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ARMY

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SEASONS  
GREETINGS



THE QUARTERMASTER MOTOR TRANSPORT SCHOOL  
HOLABIRD QUARTERMASTER DEPOT  
BALTIMORE MARYLAND



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Original Articles Are Welcomed.

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

★ *A Merry Christmas* ★

★ ★  
AND FOR A HAPPY NEW YEAR

RESOLVE TO REMEMBER

Care.

Courtesy.

Consideration.

Be safe - not sorry.

Stop means STOP - not slow down.

Carbon Monoxide kills - give it the air.

Driving is a good job - Why not do it well?

Expect the unexpected - use care and consideration.

Your truck may have an all steel body - but you haven't.

Accidents go up when the sun goes down - be extra careful  
after dark.

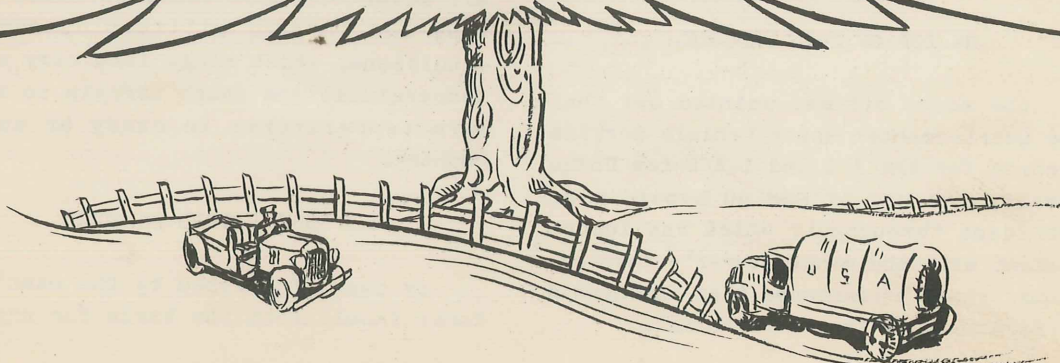
Don't take cat naps while driving - you haven't nine lives.

A driver must have something lacking who doesn't look where he  
is backing.


If you want more time to live - take more time to drive safely.

A little patience at crossings will keep a lot of patients out of  
the hospital.

Horse sense behind the steering wheel is lots better than horse power  
under the hood.







# The old old

## GREASE STORY

The Motor Transport School recently received a letter from a motor officer asking the school to straighten out what, to him, was a maze of recommendations and counter-recommendations on truck lubrication.

Briefly this was what he was running into: The instruction manuals for Dodge 1940, 1-1/2 ton 4 x 4 trucks, call for lubricating wheel bearings, transmission, transfer case and differentials every 10,000-miles. Recommendations for other makes of vehicles call for the same routine every 5,000-miles. The instruction manual for the 1940, 1/2-ton Dodge specifies lubrication every 15,000 miles. The motor officer was given a 10,000-mile margin of error, which is enough mileage to ruin any truck; particularly since it is a well-known fact that the hypoid gear lubricant recommended for the 1/2-ton Dodge breaks down rather rapidly after 5,000-miles of service. An additional 10,000-miles tacked on to this could probably put the 1/2-ton Dodge in the grave yard for keeps.

### ON TOP OF THIS TROUBLE,

the motor officer pointed out that the Quartermaster Motor Vehicle Service Records for the 1/2 and 1-1/2-ton Dodge specify the use of SAE 90 hypoid gear lubricant throughout, which was inconsistent with the manufacturer's instructions, which recommended that the hypoid be used only in the differential.

The letter finished its tale of woe by requesting that information be furnished on the latest agreement made between the vehicle manufacturers, the manufacturers' sub-contractors, the oil companies and the Quartermaster Corps, regarding the lubrication of the 1940 vehicles.

On the surface, lubrication appears to be about the easiest of the numerous motor maintenance problems: The Right Lubricant in the Right Place, at the Right Time, in the Right Manner.

Scratch the surface on this one, however, and you will run into more trouble and more headaches than you have ever had before.

### EXPERTS DISAGREE

When vehicle manufacturers and technical experts from oil companies can't agree on lubrication, then it is time for the motor officer and the mechanic to look out. No general rule of thumb can be given that will cover all makes of motor vehicles under the many and varying military operating conditions, which range from very cold temperatures and rough terrain to very warm temperatures in sandy or dusty country.

### THE LUBRICATING SCHEDULE

or chart furnished by the manufacturer should form the basis for organ-



ization lubrication schedules. However, the lubrication periods recommended by the manufacturer are usually too infrequent for military motor vehicles, which undergo much more severe service than commercial vehicles. When the manufacturers' recommendations are obviously incorrect or inconsistent, they should always be modified to meet specific operating conditions by referring to local regulations and the technical service bulletins published by the supply services. The use of proper lubricants should be based on the experience of qualified personnel.

In other words, the responsible motor officer must start with the recommendations of the manufacturer or the supply service and modify them when necessary, to meet the local conditions.

#### RECOMMENDATIONS

In trying to clear things up for this motor officer we suggested that he read the Quartermaster Motor Transport School Text No. 10, "Lubrication", particularly paragraphs 27, 28, 29 and 37. Section VII gives the principles of preparing and using lubrication schedules and charts based on the 1,000-

mile or monthly maintenance and the 6,000-mile or semi-annual maintenance. This last clearly indicates that transmissions, transfer cases, power take-off units and live axle differentials should be drained and refilled every 6,000 miles.

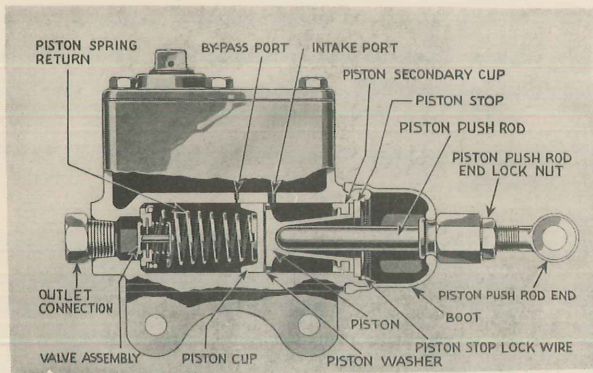
The danger of mixing hypoid gear lubricants other than those specified in Circular Letter #78, O.Q.M.G., 1940, is well recognized and accepted throughout the automotive industry. It is something that local motor officers must guard against. If a vehicle manufacturer makes specific recommendations in his manuals covering his vehicles and these recommendations are not carried out in detail, the manufacturer has a basis on which he can void his warranty under the terms of the purchase contract. For this reason, all material published by the Motor Transport School and the Holabird Quartermaster Depot, urges following those recommendations unless it is obvious that they are in error, when they should be made the subject of a specific complaint under Motor Transport Technical Service Bulletin No. Z-5, Office of The Quartermaster General, or by a specific letter when conditions warrant such action later.



Pity the perplexed mechanic who spent 15 minutes getting his spark plug gaps to a gnat's whisker, and then set them on old gaskets so tightly that they were distorted and the gap was changed several thousandths. He didn't know whether to blame the carburetor, the compression, or the distributor for the poor idle he got, for he KNEW the spark plugs were gapped OK.....

You may have "timed" the engine with a neon light or piston locating gauge, but did you ever try to time it with your Ingersol? You would have to hurry, for at ordinary road speeds less than three hundredths of a second will pass between the time the piston starts to compress the fuel mixture and the completion of the power stroke.





