

ARMY MOTOR TRANSPORT

Development and Maintenance Of **Maj. Gen. Edmund B. Gregory**
Our Chief Military Vehicles

Quartermaster General, U. S. Army.

In reprinting General Gregory's excellent article from the last issue of **ARMY ORDNANCE**, we hope to furnish a comprehensive cross-section-picture of modern motor-transport-vehicles to the many new readers of **ARMY MOTORS**.

THE world's greatest battles have been won by the armies that transported their men and supplies the fastest—got there "fustest with the mostest men." The wheel—the device that gets the men there today—was known in Europe centuries before the birth of Christ, but it was unknown in the Americas when they fell before the onslaught of European conquerors. Despite this initial ignorance, America today has brought the wheel to its highest development in the motorized and mechanized forces that will preserve our civilization.

Army motor transport is depending on the thirty-three years' experience of the Quartermaster Corps to start and keep it rolling. An experimental truck was studied by the Army as early as 1907. In 1916 it was decided that motor transport might be useful to General Pershing in his campaign against Villa on the Mexican Border, and the first truck company was organized.

Automobiles and trucks were coming into their own when the United States entered the World War of 1917, and the Army emerged from that conflict with a huge motor-transport program involving some 216 different makes and designs of vehicles, many of them foreign. We learned a lot about maintenance, repair, and parts replacement in that war—learned it the hard way—and were convinced that probably the most important key to efficient operation is standardization.

The Quartermaster Corps is now procuring trucks and passenger vehicles to meet the requirements of an Army of over 1,800,000 men. However, the current program has sufficient flexibility to permit further expansion.

The Quartermaster Corps has made the Army the largest fleet operator in the country. It buys all the general-purpose vehicles such as ambulances for the Medical Corps, radio cars for the Signal Corps, small-arms repair trucks for the Ordnance Department and truck-tractors for the Corps of Engineers. The Quartermaster Corps itself operates and maintains every kind of motor transport from motorcycles and passenger cars through a wide variety of trucks ranging from the ¼-ton "jeep" to the massive 6-ton jobs which can pull an 8-ton load, like a gun or trailer, in addition to carrying their rated payloads.

The majority of our vehicles are trucks, of course, which do most of the Army's hauling. Briefly, Quartermaster Corps vehicles fall into the following categories (Such designations as "4 x 4" mean that the vehicle has four wheels and that all four wheels are power-driven.):

The ¼-ton, 4 x 4, truck.—This vehicle, known as a "jeep," has almost unlimited uses (Fig. 1). Primarily, however, it is a light-weapon and personnel carrier for the Infantry. It may be used as a combat vehicle since it can tow into action the 37-mm. antitank artillery weapon weighing approximately 800 pounds. It also is used as a command-reconnaissance car.

The ½-ton, 4 x 4.—This vehicle is fitted with a wide variety of bodies to serve as a command, reconnaissance, pickup or radio truck, as an Infantry weapons carrier, or as a cross-country ambulance (Fig. 5). It also can tow a 37-mm. gun.

The 1½-ton, 4 x 4.—This is a general-purpose truck which may be used as a prime mover for 75-mm. field guns (Fig. 6).

The 2½-ton, 6 x 6.—This vehicle is the basic Army truck (Fig. 2). It is manufactured in two wheel bases as a general-purpose vehicle, cargo carrier, gasoline tanker, and prime mover for the 75-mm. field gun and the 105-mm. howitzer.

The 4-ton, 6 x 6.—This vehicle is used primarily for tow-

ing 155-mm. howitzers and as a wrecker or general-purpose vehicle (Fig. 7).

The 6-ton, 6 x 6.—This vehicle is the prime mover for the mobile 3-inch and the 90-mm. antiaircraft guns (Fig. 8).

The 4-5-ton, 4 x 4, tractor-truck.—This vehicle is used for towing semitrailers, such as fueling units for the Air Corps, combination cargo and animal carriers for the Cavalry, and trailers loaded with spare parts for Quartermaster companies (Fig. 3).

The 5-6-ton, 4 x 4, tractor-truck.—This vehicle's semitrailers carry various bulky loads such as the Corps of Engineers' topographical unit and ponton trailer unit. The tractor is shown in Fig. 4.

