTS

T E C H N I C A L M A G A Z I N E S

models obtained directly from the truck manufacturers.

"MOTOR AGE"
December 1940

"Tune-up Tips on '41 Cars". Increased use of 10-mm. spark plugs on the 1941 cars are only one of the factors affecting tune-up on the new models. Dual carburetion, while requiring new procedure, is not particularly difficult to adjust.

"Electrical Service on the 1941 Cars". This article is of particular interest because it gives the specifications of the 1941 generators and starters and emphasizes the need for accurate testing equipment.

"Special Feature of New Tools, Equipment, Parts, Accessories and Supplies". Descriptions of many of the new products that are on display at the A.S.I. Show, together with many additional items announced at this time by other manufacturers.

"Grille Removal on 1941 Cars". The step by step procedure for removing radiator grilles. This story covers the 1941 models, and picks six cars as representative types for the entire line.

"Service Procedure on the 1941 Brakes". In this article is a table of brake lining sizes as used on the 1941 models, together with illustrations of

the popular types of brake construction. The story outlines the adjusting procedure on all 1941 types of brake.

"What's New in Wheel Alinement". A general review of the different types of front end construction used on the 1941 models, with particular reference to the new Nash "600". Caster, camber and toe-in adjustments are outlined, along with a table of specifications.

"Battery Locations for 1941". This story tells the boys where to look for the batteries in the new models, and emphasizes the need for more frequent checking with a hydrometer and checking for corroded cables.

"Lubrication for 1941". The automatic transmissions and fluid drive units on the 1941 cars require special lubricants which will have to be stocked by any service station attempting to do a universal job of service.

"MOTOR SERVICE"
December 1940

"Light Combat Cars". An informative article on the construction of small tanks.

"Bearings". The stepchild of the engine overhaul department. Mechanics who know better are often inclined to forget the importance of correctly fitted bearings. Bearings need attention long before they get loose and start to clatter.

"Compound Carburetion". The use of two carburetors instead of one, both of them feeding to all cylinders, is designed to combine maximum power and speed with fuel economy.

"Flushing the Hydraulic Brake System". Poor hydraulic brakes can cause trouble. Dirt or gummy residues from old or improperly manufactured

fluid, bind the moving parts of the wheel or master cylinder. Get rid of the gum and you'll get rid of a lot of trouble.

"Shop Kinks". Kinks on sticking starting motors; changing oil filter elements; and repairing window regulator handles.



We have been running two sections in THE 'AM that we suspect are not read with as much interest as we hope the rest of THE 'AM is read. The sections are "Digests--and Comments--of Current Technical Magazines", and "Acknowledgments". Most of the letters that we have received congratulate us on giving technical material and automotive information that is readily available to the general mechanic and motor officer. If you find THE 'AM valuable and interesting, you can easily see, since a good proportion of our articles come from current technical magazines, that the magazines themselves should afford much wider and just as interesting reading.

We try in the Digest and Comments to skim "the cream of the crop" each month, choosing what we think would be

of most interest to those concerned with army motor maintenance. We enjoy reading the magazines, and we feel that if you once acquire the habit of dropping into the library every week or so, and looking over the new arrivals, that you'll find a lot of your difficulties and problems gradually disappearing, and that you'll acquire a broader and deeper knowledge of "what makes the wheels go round".

THE 'AM is indebted to the publishers of these many technical magazines. We believe that your interest in them is the best indirect method of showing not only your pleasure in THE 'AM, but also your appreciation of the many technical trade magazines that are largely responsible for making THE 'AM what it is, by their freely given cooperation.



A C K N O W L E D G M E N T S

THE EDITORS WISH TO THANK THE FOLLOWING PUBLISHERS FOR THEIR COURTESY IN ALLOWING "THE 'AM'" TO MAKE USE OF ARTICLES AND ILLUSTRATIONS FROM THEIR PUBLICATIONS.

THERE WERE NECESSARILY MANY ARTICLES THAT COULD NOT BE USED, BUT IT IS HOPED THAT THOSE PUBLISHED HERE WILL STIMULATE INTEREST IN THE SOURCE MATERIAL.



"Good Brakes and Good Fluid - Quick Stops", page 254, was based on "The Right Brake Fluid" - AUTOMOBILE DIGEST, December 1940, Automobile Digest Publishing Company, 22 E. 12th Street, Cincinnati, Ohio.

Subscription - \$2.00 per year.

"The Knack of Ironing", page 255, was based on "The Knack of Ironing" - AUTOMOBILE DIGEST, November 1940, Automobile Digest Publishing Company, 22 E. 12th Street, Cincinnati, Ohio.

Subscription - \$2.00 per year.

"Shock Service", page 249, was based on "Shock Service" - MOTOR, November 1940. Hearst Magazines, Inc., 572 Madison Ave., New York, New York.

Subscription - \$2.00 per year.

"Streamlined Service", page 247, was based on "Service Station on Wheels" - THE ETHYL NEWS, November 1940, Ethyl Gasoline Corporation, Chrysler Building, New York, New York.

"Safety Rims", page 243, was based on "Safety Rim Service" - SERVICE REPORTER, September 1940. The Chrysler Corporation, Detroit, Michigan.

"Lube Lunacy", page 252, was taken from MOTOR AGE, November 1940. The Chilton Company, Inc., Chestnut and 50th Sts., Philadelphia, Pennsylvania.

Subscription - \$2.00 per year.

The back cover was taken from - SMASH HITS, The Travelers Insurance Company, Hartford, Connecticut.



Like Bats Out of Hell

RIDING alone over the arid wastes of New Mexico one summer evening in 1901, Jim White saw what appeared to be the smoke of a friendly campfire. As he approached the swirling column, he discovered that it was not smoke but a rising cloud of millions of bats. The bats came from an opening in the ground, and when the column disappeared into the South, Jim White ventured into the cavern.

The next morning he was awakened by the swirling of millions of wings, and the column rewound its way back into the security of the cavern.

Each day, even now, this activity takes place, punctually and unerringly. The bats leave the cave at sunset, fly over the Rio Grande, consume some eleven and a half tons of insects, and at dawn return to the sanctity of the now famous Carlsbad Caverns. But each night the returning group is smaller, for owls and preying animals exact their toll from the bat population. Eventually the species may become extinct.

Like the bats, we human beings venture forth each day, dash about our business, then turn back to the security of our homes. As with the bat population, each day a toll is exacted and the group diminishes. Each day some of the millions of drivers and pedestrians do not make the return trip home. They are killed or crippled in traffic accidents.

Unlike the lower orders, Man has always found the means of combatting the destructive forces which beset him. Traffic accidents present a serious threat to this generation. How soon will we succeed in solving this modern menace?