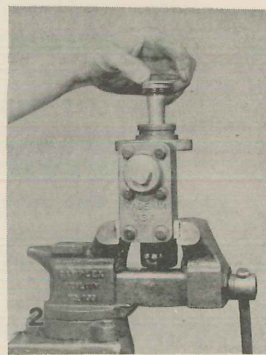
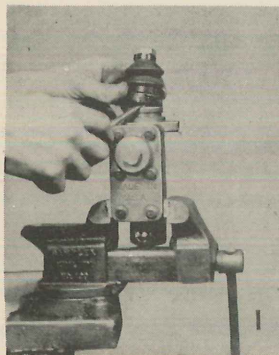
**1**  
Remove clamp ring fastening boot to master cylinder, and remove boot and push rod.

**2**  
Remove piston stop lock wire and piston stop washer, and lift out piston.

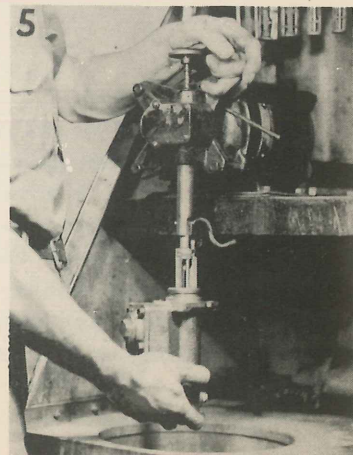
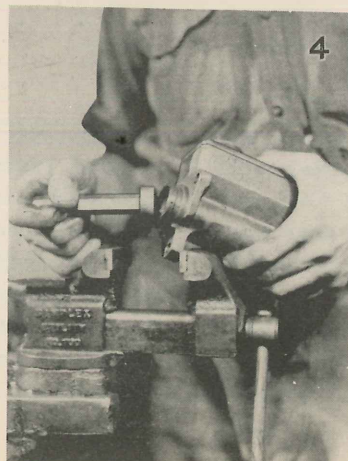
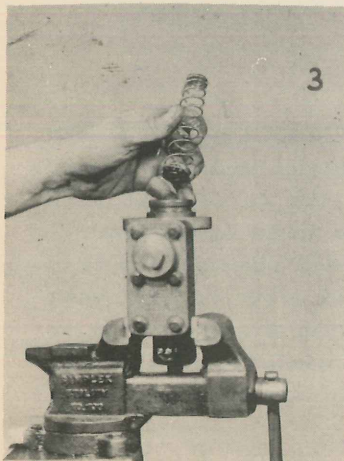
**3**  
Remove the piston return spring and the check valve.

**4**  
Check the cylinder with a Go and No-Go gage to determine if the cylinder has been honed before and is now too large to stand another honing. If the gage enters the cylinder it indicates that the cylinder is too large, and should be replaced.

**5**  
Honing the cylinder should be very carefully done, removing only enough stock to smooth up the walls and eliminate any scratches or pits.



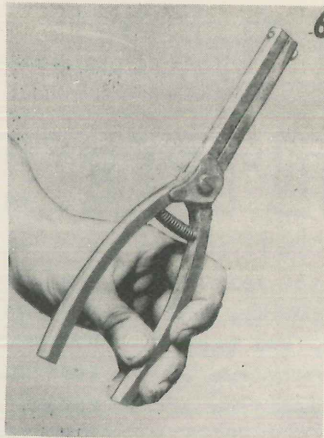
# HYDRAULIC Brake





### 6 & 7

Honing the cylinder places a sharp edge around the by-pass port. This should be burred off to prevent it from wearing the piston rubber cup. Special pliers are available, having a sharp dowel slightly smaller than the port. This dowel is inserted in the port, and a slight pressure applied to remove the sharp edge.

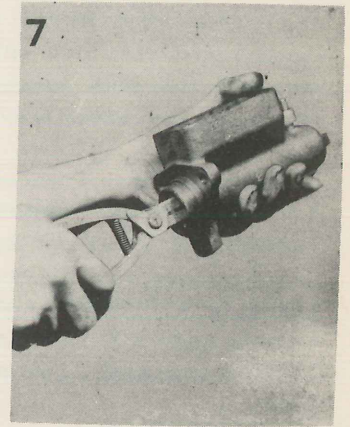


### 8

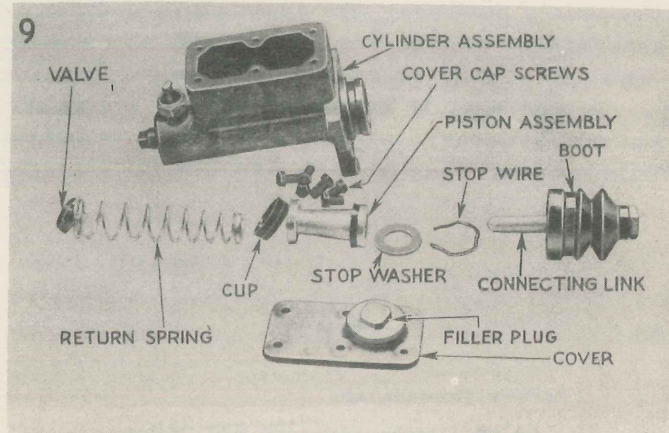
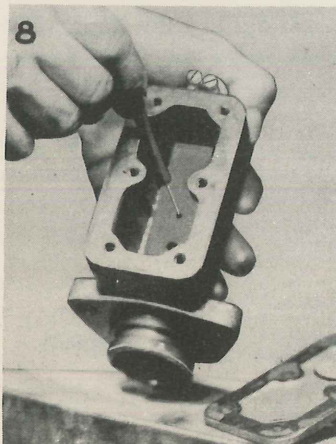
Check the size of the by-pass port with a wire gage. The "go" gage is .117 in., and the "no-go" gage is .126 in. If the "no-go" gage enters the port it indicates that it is too large, and the cylinder should be replaced.

### 9

Wash all parts in alcohol, and when re-assembling, all parts should be dipped in hydraulic brake fluid. Use new primary piston cup, new secondary cup and new check valve. Never wash hydraulic brake parts in gasoline, kerosene or oil.



## CYLINDER OVERHAUL





# TRAINING *for* MAINTENANCE

Training mechanics in motor maintenance consists mainly of giving, and seeing that they understand, the basic principles and operating theories of the various units and sub-assemblies of the motor vehicle. Mechanics can't be expected to do a thing properly unless they know what makes the "wheels go round", and they can only know this by having a thorough background knowledge of operating theories and principles.

However, the mechanics must strengthen and augment this basic fundamental knowledge by a large amount of practical experience covering every possible adjustment and by having the dimensions of various clearances, tolerances and fits at their finger tips.

## MANUFACTURER'S MANUAL

It is impractical to issue dimensional data on every type and model of truck now pouring into the Army. The one accurate, sure reference is the manufacturer's handbook. The importance of this manual to the instructor and the student cannot be emphasized too much. In some ways it is just as vital to the satisfactory operation of the vehicle as the four wheels and the

engine. Some place along the line in your maintenance work, you're going to hit a snag and you'll find yourself lost unless you have the manufacturer's manual at hand and know exactly how to find the necessary information. Of all the books in the maintenance man's possession, the manufacturer's manual is certainly the "Mechanic's Bible" for the particular vehicle. Frequently additional information will be desired on major units and assemblies that are not manufactured by the builder of the truck - for example, on Carter or Stromberg carburetors, Delco Remy or Auto-Lite electrical equipment, Westinghouse air brakes, etc. When this information cannot be found in the manufacturer's manual, the manufacturer of the specific unit in question can be written for fuller details.

## SCHEDULE OF INSTRUCTION

The following suggested schedule of instructions is based on reference books which are readily available to the instructor and student. No specific mention has been made of the manufacturer's manual but it must be remembered that this book should be consulted along every step of the training program.