DESPITE their widely divergent uses, all these trucks have certain things in common. Each embodies certain specific military characteristics, including maximum ground clearance, careful balance between gross weight and tire-contact area, and angles of approach and departure of about forty-five and thirty degrees, respectively. The Army truck provided for tactical purposes must be prepared to go wherever the troops go—across country, swamps, shelled areas, anywhere—to get men, guns, food, and ammunition wherever combat troops and artillery may be located.

To meet such conditions, several important and fundamental characteristics have proved essential to military motor vehicles. First and foremost is the adoption of all-wheel drive. Even the tiny "jeep" has this improvement, which gives traction on every wheel and has just about eliminated the familiar World War picture of an Army truck stuck in the mud. To prepare for the rare occasion when they do get bogged, the trucks are equipped with power-driven winches which will pull them out by their own bootstraps. All Army, tactical motor vehicles with all-wheel drive have a front-axle declutching device which permits the front-axle drive to be disengaged when operating on dry, hard-surfaced roads where the extra traction is not necessary. A 6-wheel vehicle can have three power-driven axles and ten tires on the ground, which number can be increased to twelve by using dual front wheels.

Another early commercial development adopted by the Army is the "bogie" axle, a device which allows each axle to act independently, thereby relieving structural strains by compensating for uneven terrain. The bogie axle, of course, is most important to the larger trucks, such as the big 6-tonner.

To keep Army trucks moving through deep sand and mud where traction is most difficult, they are equipped with traction devices on the rear wheels which get a grip like a

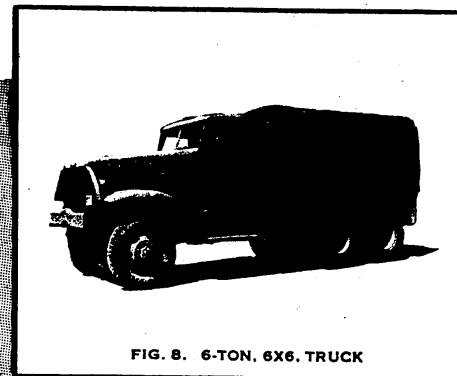


FIG. 8. 6-TON, 6X6, TRUCK

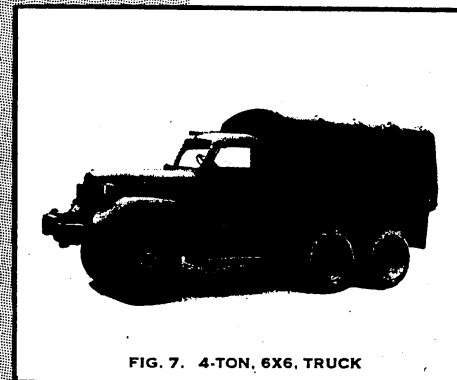


FIG. 7. 4-TON, 6X6, TRUCK

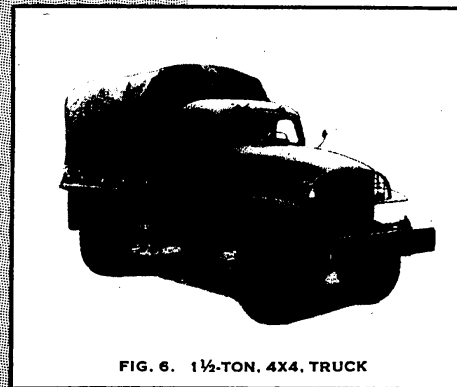


FIG. 6. 1½-TON, 4X4, TRUCK

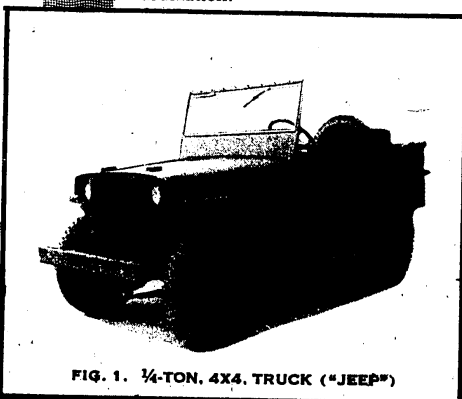


FIG. 1. ¼-TON, 4X4, TRUCK ("JEEP")

