

TEST MARCH OF 1ST BATTALION, 83RD FIELD ARTILLERY

(5-Ton Tractor Drawn 75-mm. Gun Battalion)

BY MAJOR J. W. RUMBOUGH, 83RD FIELD ARTILLERY

DURING the period September 15th–October 30, 1920, the 1st Battalion, 83rd Field Artillery, completed the longest march ever taken by a 75-mm., 5-ton tractor drawn, artillery battalion.

The march was in the nature of a test of the 5-ton Artillery Tractor, which has now become familiar to most officers in the Service.

The distance covered during the march was 623.1 miles in 25 marching days, or approximately an average march of 25 miles per day.

The itinerary chosen was one which took the battalion over some of the roughest roads in Kentucky, Tennessee and Georgia which are passable for wheeled vehicles.

PREPARATION FOR THE MARCH

When it was decided that the 1st Battalion, 83rd Field Artillery, stationed at Camp Knox, Kentucky, was to proceed, by marching, to The Infantry School at Camp Benning, Georgia, letters were directed to the State Highway Commissions of Kentucky and Tennessee, requesting information on the condition of roads, their practicability for automobile traffic and the strength of the bridges, etc., along the route which had been tentatively selected. The answers received indicated that in many places the repair of the roads, the grades to be negotiated and the bridges which had to be crossed were not of a type that would cause the route to be chosen for a pleasure trip, but were of a nature which would without doubt develop any defects which existed in motorized matériel.

After a careful study of the road conditions and the question of supply of the organization en route, it was decided that the column would march southeast from Camp Knox, passing through the towns of Springfield and Danville, Kentucky; cross the Kentucky-Tennessee border at a small town called Jellico, about thirty miles southwest of Cumberland Gap; thence south to Chattanooga; from there to Atlanta and then almost directly south to Camp Benning.

This route is not one that is considered the best by the automobile clubs, but in view of the nature of the march and the fact that the supply by rail could be accomplished with comparative ease, it was chosen.

As soon as the route was definitely decided upon letters were written to the postmasters at the various towns where the daily halts

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were to be made, requesting information as to the location of suitable camp sites, and asking that they arrange with the local merchants for the supply of the necessary fresh beef, bread and ice for the command.

At the same time that the letters were addressed to the postmasters request was also made of the Quartermasters at Camp Knox,

TOWN	DISTANCE Miles	GASOLINE Gals.	ENGINE OIL		TRANSMISSION OIL 600W Gals.	CUP GREASE Pounds
			MOB. A. Gals.	MOB. B. Gals.		
Camp Knox, Ky.						
Boston, Ky.	30					
Springfield, Ky.	32					
Danville, Ky.	28	3500	10	250	350	800
Brodhead, Ky.	30		10	250	350	800
Livingston, Ky.	18					
Bernstadt, Ky.	14					
Corbin, Ky.	21	3500	10	250	350	800
(Coal Creek), Ky.		3500	10	250	350	800
Jellico, Tenn.	31					
LaFollette, Tenn.	28					
Clinton, Tenn.	24 $\frac{1}{4}$					
Harriman, Tenn.	29 $\frac{3}{4}$	3500	10	250	350	800
Spring City, Tenn.	29 $\frac{1}{2}$					
Sale Creek, Tenn.	29 $\frac{1}{2}$					
(Dayton, Tenn.)		3500				
Chattanooga, Tenn.	28 $\frac{1}{2}$	3500				
Dalton, Ga.	29 $\frac{1}{4}$		10	250	350	800
Adairsville, Ga.	30 $\frac{3}{4}$	3500				
Kennesaw, Ga.	33 $\frac{1}{2}$					
Atlanta, Ga.	24 $\frac{2}{3}$	3500				
McCollum, Ga.	31 $\frac{7}{12}$		10	250	350	800
Luthersville, Ga.	31					
Chipley, Ga.	30					
Columbus, Ga.	31	1700				
Camp Benning, Ga.	10 $\frac{1}{10}$					
Totals.		29,700	70	1750	2450	3500

Kentucky; Fort Oglethorpe, Georgia, and the Candler Warehouse (Atlanta Supply Depot) to ship the components of the rations other than those mentioned above to several points on the railroad near those stations. It being estimated that five days' rations, less beef, bread and ice, could be carried on the transportation with the battalion. The points selected for the ration dumps were at towns which the column was to reach at four, or five day intervals.