## ENGINES

NO.	SUBJECT	TEXT	HOURS
1	Safety Precautions Using tools, handling gasoline, cleaning material.	AR 850-20 MTST 12 Sp. T.-99	1



2	Motor Terminology	MTST 1 Sp. T.-99	1
3	Engine Nomenclature Disassembly, inspection, description.	MTST 2	3
4	Principles of Internal Combustion Engine Elementary principles - cycles - multicylinder engines.	MTST 2 Sp. T.-99	3
5	Valves and Valve Mechanism Purpose - cam function - valve timing - maintenance.	MTST 2	3
6	Bearings Fits - clearances - lubrication - adjusting.	MTST 2	9
7	Pistons and Piston Rings Construction - clearances - fitting - oil pumping.	MTST 2	6
8	Lubrication Principles - practices.	MTST 10 and 2 Sp. T.-99	7
9	Engine Cooling Water pumps - radiators - anti- freeze - trouble shooting.	MTST 2 Sp. T.-99	7
10	Fuels and Fuel Feeds Types - pumps - repair.	MTST 3	7
11	Carburetion. Principles - design - superchargers - manifolds - exhaust systems.	MTST 3	7
12	Ignition Elementary electricity - charts - current sources - ammeters - coils - distributors - plugs.	MTST 4 Sp. T.-99	6
13	Electrical Units Generators - regulation - reverse current relays - starters - lighting system - accessories.	MTST 4 Sp. T.-99	12
14	Tune-up Equipment	Manufacturer's Manual	7
15	Engine Trouble Shooting Methods - tracing trouble - electrical and fuel troubles.	Manufacturer's Manual	42



16	Reviews on Subjects Covered	All	6
17	Examination on Subjects Covered	All	6
18	OPEN, For Special Use of Co. Commander		1
			-----
	Total hours		141

## CHASSIS UNITS

1	Chassis Nomenclature	MTST 1 Sp. T.-99	2
2	Safety Precautions, Use of Tools General rules.	MTST 12 Sp. T.-99	1
3	Frames Classes - design - troubles and repairs.	MTST 6 Sp. T.-99	4
4	Springs and Shock Absorbers Classification - platform - Hotchkiss drive - shackles and springs - shock absorbers - troubles and remedies.	MTST 6	5
5	Front Axles and Steering Gears Construction - steering gears - Pitman arm - steering linkage - troubles.	MTST 6 Sp. T.-99	10
6	Front Wheel Drive Designs - servicing.	MTST 5	5
7	Steering Geometry and Wheel Alignment Caster - camber - toe-in - toe-out on turns - methods of checking, correction.	MTST 6 Sp. T.-99	5
8	Brakes Braking systems - mechanical - hydraulic - air - electric - vacuum booster - brake adjustment - testing.	MTST 7 Sp. T.-99	13
9	Power Transmission Gears - power transmission systems.	MTST 5	1
10	Clutches Kinds - Principle of action.	MTST 5 Sp. T.-99	9

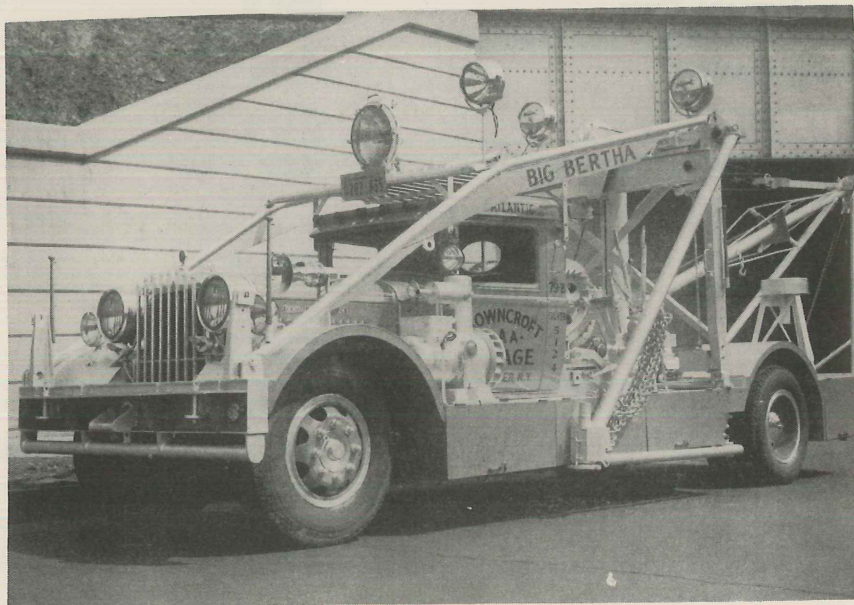


11	Transmissions and Transfer Cases Kinds - over-drive - transfer case - reduction gear - power take-offs - lubrication.	MTST 5	10
12	Rear Axles and Differentials Principles - bearings - adjustments - universal joints - lubrication - types of drive.	MTST 5 and 6 Sp. T.-99	10
13	Wheels, Rims and Tires Types - balancing - mounting - rims - tires - repair.	MTST 6 Sp. T.-99	6
14	Winches and Trailers Types - construction - operation - servicing.	MTST 6 MTTSB 2-10	2
15	Body and Fenders Repair - welding - special tools.	MTST 18	15
16	Lubrication How - when - where to use.	MTST 10 Sp. T.-99	5
17	Inspection Command - preventive - technical.	MTST 11 Sp. T.-99	23
18	Review	All	8
19	Examination	All	6
20	OPEN, For Special Use of Co. Commander		1
			-----
	Total hours		141





# Big BERTHA



She has four driving wheels and 25 gear shifts.

She can raise a dead load of several tons straight up from a depth of 1,000 feet.

She can lift and swing around any of the gigantic tractor-trailer trucks that rumble over the state's highways day and night with their tons of freight.

Her name--appropriately enough--is Big Bertha.

Looking like a cross between an army tank and a Flash Gordon juggernaut, Big Bertha conceals beneath her expensive exterior the heart and soul of a simple wrecking truck.

For that's all Big Bertha is....a wrecker. But hers is a highly specialized field. No accident to any common garden variety of automobile can arouse Bertha's enthusiasm.

Big Bertha is a product of the ingenuity of two Rochester, New York, garage men. She took 16 months to assemble, and cost approximately \$10,000. She has three swinging booms, (14, 20 and 32 feet long), and has 7-foot outriggers on each side. She has her own lighting system with a complete gasoline power plant, augmented by six batteries to insure continued lighting. Bertha is equipped with three floodlights and four spotlights which may be kept on indefinitely and which literally turn night into day.



Recently near Rochester, a railroad engine collided with a transcontinental truck, hurling it into a ditch and creating a neat wrecking problem. It took Bertha's crew little more than 15 minutes to pick the truck from the ditch and drag it out to the highway.