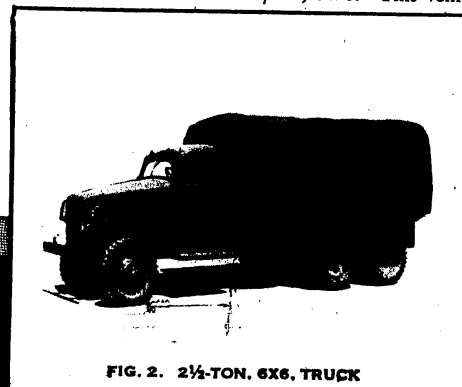


FIG. 2. 2½-TON, 6X6, TRUCK

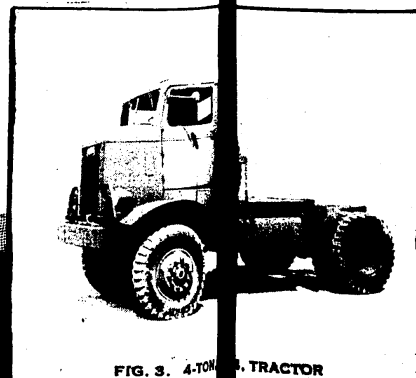


FIG. 3. 4-TON, TRACTOR

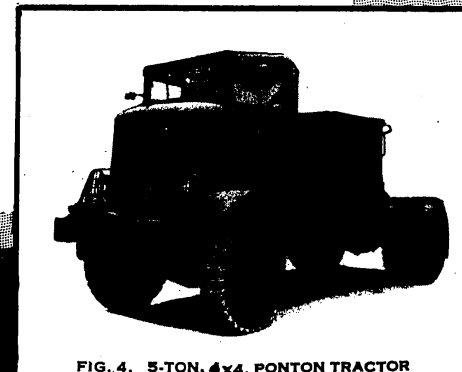


FIG. 4. 5-TON, 4X4, PONTON TRACTOR



FIG. 5. ½-TON, 4X4, TRUCK

tank and carry the truck with the law of gravity permits. Other military requirements include adjustable windshields, radiator and headlight brush guards, towing hooks and pintles, special front and rear bumpers, series-parallel switches, and special spare-tire and fuel-tank mountings.

In order to be somewhat more specific, it might be well to describe two of the widely used Army trucks—the ¼-ton, 4 x 4, "jeep," and the 1½-ton truck. The ¼-ton has a payload allowance of 800 pounds, including the operating personnel and military supplies. It can tow a 1,000-pound load mounted on two pneumatic-tired wheels. It has a maximum wheel base of 80 inches, a 4-cylinder water-cooled engine with a minimum piston displacement of 110 cubic inches. The tires are 6.00 x 16 inches. The trucks have a maximum speed of 50 miles an hour and a level-road minimum speed of 3 miles an hour. They can ford water at least 18 inches deep at 3 miles an hour. The transmission provides three speeds forward and one in reverse. The 2-speed transfer case has a high range of 1.0 and a low range of 2.0 to 1. Other features include spiral-drive rear axle with gear reduction of 4.75 to 1, 4-wheel hydraulic service brakes, with hand-operated parking brake, and battery and coil ignition. The "jeep" is designed specifically for tactical service and has a base mounting for a machine gun.

The 1½-ton model has a payload capacity of 3,300 pounds including the operating personnel and military supplies. It tows 4,000 pounds on a single-axle trailer mounted on pneumatic tires. It has a wheel base of approximately 145 inches and uses 7.50 x 20 tires on its single front and dual rear wheels. A 6-cylinder engine, with a minimum piston displacement of 235 cubic inches, gives this vehicle a maximum speed of 45 miles an hour and a minimum of 2½ miles an hour. The transmission provides four speeds forward and one in reverse. The front and rear axles are of the full-floating type, the differentials are of the semilocking type. The fuel tank carries gasoline for several hundred miles. The 4-wheel service brakes, hydraulic with a vacuum booster, can hold the fully equipped and loaded truck on a 65-degree grade and bring it to a complete stop within 25 feet from a speed of 20 miles an hour on a dry, hard, approximately level road. This chassis is for use with either a cargo, dump, panel, or delivery body, or a fifth wheel may be mounted on it for use as a truck-tractor.

General-purpose Quartermaster vehicles are divided into two general classes: those required for tactical purposes and those required for administrative purposes. Tactical vehicles usually have all-wheel drive; administrative vehicles may have two or three axles, but they generally have rear-wheel drive only. The passenger car obviously has a limited use, and the motorcycle with sidecar, though a speedy and economical means of transportation, is rapidly giving way to the "jeep."