Letters were also written to the Standard Oil representatives of

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Kentucky, Tennessee and Georgia to determine if the necessary supplies of gasoline, oils and greases could be purchased at various points along the line of march at which they would be required. It had been determined before this action was taken that the Quartermaster Corps was unable to locate these supplies in time to be available when necessary.

It was estimated that the carrying capacity of the Battalion transportation in gasoline, oils and grease was such that if the consumption of fuels was not greater than estimated, nine gasoline filling points and seven oil and grease filling points would be necessary.

The itinerary decided upon was as is shown in the preceding table. The amounts of fuel estimated as necessary at various points being indicated.

It is interesting to note the changes that were necessary both in the daily marches and in the amounts of fuels consumed. These are shown in the following table.

TOWN	DISTANCE	DATE	GASOLINE	ENGINE OIL		TRANSMISSION OIL 600W	CUP GREASE
				MOB. A.	MOB. B.		
			Gals.	Gals.	Gals.	Gals.	Pounds
Camp Knox, Ky.			1800		226	330	800
Boston, Ky.	30	Sept. 15					
Springfield, Ky.	32	Sept. 17	3460		100	157	
Danville, Ky.	28	Sept. 18	2125		82		800
Brodhead, Ky.	30	Sept. 20			287		
Livingston, Ky.	18	Sept. 21					
Bernstadt, Ky.	14	Sept. 22					
Corbin, Ky.	21	Sept. 24	7085	10	374½	101½	671
Jellico, Tenn.	31	Sept. 25	2204		99		
LaFollette, Tenn.	28.8	Sept. 28	2905				
Clinton, Tenn.	28	Sept. 29	30	10	240		800
Harriman, Tenn.	30	Oct. 1	3636	10	246	100½	300
Spring City, Tenn.	24.5	Oct. 2			100	175	
Sale Creek, Tenn.	24.6	Oct. 4	2605				
Chattanooga, Tenn.	28.4	Oct. 5	2500			148½	
Dalton, Ga.	37.3	Oct. 7	2400		395	151	
Calhoun, Ga.	20.1	Oct. 8	600				
Cartersville, Ga.	28.8	Oct. 9	3750				
Marietta, Ga.	21.5	Oct. 11	2135	½	27½		
Lakewood Park, Ga.	25.8	Oct. 13	2935		499½	150½	400
(Atlanta)							
McCollum, Ga.	26.7	Oct. 26					
Luthersville, Ga.	21.7	Oct. 27	2675		51		
ChIPLEY, Ga.	26	Oct. 28	2800			50½	450
Columbus, Ga.	35.5	Oct. 29					
Camp Benning, Ga.	10 ¹ / ₁₀	Oct. 30					
Totals	623.1		44,945	30½	2735	1364½	4171

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Due to the fact that the battalion was ordered to remain at Cartersville (Battery A only) and Lakewood Park (Atlanta) until the tractors had been overhauled and the county fairs taking place at those two points were over, the consumption of gasoline and other fuels up to those two points were taken into consideration in analyzing the question of fuel consumption per mile, while the consumption in Atlanta and at Cartersville was of necessity disregarded. The mileage obtained is discussed at a later place in this article.

ORGANIZATION OF THE BATTALION FOR THE MARCH

The organization of the battalion for the march was as follows:

Personnel.

Headquarters and Headquarters Detachment.	
Officers	2
Enlisted	23
Battalion Supply Detachment.	
Officers	1
Enlisted	14
Medical Detachment.	
Officers	1
Enlisted	3
Battery A.	
Officers	2
Enlisted	122
Battery B.	
Officers	2
Enlisted	125
Battery C.	
Officers	2
Enlisted	120

Matériel.