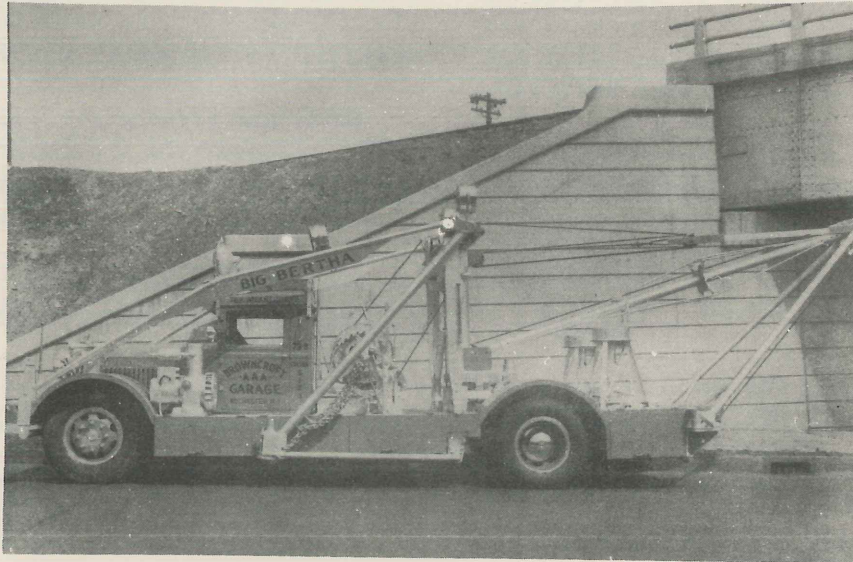
Big Bertha is of welded construction throughout, mounted on a five ton truck chassis. With a worm drive rear unit it measures 31 feet overall and its special equipment weighs 12 tons. All derrick parts are so arranged that the unit can pass under an eight foot clearance in doorways and underpasses. The frame is reinforced with a 5x5½ inch angle iron, welded on the outside of the entire length of the chassis. Loads are supported by a twelve inch I-beam

welded across the frame below the mast.

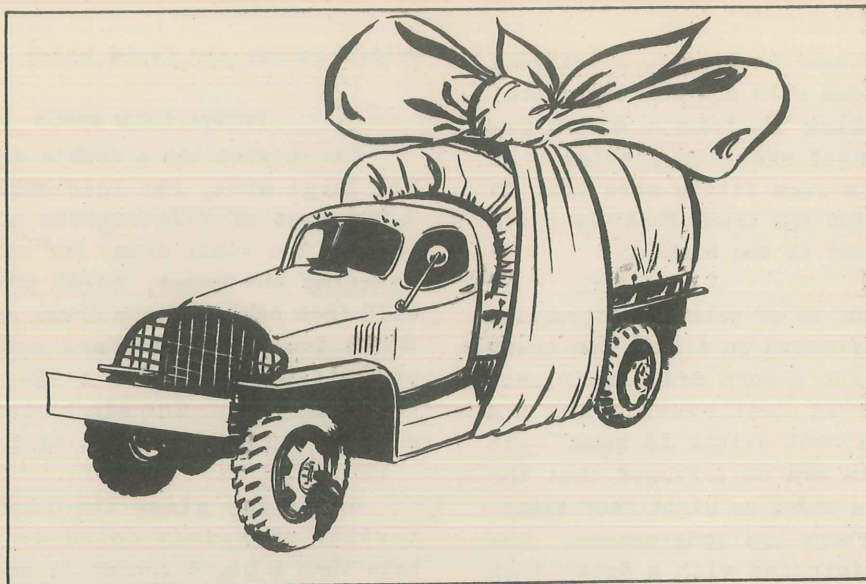
#### DOUBLE DRUM WINCH

The derrick has a double drum winch. The large drum, for load cable, holds 1,000 feet of five-eighths plow steel cable. The small drum, for raising and lowering the booms, holds 200 feet of half inch cable. Both drums are driven from a two speed forward and reverse power take-off, with a 42-to-1 worm reduction gear. The winch also carries a large capstan for rope rigging work.

Wreckers, along the lines of Big Bertha, certainly could be a lot of help when a big 6-tonner is wrecked, or a heavy gun is overturned and more often when the big movable forts (heavy tanks) become immobile.







The Cargo Body Top Bows described in The Quartermaster Motor Transport Technical Service Bulletin No. U-1, can be readily repaired in the field by using the following trick to bend the top stave and using the new metal bow corners described in that bulletin.

Secure a piece of straight grained hardwood, preferably red oak, white oak or white ash, 1 inch thick 2½ inches wide and of the following lengths:

Inside Body Width	Length	Height of Block
90 ins.	78½ ins.	7 ins.
88 ins.	77½ ins.	6-¾ ins.
80 ins.	68 ins.	5-¼ ins.
70 ins.	58½ ins.	4 ins.

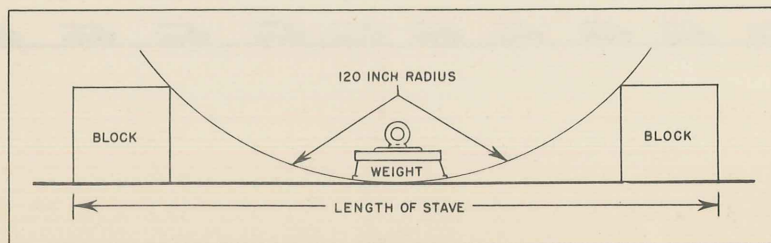
Soak the top stave in hot water for about 30 minutes and place it on two blocks, as shown in the illustration.

Then weight the center until the stave is bent so that its center is as low as the bottom of the blocks. Allow the stave to dry thoroughly before moving the weight. It is then ready to assemble to the metal bow corners.

Metal bow corners part No. 215746 can be obtained from the Edward G. Budd Manufacturing Co., Detroit, Michigan at an approximate cost of 30 cents each.

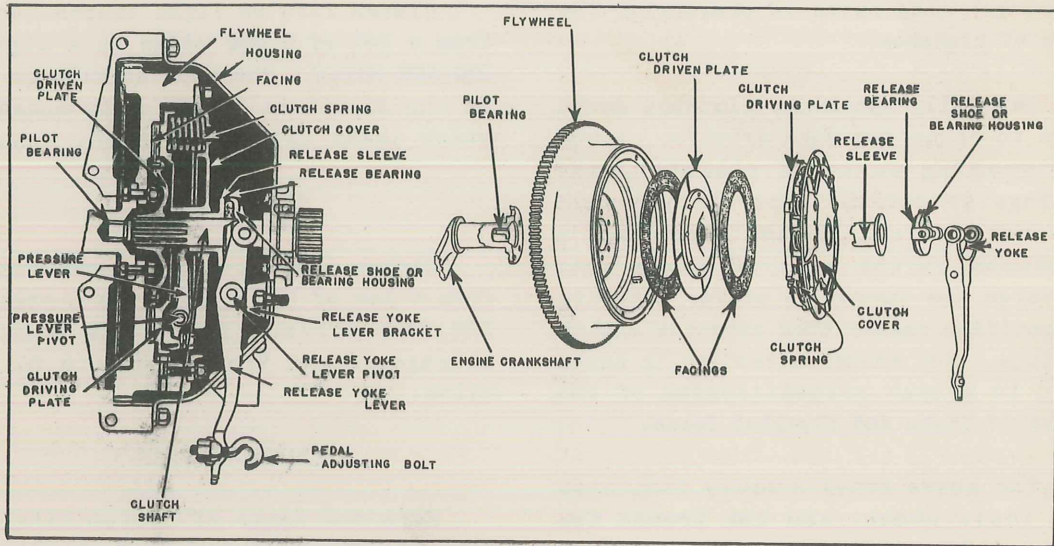
The vertical side staves are also 1 inch thick, 2½ inches wide and of the following lengths:

Inside Body Width	Length
90 ins.	58½ ins.
88 ins.	43-¾ ins.
80 ins.	44½ ins.
70 ins.	45½ ins.



# CLUTCH

## MAINTENANCE



The clutch is probably the most used unit on a motor vehicle. Each time the operator changes to a different gear, the clutch must be disengaged and then engaged. Each time the clutch is released or engaged there is a considerable amount of friction between the clutch driving disk and the driven plate, which is usually fastened to or part of the flywheel. This friction generates heat, and the clutch usually is designed so that heat can be quickly and equally distributed to prevent spot burning.

A clutch that is allowed to slip will not wear out; it will burn out.