Many a battle has been lost in the past, and the course of history has often been changed because men and supplies could not get across a river or sea. Moses and the children of Israel, for example, never would have escaped the Egyptians if Pharaoh's chariots had been able to float after the waters of the Red Sea had closed in. All this indicates the need for a vehicle that will travel in water as well as on land—an amphibian. Such a vehicle is now undergoing tests. An amphibian eliminates delays for loading and unloading on each bank and thus minimizes the danger of air and artillery bombardment. The amphibian, which can enter the water immediately, propel itself across, and then climb right out

with its load, may be the Army's answer to this age-old military problem.

COMBAT and administrative vehicles are not, however, the only product of the Army motor transport service. Mobile shops are among the latest developments. Almost every type of repair-service equipment is now mounted on a truck or trailer and can follow troops right into the field. Motor-repair shops that can handle any kind of a breakdown and mobile service trucks are outstanding types. Army clothes are now washed in mobile laundries and Army personnel in mobile shower baths. Army appetites are satisfied by food prepared in mobile kitchens and bakeries, and Army clothes, shoes, and equipment are repaired in mobile tailor and cobbler shops. A combination commissary and post exchange on wheels now gives the soldier his smokes and candy as easily on maneuvers as he can get them on the post. This unit is mounted on a 2½-ton standard Army cargo truck equipped with cabinets, shelves, steps, and an awning. The cabinets have 250 bins divided into 4 sections and hold about 60 separate items of merchandise. With 4 specially trained attendants, each truck is able to handle the needs of approximately 8,000 men. During halts on the march it can be set up in 15 minutes.

It will not be surprising if the Army's growing fleet of shower baths on wheels proves to be the greatest morale booster yet developed. In these mobile units the soldier can take a shower while his clothing is being "deloused" with steam under heavy pressure. Walking out after a refreshing bath and donning spick-and-span clothing he should be in a frame of mind to meet all comers. We estimate that a sterilization and bath company can take care of about 2,500 soldiers daily.

The new wheeled laundry is made up of small independent units which can be rapidly dispersed and concealed during air attacks. If the individual units are disabled, the remaining ones can continue operating, or companies may be broken up if desirable to serve widely scattered troops. It is estimated that 16 of the new individual units can service approximately 16,000 men a week. These units are mounted on semitrailers. The laundry equipment receives electrical power from a motor generator, and an oil-burning boiler provides necessary steam.

The basic operating unit of the mechanized cobbler and tailor "shop" which travels with the troops is a section of three separate mobile units—one for repairing shoes, one for clothing, and a third for textile equipment such as mosquito bars, blankets, and tentage. A company of 12 trailers will look after about 48,000 men. A gasoline-driven generator provides power for the electrical repair machinery, all of which, with the other necessary equipment, including two tents, is carried in the repair trailer. The tents are set up at the ends of the trailer to serve as receiving and shipping sections of the repair unit. The repair unit itself is a standard semitrailer with doors at both ends and three windows along each side. To balance the weight, repair equipment is installed along both sides, and supplies are carefully distributed in cabinets and under benches.

Similar thought was given to weight balance in all other mobile repair and service units operated by trained men. They include extremely heavy machine repair shops equipped with power-driven lathes and wide varieties of tools which require careful mountings and especial attention to weight distribution.

Such mobile facilities as these are essentially a development of the gasoline era and were unknown in previous military history. While less spectacular than the dive bomber and the tank, they represent fully as advanced a military achievement. Like everything else on wheels, however, their value depends on their ability to keep moving. It is the task of the Quartermaster Corps not only to furnish the Army with motor-transport service but to keep the Army's vehicles rolling. That means supply and maintenance, both of which involve some ticklish problems in these days of swift-moving warfare over all kinds of terrain.

THE motor-transport supply problem is essentially one of getting fuel, lubricants, and spare parts to the motor vehicles wherever they may be. Supply is being tackled from every angle and the Army believes it has solved the problem. Most of the Army vehicles have large fuel tanks to begin with, and a recently developed 5-gallon container can be mounted in convenient places on a truck to augment the fuel supply. Naturally, however, it is impossible for any Army motor vehicle to carry enough gasoline for an indefinite period. This disadvantage must be offset by a rapid supply system that can deliver fuel to the field promptly enough to prevent delays.