Headquarters, Headquarters Detachment and Medical Detachment.

- One Dodge Touring Car.
- Two White Reconnaissance Cars.
- One G.M.C. Hospital Ambulance.
- One 5-Ton Tractor, drawing reel cart.
- One Motor-cycle with side car (Indian).

Supply Detachment.

- Three F.W.D. 3-ton Trucks, with ammunition bodies.
- Two Liberty Tank Trucks (750 gallons capacity).
- One Artillery Repair Truck.
- One Motor-cycle with side car.

Batteries. (Totals for three batteries.)

- Three Dodge Touring Cars.

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Six White Reconnaissance Cars.
Forty-two 5-Ton Tractors.
Three Artillery Supply Trucks.
Six F.W.D. 3-Ton Trucks, with ammunition bodies.
Three Dodge Light Repair Trucks.
Nine Motor-cycles with side cars (Indian).
Sixty Caissons.
Twelve Guns 75 mm., Model 1897 (French).
Six Personnel Trailers.
Three Machine Gun Trailers.
Three Rolling Kitchens.
Three 300-gallon Tank Trailers.

In addition to the above equipment each battery had a home-made water tank trailer, of about 200 gallon capacity.

DISTRIBUTION FOR THE MARCH

Due to the fact that it was known that the wheeled vehicles could not march in the same column with the tractors, the battalion was, for marches, divided into two columns. The leading column, which was known as the "Supply Column," was composed of all of the wheeled vehicles except the Battalion Commander's Dodge, three motor-cycles, the Dodge light repair trucks of the batteries, and the Hospital Ambulance. The Supply Column was under the command of the Battalion Supply Officer during the daily marches, who during part of the day had the Battalion Adjutant as an assistant in conducting the march.

The Supply Column was formed from front to rear as follows, the Supply Officer riding in the leading Dodge touring car and the Acting 1st Sergeant of the Supply Detachment in the motorcycle side car:

Three (Battery) Dodge Touring Cars. Cars in order of Batteries in Tractor Column.
One Battalion Headquarters Reconnaissance Car.
Six Battery Reconnaissance Cars. In order of Batteries in Tractor Column.
Two Battalion Headquarters F.W.D. Trucks.
Nine Battery F.W.D. Trucks. In order of Batteries in Tractor Column.
Three Artillery Supply Trucks. In order of Batteries in Tractor Column.
Three Supply Detachment F.W.D. Trucks.
One Artillery Repair Truck.
Two Liberty Tank Trucks. (Capacity, 750 gallons.)
One Motor-cycle with side car. (Acting 1st Sergeant.)

The Tractor Column was formed with the Battalion Commander's Dodge leading, followed by the three battery agents in motor-cycles.

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The batteries were formed with the tractors in column and the Dodge light repair truck towed behind the last carriage, when it was not being used for repair work.

Each Battery Commander rode the leading tractor of his battery, while the Chiefs of Platoon rode motor-cycles, which were either towed, or else moved up and down the column, progressing by jumps.

The Hospital Ambulance was at the rear of the entire column, and would close on the Tractor Column, then halt and allow the column to gain sufficient distance to make it worth while for the ambulance to again move forward.

THE MARCH

As shown in the itinerary, the first march taken was from Camp Knox, Kentucky, to Boston, Kentucky. On this march the Tractor Column started as a whole and an attempt was made to keep the batteries closed up in column. It was soon seen that this method would have to be changed, as tractors which had to fall out for minor repairs, or adjustments, blocked the rear batteries, due to the fact that unlike horse-drawn vehicles which fall out of column, it was frequently impossible to move a stalled tractor to the side of the road. Another cause for stringing out the column was the necessity for halting the tractors in order to shift gears. The power of tractors in the batteries varied, and it was not until the Battery Commanders became familiar with the peculiarities of each of the tractors of their batteries that this trouble in the batteries was to a great extent obviated. The country over which the first march was made was hilly, and frequent shifting of gears soon resulted in the leading battery gaining ground, which could not be made up by the rear batteries during halts.