Proper adjustment and maintenance are essential to long clutch life and smooth operation.

It is important for the clutch to engage smoothly so that all units and sub-assemblies involved in power transmission, from the engine to the wheels,

are protected from the abuse incident to sharp, rough applications of power. This is particularly true with heavy duty clutches. Smooth engaging clutch action prevents premature break-downs in transmission, universal joints, differential and axle shafts.

### SMOOTH ENGAGEMENT

is best obtained by having the pressure plate move in a plane parallel to the flywheel face, so that the friction surfaces of the driving and driven plates meet simultaneously over their entire area.

### CLUTCH SURVEY

The clutch is as good as the driver. This seems to be the general agreement among 171 fleet operators who participated in a recent survey on Clutch Maintenance. Because many drivers are guilty of "riding" the clutch pedal, producing undue wear on throwout bear-



ings and premature wear on the plates and facings, a number of operators seem to think that heavier springs might tire the "clutch riders" enough to discourage them. Preventing oil and grease from getting on the clutch linings (facings) also helps in prolonging the life of clutches.

Generally speaking, clutches don't seem to cause too much trouble. Among the wearing parts of a clutch, the linings or facings apparently demand the most attention and there was a tendency on the part of those that answered the survey to prefer metallic composition rather than asbestos clutch facings. Not enough attention is being paid to proper reconditioning of the pressure plate and flywheel faces.

The above brief summary indicates the ideas about, and the trends in, clutch maintenance.

#### TRYING TO GET BY

with a used clutch plate by simply renewing the lining, doesn't seem to be a very popular practice. The replies to the questionnaire didn't condemn this practice when the clutch plate is perfectly good and when the clutch is well balanced. But before refacing a clutch, the whole unit should be carefully inspected and if the slightest doubt exists, a new plate should be used. The necessary reconditioning should be done to the flywheel face and the pressure plate, *i.e.*, metal surfaces must be reground to eliminate scores and ridges and to leave a smooth finished surface.

One particularly interesting question was "What is your average clutch life in new vehicles?" Based on your own experience, with some of the new trucks that you have probably been driving, your answer to this will indicate the difference between civilian

and military practices. The answers to the survey can be broken down into three groups as follows:

#### LIGHT TRUCKS

Clutch life on light trucks ranged from a low of 5,000 miles to a high of 200,000 miles. The popular mileage was in the 20,000 to 50,000 mile bracket, which seems to be reasonable enough.

#### HEAVY TRUCKS

Clutch life on heavy trucks ranged from a low of 5,000 miles to a high of 150,000 miles. Again the popular mileage ranged from 20,000 to 50,000 miles.

#### PASSENGER CARS

Here the range of clutch life was less broad, going from a low of 7,000 to a high of 100,000 miles, but again the popular mileages were in the 20,000 to 50,000 mile class.

About the only general conclusion one can draw from these answers as to average clutch life is that *A clutch is as good as the driver.*

In order to find out just how worthwhile clutch maintenance and overhauling is, the next question asked "After clutch overhaul, do you get comparable clutch mileage?" 115 of the 171 operators said they obtained greater mileage, which suggests that a little more attention (on the part of those who got less mileage) to bearings flywheel and pressure plate faces would go a long way to increasing mileages after overhauls.

Another question "Which part of the clutch gives you the most trouble?" reveals that clutch facings are the most general headaches. Perhaps this one thing was mentioned so numerously



because it is the one part of the clutch that actually wears out quickly, in fact, the one part that is made to wear out. Here is a list of the parts mentioned by the 171 answerers as giving most trouble:

Clutch facings	120
Clutch release bearings	47
Pressure plate	24
Clutch plate	19
Clutch spring	18
Flywheel face	2

#### FLYWHEEL FACE

The next question dealt with a very important part of the clutch - the flywheel face: "Do you ever have the flywheel face reground, in doing clutch jobs?" 22 of the answers said "yes"; 52 said "sometimes" and 93 indicated that they did not have flywheels refaced.

It shouldn't be necessary to point out that the flywheel face is an

Many passenger cars are appearing with some variations of the vacuum operated gear shift. There is one thing you want to be very sure about when adjusting the shift. Never get underneath them with the engine running, to make any adjustment. Moving the valve or links will make the gears shift and put the car in gear. Always make sure that the rear wheels are off the ground, or if you can't do that, make sure that the wheels are securely blocked, so that the car cannot move backward or forward.

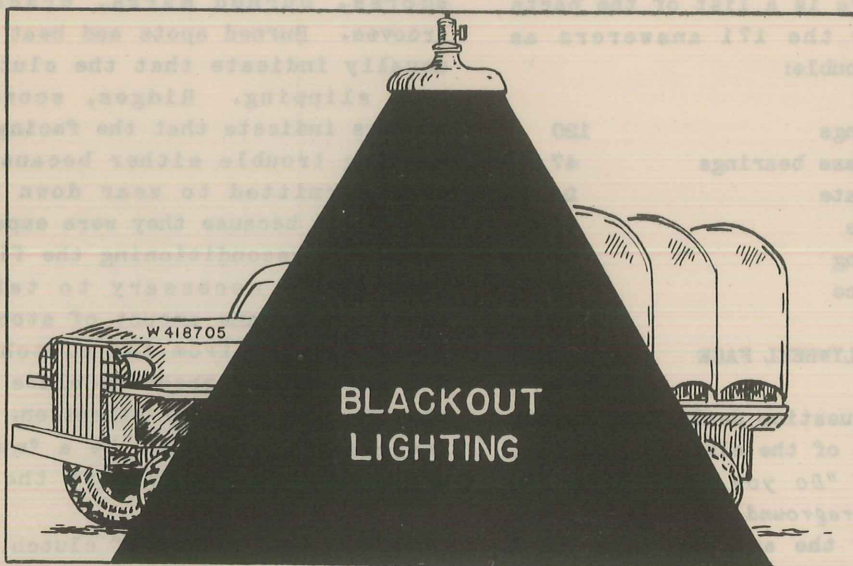
important part of the clutch assembly. Everytime a clutch is overhauled, its face should be checked for ridges, scores, burned marks, cracks and grooves. Burned spots and heat checks usually indicate that the clutch has been slipping. Ridges, scores, or grooves indicate that the facings were causing trouble either because they were permitted to wear down to the rivets, or because they were especially hard. In reconditioning the flywheel face it is necessary to take off exactly the same amount of stock from the flange as from the clutch face. The face of the pressure plate should also be given similar attention. These two operations should be a "must" on every clutch job done in the shop.

Sometimes the surface of clutch plates may appear to be perfectly satisfactory, but a careful inspection often reveals that they are badly warped, making it impossible to obtain accurate adjustment.



It's a risky procedure to install too many wires to one terminal, for it makes it difficult to tighten the screw sufficiently to get a good contact, and the wires' weight may work the screw loose. Next time you have a handful of leads to connect to the ammeter or ignition switch terminal, either buy or make a terminal bar. Put the terminal screw through the one thickness of the bar, and then have a separate screw for each two leads along the length of the bar--it makes a neat and permanent job.





Blackout, to Mr. John Public, means but one thing - complete darkness. Blackout to the military vehicle driver means that he must adjust his light switch, not to turn his lights out completely but to change to another set of lamps known as blackout lamps.

Blackout lamps in use today do not illuminate the highway to show up obstructions. They act only as a controlled light on the vehicle to indicate its position from the front and rear in order to prevent collisions. They should be clearly visible at 500 feet and not visible at 1,000 feet or above an angle of 10 degrees from a distance of 300 feet.