Whenever feasible, the Army uses tankers for transporting fuel by water and railroads for transporting fuel by land. When neither is practicable, tank trucks are used, and when tank trucks have gone as far as possible, 5-gallon containers carried on trucks are employed. Sometimes, of course, it is not possible for a truck to get over the terrain with the necessary promptness. To overcome this obstacle, the Quartermaster Corps is testing a portable pipe line that will carry fuel over hills, down dales, and across rivers, where trucks would be virtually helpless. Portable pipe lines can shuttle gasoline between the base course of supply and convenient distribution points with less exposure to air and artillery attacks than other fuel carriers. The pipe lines come in self-contained half-mile units, each complete with a centrifugal pump driven by a 20-horsepower gasoline engine. They are capable of delivering gas through swamps, forests, over mountains or across water at a rate of approximately 200 gallons a minute.

For ship-to-shore service, one of the new developments is a 5,000-gallon floating gasoline tank which is especially designed to assist in setting up an initial fuel storage supply on a shore. This tank may be floated ashore either empty or full. It may be used in conjunction with the portable pipe line.

The maintenance problem is just as complex as supply. When tens of thousands of trucks and cars are operating in the field, a tremendous organization is required to keep them rolling. The Quartermaster Corps is building such an organization both behind the lines, in great motor maintenance and repair centers, and in the field of operations where the mobile repair units are constantly proving their value.

The center of the vast organization that procures, maintains and operates Army motor vehicles is the Motor Transport Division of the Office of the Quartermaster General in Washington. Spreading out from the Washington headquarters are the eight motor supply depots scattered throughout the United States to furnish motor supplies and spare parts, the depot companies that carry parts to the field, the light and heavy-maintenance companies that maintain the vehicles, the truck companies that operate them, and the various repair shops, training schools, and other facilities.

Proper maintenance necessarily requires trained drivers, skilled mechanics, and a supply of tools and spare parts. The Army has them all and is getting more continually. Vast numbers of motor-transport specialists are being trained at the motor-transport schools at Holabird, Md.; Fort Normoyle, Tex.; Fort McPherson, Ga.; Stockton, Calif.; Fort Wayne, Mich., and at the Quartermaster replacement training centers at Camp Lee, Va., and Fort Francis E. Warren, Wyo.

The emphasis on standardization has anticipated and thus far forestalled many motor difficulties commonly encountered in the past. The resulting interchangeability of parts has simplified repairs and replacements and is keeping road delays and repair tie-ups to a minimum. Gasoline and oil have been standardized, too, so that only one type of gasoline, three grades of engine oil, two types of greases, and one type of gear lubricant are needed for all kinds of operation.

The supply and maintenance organization and the standardization program represent steps we have taken before the Army motor vehicles even start to run. Prior to procurement, prospective models are tested exhaustively over grueling proving grounds at the Holabird Quartermaster Depot that expose any potential weakness. Faults must be remedied by the manufacturer before the final product is delivered to the Army. Consequently, military vehicles are the toughest, ablest, and strongest the combined talents of the Army and the motor industry can produce.

THE Army's theory is that the best way to keep trucks rolling is to make every one along the line, from top to bottom, do his part. Consequently, motor-vehicle maintenance is divided into four echelons, starting, logically, with the duty of the driver and assistant driver.

First-echelon maintenance means driver preventive maintenance. Every driver must see that his vehicle is correctly loaded, properly operated, adequately lubricated, fueled, and in good repair. Careful driving to avoid unnecessary wear and tear and to conserve fuel is a natural accompanying responsibility.

The second echelon is organizational preventive maintenance. It includes minor adjustments, seasonal check-ups, small replacements, and supervision of first-echelon maintenance. The company mechanics handle this work with the aid of light repair trucks equipped with air compressors, tool kits, and parts cabinets.

The third echelon specializes in unit replacement, which means replacing a faulty unit with a good one rather than taking time to repair it. This puts trucks back into operation in the shortest possible time. It keeps the second echelon supplied with parts and operates a mobile motor repair shop on wheels. The primary function of the third echelon is to collect crippled vehicles and return them to their organization in a serviceable condition or replace them as soon as possible.

Fourth-echelon work is performed by heavy-maintenance companies in stationary or semimobile shops. They can tear down and repair unit assemblies; repair, rebuild, reclaim, and salvage vehicles, and store and issue parts and supplies. These companies have specialist mechanics of various types necessary for the heaviest repair work in the Army.

Briefly stated, this is the plan of the Quartermaster Corps for Army motor transport: To buy better motor vehicles than any other army; to have more and better trained drivers and mechanics, and, by effective supply, operations, and maintenance, to "Keep 'em rolling!" An Army so equipped can win.