The Supply Column moved without difficulty until after the noon halt, when a heavy rain began, which lasted two hours and a half, turning the road into a sea of soft, slippery mud. The full supply of skid chains had not been obtainable at Camp Knox when the battalion left, though they were received at Boston the next day, and after the storm began it was frequently necessary for the drivers of the wheeled vehicles to dismount and assist the trucks in making the grades by pushing them by hand.

The camp site at Boston was in a meadow. The ground had become soft from the heavy rain, and as soon as the trucks from the Supply Column ran on it they began striking soft, deep mud concealed by the heavy grass. A number of trucks were bogged down before it was decided to give up the idea of having the trucks belonging to the various organizations go to the location of their camps. After this experience the Supply Column during the remainder

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of the march was left on the road when the camp site was wet. When a rain came up after the battalion was in camp the trucks were moved to hard ground accessible to the road, or actually on the road itself.

During this march numerous difficulties were experienced with the tractors, both as a result of the inexperience of the drivers and as a result of faulty adjustments.

The diary of the march on this date contains the following remarks: Gas-lines frequently broke, due to the vibration. A fire was caused by a driver filling the left-rear, main tank of a tractor. Gasoline splashing on the kerosene tail lamp, located under this tank, became ignited, but fortunately did not do any serious damage. Only collapsible canvas buckets are issued for use in filling the tractor tanks. This causes wastage in filling and danger from splashing gasoline when night filling of the tanks is necessary.

Due to the number of minor repairs and adjustments which were necessary on the tractors, it was decided to lay over the 16th of September at Boston. A number of skid chains were received for the trucks during the 16th, though not an entire set for each truck.¹ During the remainder of the march a great many of these were lost. After they became worn they frequently slipped off in the deep mud and became buried; their loss not being discovered by the driver until he made his inspection of the truck at the next halt.

September 17th the battalion moved to Springfield, Kentucky, the Supply Column leaving camp five minutes before the Tractor Column, the latter moving as a unit. The roads were still slippery in places due to the rain of two days before, and the country was more hilly than that of the previous march, but the Supply Column trucks had little difficulty, the skid chains demonstrating their efficiency. Tractor troubles occurred, but not with the same frequency as during the first march, the adjustments made at Boston being responsible. Leaky gas-lines and gas-line connections were responsible for most of the delays on this march.

At Springfield the battalion wheeled vehicles and most of the tractors were forced to remain on the road—the only available camp site being too small for the entire battalion.

The third march, from Springfield to Danville, Kentucky, a distance

¹ This lack of proper skid chain equipment is very noticeable in the photographs of the trucks in the mud. Soon after starting the march the trucks were reduced to not more than two chains per wheel, instead of the full number eight per wheel which is the proper equipment for the truck, and this number was further reduced by losses as described until some of the trucks were practically helpless in mud. It is obvious that trucks operating under these conditions were at a great disadvantage and delayed the column more than they should have with full chain equipment.—EDITOR.

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of twenty-eight miles, was over good roads most of the way. The country was hilly and the same trouble was experienced in having the column string out, due to having to stop the tractors when shifting gears.

The batteries left camp at ten minute intervals, and as a result no trouble was experienced by the "lame-duck" tractors of the leading batteries blocking the road for the batteries in rear. The interval of ten minutes between batteries was found to be too great, and after this march the interval was reduced to five minutes during the remainder of the march.

The column remained at Danville over Sunday, taking this opportunity to wash the vehicles, repair gas-lines and complete the installation of 3-inch boiler pipe to replace the mufflers in Battery B. Battery C had used this method of carrying the exhaust gases over the drivers' heads from the beginning of the march, and had no cases of the drivers being gassed—while a number of men in the other batteries had suffered from this.