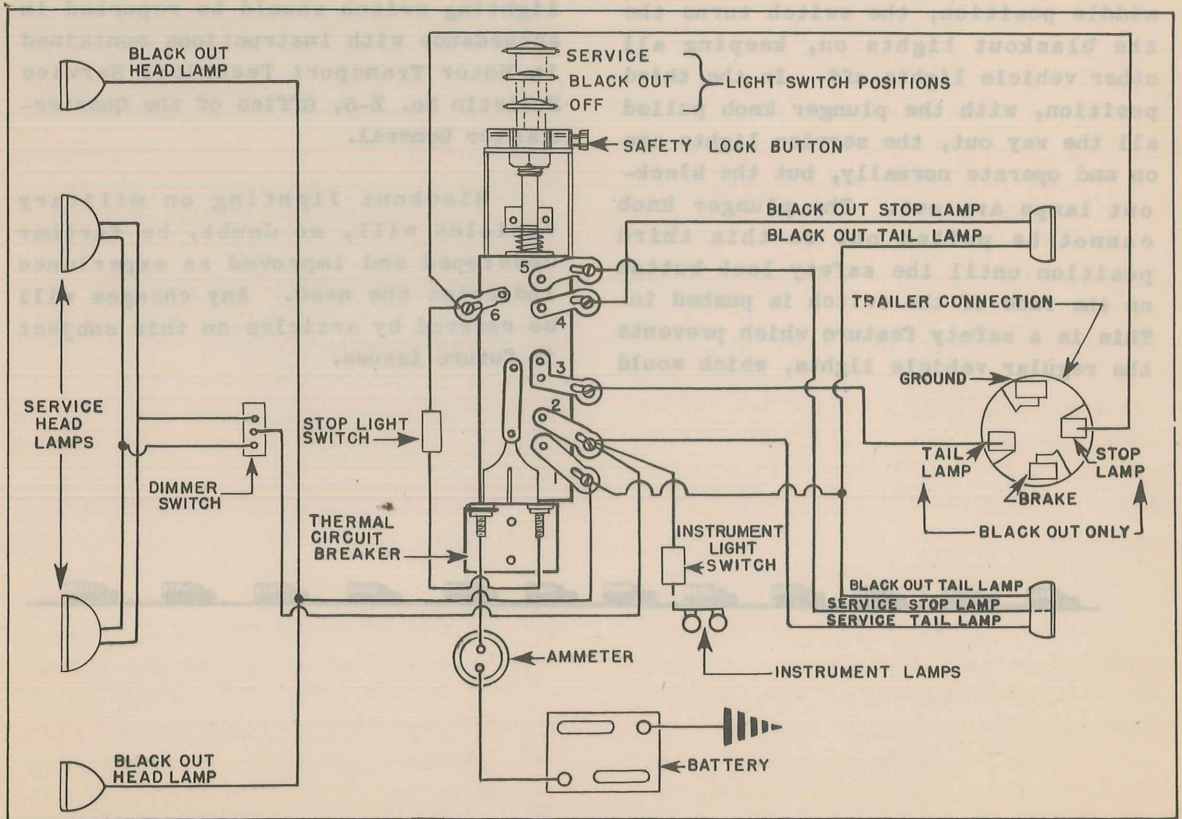
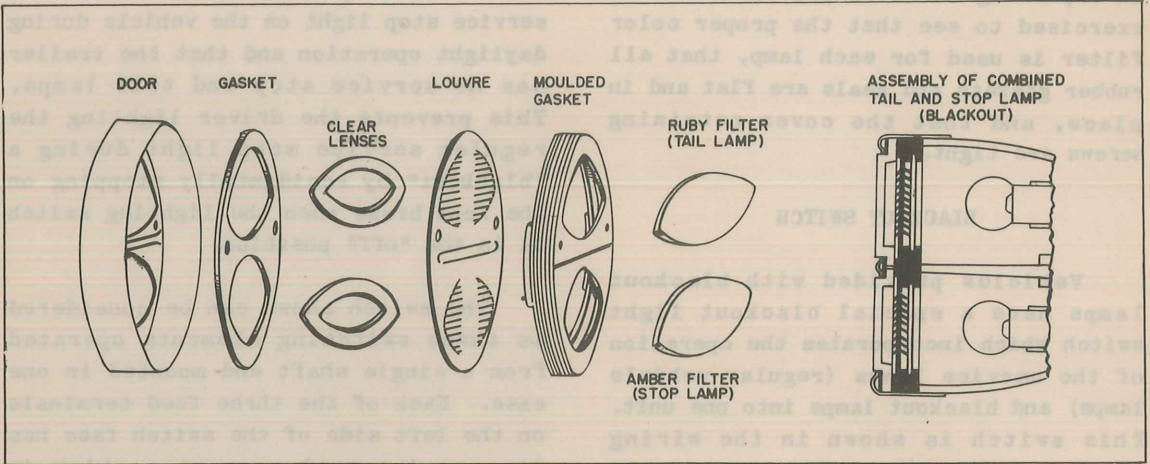
Figure 1 shows a sectional view of a combined service stop lamp and a blackout tail lamp. A study of this illustration will show that the light from a 3 candlepower No. 63 bulb passes through a colored filter, a double louvred plate

and finally through a clear glass outer lense. Note: Lamps that are visible to ground personnel for more than 1,000 feet or not clearly visible for 500 feet; lamps in which condensed water vapor is found; and lenses that contain ripples or any other defects should be reported in accordance with instructions contained in Motor Transport Technical Service Bulletin No. 2-5, Office of The Quartermaster General.

#### ANOTHER FEATURE

Of the blackout lamp is a dark strip about 1/2 inch wide down the center of the louvres to produce a stereoscopic effect. To the average eye the light will appear as one light at distances greater than 75 feet and as two lights at less than 75 feet. This indicates to the trailing vehicle driver the approximate distance he is from the leading vehicle.







Tail lamps are equipped with a ruby red filter, stop lamps with an amber filter, while blackout lamps on the front of the vehicle have blue filters. In repairing these lamps, care must be exercised to see that the proper color filter is used for each lamp, that all rubber gaskets and seals are flat and in place, and that the cover retaining screws are tight.

#### BLACKOUT SWITCH

Vehicles provided with blackout lamps have a special blackout light switch which incorporates the operation of the service lamps (regular vehicle lamps) and blackout lamps into one unit. This switch is shown in the wiring diagram, with its connections to the various units in the lighting system. The plunger knob has three positions: off, blackout lights and regular vehicle lights. In the first position all lights are off. In the second, or middle position, the switch turns the the blackout lights on, keeping all other vehicle lights off. In the third position, with the plunger knob pulled all the way out, the service lights are on and operate normally, but the blackout lamps are out. The plunger knob cannot be pulled out to this third position until the safety lock button on the face of the switch is pushed in. This is a safety feature which prevents the regular vehicle lights, which would

be visible during a night movement, being accidentally turned on.

A study of this wiring diagram will show that no provision is made for a service stop light on the vehicle during daylight operation and that the trailer has no service stop and tail lamps. This prevents the driver lighting the regular service stop light during a "blackout" by accidentally stepping on the foot brake when the lighting switch is in the "off" position.

The switch shown can be considered as three switching elements operated from a single shaft and mounted in one case. Each of the three feed terminals on the left side of the switch face has its own internal connector which is moved to connect to either of the two terminals directly opposite or to the off position.

Any defects observed in the blackout lighting switch should be reported in accordance with instructions contained in Motor Transport Technical Service Bulletin No. Z-5, Office of the Quartermaster General.

Blackout lighting on military vehicles will, no doubt, be further developed and improved as experience indicates the need. Any changes will be covered by articles on this subject in future issues.







# RECAPPING TIRES

1. A few years ago this tire would have been discarded as worn out. But with present methods of tire reconditioning it can be restored to useful life through recapping.