Battery B had tried turning the mufflers from a horizontal position to a vertical one, bolting them to the armor. This proved to be unsatisfactory, as the vibration soon broke the heavy mufflers. Battery A wired their mufflers in a vertical position. This also proved to be unsatisfactory, as the vibration soon worked the wire loose, and it was only by giving them constant attention that they were kept in place.

The boiler pipe that was installed to replace the mufflers was four feet long and three inches in diameter. It was flared at the lower end, the muffler was removed and the pipe slipped over the end of the exhaust. Though this make-shift change did not answer the purpose of a muffler, it was efficient in the prevention of gassing. Eventually, when the tractors of the entire battalion had their mufflers removed and the pipe substituted, no further cases of gassing of drivers occurred.

Monday, September 20th, saw the battalion on the road to Brodhead, Kentucky, with an interval of five minutes between the Supply Column and the leading battery and the same interval between batteries. This march was made with less road troubles than any march which had preceded it.

The road was rough in spots and grades up to about twelve per cent. were encountered. Though in general the thirty mile stretch was in better condition than we had found on our first two marches. Camp was made at Brodhead on the Fair Grounds. The battalion being in camp at 3.45 P.M. The camp site at this town was one of the best that the Battalion had during the entire march.

The march from Brodhead, Kentucky, to Livingston was a short



PHOTOGRAPH No. 1.—TRACTORS PULLING TRUCKS OVER VERY STEEP GRADE, ASCENT OF GAULEY OR WILDCAT MOUNTAIN, KY., "SCYLLA."



PHOTOGRAPH No. 2.—TRACTOR COLUMN CUTTING THROUGH FIELDS TO AVOID QUICKSAND. "CHARYBDIS."

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one—eighteen miles. It was considered advisable for the battalion to reach the camp at Livingston at an early hour, in order that preparations could be completed before dark for the next day's march over Gauley, or Wildcat Mountain. This march was expected to be one of the most difficult of the entire trip. Reports had been received both from local inhabitants and as a result of a road reconnaissance made prior to the departure from Camp Knox, that the road over the mountain was narrow, very rough and in places exceedingly steep and dangerous. A number of people who had been over the road had stated that trucks would not be able to negotiate the grades—and the entire battalion knew that it was a question whether or not we could carry out our mission and reach East Bernstadt, fourteen miles away from Livingston, over this route, which was the only one at all passable for motor vehicles.

It was found that this stretch of road presented all types of obstacles which would ordinarily be used in a short test of the efficiency of a motor car. First came a stretch of sandy reddish loam, filled with boulders and rock ledges. A bridge with a weak flooring and somewhat uncertain supports required the vehicles to pass over it one at a time. This was followed by about a quarter of a mile of so-called road up a boulder-strewn creek bed.

A two hundred yard stretch of level, sandy road allowed the Supply Column to close up and halt. The tractors were unlimbered from the carriages and executed what was called "tractors pass trucks"—a movement which was necessary on a number of occasions when the Supply Column got into difficulties. The movement consisted of the tractors forming in the Supply Column, one tractor in front of each wheeled vehicle, being attached thereto by a tow chain.

The ascent of the mountain then began. The west side of the mountain presented a grade up to about twenty-five per cent, of some three hundred yards—followed by about one hundred yards of a grade of forty to forty-five per cent. The road was rocky and rough, and though most of the trucks required little assistance from the tractors, their motors proving of sufficient power to carry them up the grade, a number would have failed to reach the summit had they not had the steady influence of the tractors.

The descent of the mountain was not as difficult as the ascent. The wheeled vehicles went down without the assistance of the tractors—braking with their engines—the ignition turned off—in addition to their brakes.

Hardly had this Scylla² been overcome—the battalion was over the mountain by 10.00 A.M.—then a Charybdis³ in the shape of a

² See Photograph No. 1.

³ See Photograph No. 2.