2. When it arrives at the shop it is given a thorough inspection for cuts, bruises or any breaks in the fabric that would weaken the carcass. If none are found, the tire is judged suitable for recapping.

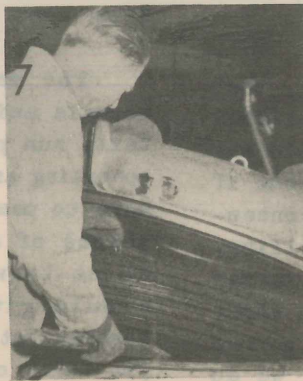
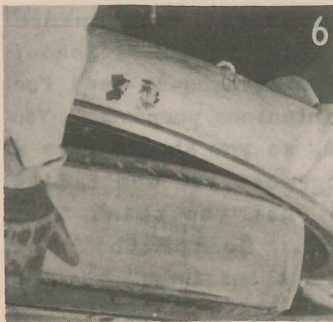
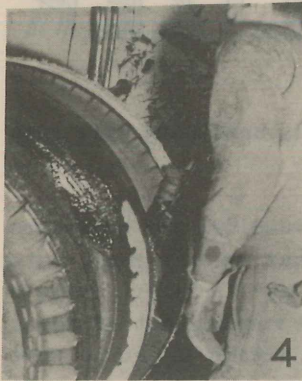
3. It is placed in a buffing machine and all traces of the original tread rubber are buffed off, leaving a smooth surface.

4. A coating of fast-holding cement is applied to the outer surface of the tire.

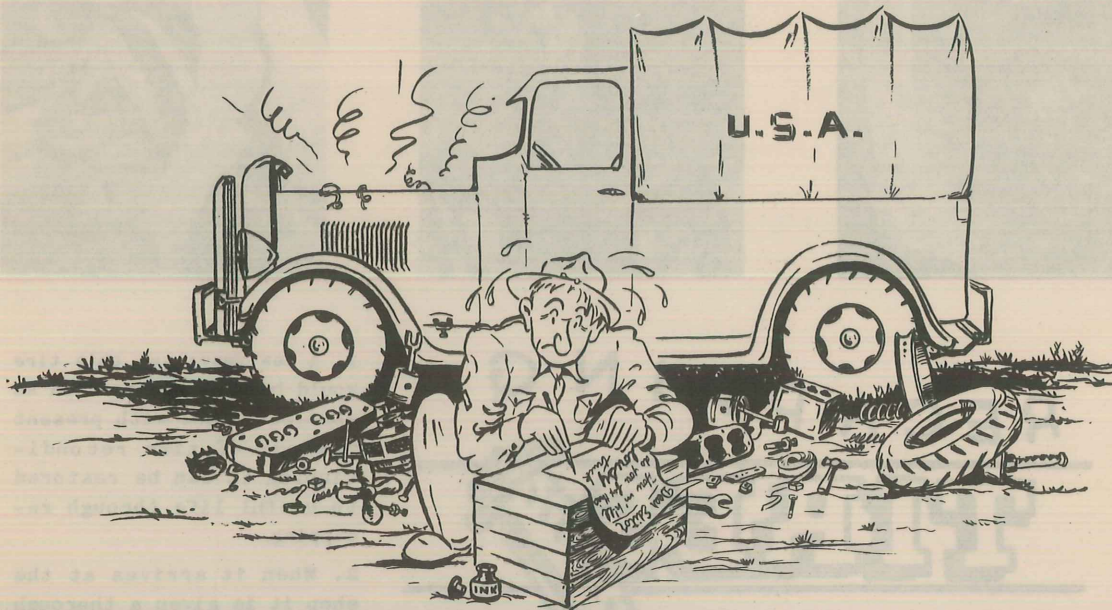
5. The new tread stock is put in place around the circumference of the tire, the cement causing it to stick firmly to the tire.

6. The tire is then placed in a mold and heat is applied for two or three hours. This vulcanizes the new tread rubber to the old tire, and at the same time molds the tread pattern.

7. The recapped tire is removed from the mold, trimmed, and then is ready for the road.







## THE "GAS" ANALYZER

Things are looking up for The "Gas" Analyzer. We actually have something to analyze. Your ideas are coming in slowly, but they're so thorough and give evidence of so much thought that we're looking to the future with a brighter eye and more hope in our hearts for the eventual success of the column. The first of them, on Equipment Authorized the First and Second Echelons, will appear next month.

We can't guarantee, of course, that any of your comments that we published on army motor maintenance will hold any weight with the powers that be, but if the gripes are loud, long and concentrated enough on some major failing, somebody will have to hear them someday and maybe - maybe - do something about it. However, that's not the prime purpose of this column, though we do

hope that eventually something will come of our efforts.

We haven't yet received any questions or suggestions that we can work into subjects for The "Gas" Analyzer. There's not much danger of running out of ideas here, but we can't always be sure that our ideas are what you want to talk about. That's why we'd like to hear from you, telling us what you want.

The manufacturers' maintenance manuals and the Motor Transport School texts run pretty much hand-in-hand for operating and maintenance purposes. You have to use them, so you should have a chance of saying what you don't like about them and what you think they should give you. So for the next contest let's talk about them: What do you think of them - both the texts and



manuals?

Is the language too highfalutin'?

Are they too big to handle comfortably?

Is the paper or the cover too thin to stand the rough handling they get in in the shops and classrooms?

Would you like some blank pages in the texts for classroom notes?

Do you prefer the black and white illustrations or the half tones?

Does the 1 a (1) regulation system of paragraphing in the texts annoy you or is it a help?

Would an index be valuable?

What ideas do you have that would make them better, easier and more valuable for instruction and studying purposes?

Take it from there and let us know what you think about The Quartermaster Motor Transport School texts and the vehicle manuals furnished by the manufacturers.

#### QUESTION NO. 3, DECEMBER 15, 1940

The Motor Transport School texts and the manufacturers' maintenance manuals:

How much help are they to you?

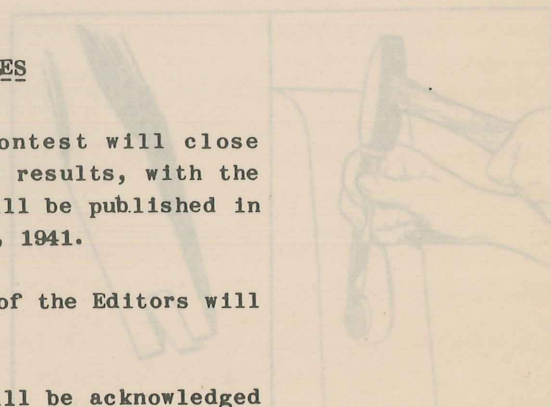
What's good about them?

What would you like changed?

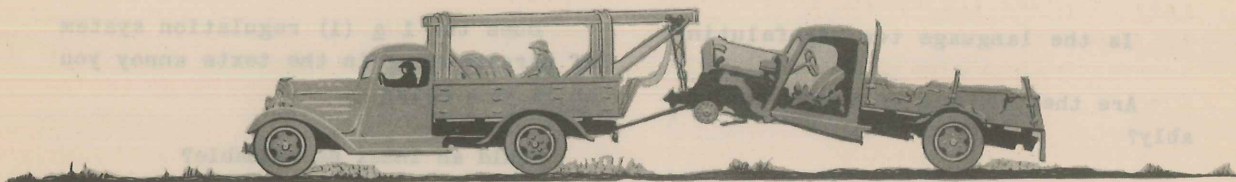
Why?

#### RULES

1. The third contest will close March 1, 1941. The results, with the winning answers, will be published in THE 'AM for March 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.

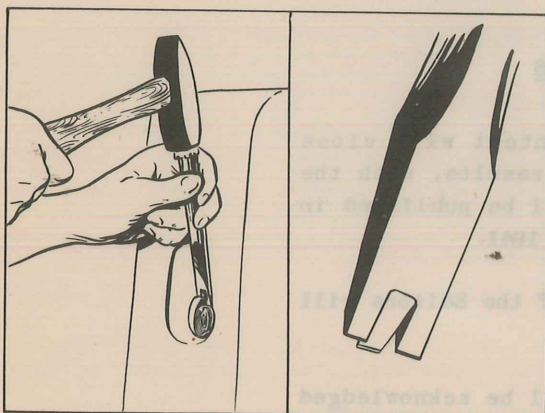






# HELP!

When you want to cut irregularly shaped holes in sheet metal that is too heavy for tin snips, you will find that an ordinary cold chisel specially ground to the shape shown in the illustration, will be a big help. The chisel shown was ground on a  $3/16$ " cutting wheel. Of course a hole must first be drilled in the sheet metal so you can insert the small point of the chisel for starting the cut. The edge of the opening should be filed afterwards. Chisels of this type, which are commercially available, have an insert cutter blade  $3/32$ " thick.



Overhauling a master cylinder without honing out the unit is like washing your hands with your gloves on. You go to all the trouble to accomplish exactly nothing.



## TIGHTENING CYLINDER HEAD BOLTS

When tightening cylinder head bolts it is vitally important that they receive equal tension. Unequal tension can distort and break the cylinder head, break the bolts or studs, distort the valve seats and cylinders, ruin the gasket and create water leaks between the cylinders. Tightening cylinder head bolts successfully requires a torque indicating wrench; different heads of course require different tensions and it is always wise to consult the manufacturer's handbook for the order and the tension to which the bolts or studs should be drawn. On cast iron heads the final tightening should be done after the engine has become thoroughly warm. On aluminum heads let the engine run until hot, then let it cool, and tighten the bolts to the proper and final tension.

The May 1940 issue of THE 'AM on page 24 gives a complete story about cylinder head distortion and a few interesting examples of "rubber cylinders".

**STARTER MOTOR**

The commutator and brush connection to the starter motor should be inspected at least once every year. If

the commutator is dirty, it should be cleaned with a No. 00 sand paper. Brushes that are worn should be renewed; electrical connections should be kept clean and tight. Ten drops of engine oil every 1000 miles of operation is sufficient lubrication and should only be applied on the grey iron bearing in the commutator end of the starter. Never put oil on the commutator or the brushes.



### The "Shorthand" of Highway Signs

When the sign is shaped like this—

—here's what it means in a general way

—and here are the reasons

OCTAGONAL



"STOP"

{ Dangerous Corner—  
Through Traffic—Stop  
Street—Trunk Line  
Junction, etc.

ROUND



"STOP"

{ Railroad Crossing. One  
horizontal bar means  
one track, two hori-  
zontal bars mean two  
tracks, etc.

DIAMOND



"SLOW"

{ Curve—Turn—Hill—  
Narrow Bridge—Loose  
Gravel—Pavement  
Ends—Begin Detour  
—Soft Shoulders—  
Dangerous Corner—  
Safety Zone—Dip in  
Pavement—Narrow  
Road, etc.

SQUARE



"INFORMATION"

{ School Zone—Cross  
Road—Play Ground—  
Men Working—  
Church Zone—Side  
Road—Hospital Zone  
—Cross Street, etc.

RECTANGLE



"DIRECTIONS"

{ Keep to Right—No  
Left Turn—No Park-  
ing—Speed Limit 20  
Miles—One Hour  
Parking, etc.



## DIGESTS-AND COMMENTS-OF CURRENT TECHNICAL MAGAZINES

### "AUTOMOBILE DIGEST"

November 1940

#### "And That Is Piston Varnish".

This subject seems to have a good many engineers fooled and while they can't agree on the same answer, this article gives most of the accepted ones.

"Crankshaft End Play". The symptoms, causes, results and corrections of this trouble.

#### "Servicing Plymouth 1940 Engines".

Factory recommendations on tolerances, clearances, specifications and important service operations.

#### "What I Have Learned About Cables".

A vehicle wiring system can be compared

to the roads we ride on and this interesting article does so.

#### "Practical Tips On Wheel Alignment!"

Larger tires and smaller wheels make perfect alignment more necessary than ever.

"1940 Steering Gears". A Discussion with specifications on adjusting 1940 steering gears.

"Shop Kinks" Some tips on Chevrolet truck steering; on curing hard-to-keep-charged batteries; a screw holder; and a wrinkle for the Dodge '39 clutch.

### "AUTOMOTIVE INDUSTRIES"

November 1, 1940

"Design of High Speed Two Stroke Engines". In this concluding section the application of the principles presented in previous sections is discussed.

"Automotive Gas Generator Used In The USSR". With the shortage of fuel in war time Europe, gas generators are coming into prominence.

*"Automotive Materials"*. Trends in metal alloys; non-magnetic steel, synthetic rubber tubing; fast brass plating process; and a new cement with latex base.

*"Summary of 1941 Automobiles"*. A discussion of the changes in the mechanical design of the new vehicle.

"COMMERCIAL CAR JOURNAL"  
November 1940

*"Man Made Barriers"*. A Discussion of the restrictive state laws and regulations that tend to hinder efficient defense. You may not agree with some of the conclusions drawn from the Third Army Maneuvers, but it is interesting reading anyway.

questions that may affect the future of truck design and operation.

*"Highways for National Defense"*. 200,000 miles of paved highways are a strategic asset, but weak and missing links must be reinforced.

*"Factory Equipment Specified by the ICC"*. A discussion of Part III of the Motor Carrier Safety Regulations which tell what the well dressed truck should wear.

*"Engineering Forecasts"*. Factory engineers give their ideas on seven

*"Shop Equipment"*. A sequence of pictures and captions of truck inspections and maintenance.

This issue contains a supplement on the fifth annual truck show and the question of National Defense.

"MOTOR AGE"  
November 1940

*"Chemicals Added to Oil"*. A discussion of "doped" oils used to offset some of the conditions resulting from normal engine operations.

cedures which should be well understood.

*"Winter Tune-Up"*. A complete check on the operations that should be performed to get a vehicle ready for winter driving.

*"Transmission Service"*. The why and wherefor of transmission service on the 1941 Pontiacs.

*"Hydraulic Brake Cylinder Service"*. Pictures tell the story of this maintenance operation.

*"Water Pump Overhauling"*. Overhauling the packless water pump calls for various replacements and pro-

*"Grinding Lathe Tools"*. This article takes the mystery out of sharpening lathe tools.



### ACKNOWLEDGMENTS

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.

"Hydraulic Brake Cylinder Service", page 215, was taken from MOTOR AGE, November 1940. The Chilton Company, Inc., Chestnut and 50th Streets, Philadelphia, Pennsylvania.  
Subscription - \$2.00 per year.

"Big Bertha", page 221, was based on "The Hercules Of The Highway" by Graham Wright - THE DEMOCRAT AND CHRONICLE SUNDAY MAGAZINE, November 10, 1940. Rochester, New York.

"Clutch Maintenance", page 224, was based on a "Survey on Clutches" - FLEET OWNER, November 1940. Ferguson Publishing Company, Inc., 90 West St., New York, New York.  
Subscription - \$2.00.

"Recapping Tires", page 230, was based on "Retreading Tires" - MOTOR AGE November 1940. The Chilton Company, Inc., Chestnut and 50th Streets, Philadelphia, Pennsylvania.  
Subscription - \$2.00 per year.