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fifty-yard strip of quicksand made bad going for the wheeled vehicles. Tractors were again called into use. However, the road became so bad that the last battery in the tractor column was forced to make a detour through a soft meadow, where several trailers sank to their bodies.

The Supply Column had moved on, but soon struck a narrow muddy road, which caused more trouble—tractors were again necessary. Fortunately this bad stretch was a short one and all went well until the road ran up on a new fill on a mountain side, where six trucks sank deep into the soft earth and had to wait until the Tractor Column came up.

A ford, followed by a four-mile stretch of rough, though fairly level road, led into East Bernstadt.

Troubles, both mechanical and road, had been of great frequency. The rocky condition of the first part of the road was responsible for sheering off armor bolts; broken gas-lines and track links, and had caused several tanks to leak on the tractors.

A reconnaissance car had rushed the ford, gotten into deep water and cracked a cylinder block, and one F.W.D. truck had burned out its bearings.

The officers—there were but two per battery—and a few experienced mechanics had been hard at work since 4.45 A.M.—and when the majority of the vehicles reached camp at 6.45 P.M. it was decided to lay over a day for repairs.

It rained during the night of September 23rd and for about two hours during the early morning of the 24th. This turned the already rough road from East Bernstadt to London, Kentucky—the next town—into a sea of mud. Five trucks slipped off the road within a mile of camp and delayed the column for about three-quarters of an hour.⁴

After negotiating the first stretch of bad road all went well until a weak, wooden bridge was reached. The Supply Column passed safely across, as did all of the tractors of the leading battery except the last. It broke the bridge at its far end, though fortunately made the solid ground without mishap.⁵ A detour, which delayed the column over an hour had to be made—and camp was not reached by the Tractor Column until 3.00 P.M. The Supply Column had made the twenty-one miles by 12.30 P.M., arriving at Corbin, less one truck which was left at Bernstadt having its bearings renewed, and did not rejoin the column until the next morning.

Corbin to Jellico, Tennessee, proved easy going until the column reached a point about five miles from the latter town, where a three

⁴ See Photograph No. 3.

⁵ See Photograph No. 4.



PHOTOGRAPH No. 3.—TRUCKS STALLED FOR LACK OF CHAINS. VERY SLIPPERY CLAY ROAD. QUITE HIGHLY CROWNED.



PHOTOGRAPH No. 4.—HIGH BRIDGE BROKEN BY 5-TON TRACTOR. (TIMBERS ROTTED OUT.)

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mile detour proved to be a veritable Waterloo⁶ for the Supply Column. The road was nothing more than a mountain trail which became exceedingly slippery from a heavy rain which began to fall just as the leading trucks entered the detour. The road was so narrow that in many places it was impossible for the tractors to work their way past the column in order that they could render assistance to trucks which had gotten into difficulties.

Nightfall found the entire battalion, less three reconnaissance cars and one F.W.D. truck still on the detour. In the dark little could be accomplished, and it was decided to bivouac on the road and move into Jellico the next morning—September 26th.⁷

A tractor had turned over on September 25th and one man was badly bruised, though not seriously injured. It was impossible for him to jump clear of the tractor when it slipped from the road, a demonstration of the danger of present type of tractor top.

The supports of the tractor tops had already required considerable attention—a great many of them having sheared off as a result of vibration. The top was found to be entirely too heavy for the supports to withstand the strains to which they were subjected when travel was over rough country. The supports either broke, or sheared off the bolts which attached them to the body of the tractor. Welding the broken supports had been unsuccessful, as they soon broke at other points. At Jellico permission was granted to one of the batteries, in which a great deal of trouble with the tops had occurred, to ship them to Camp Benning.

When the accident occurred to the tractor in which the man was hurt, one of the personnel trailers was pulled from the road, upset, and broke a wheel bearing. Bearings from the machine gun trailer, rolling kitchen and three-hundred gallon tank trailer, were found unsuitable as a substitute. Local accessory dealers had nothing that would fit and the trailer had to be shipped by rail. The necessity for "one-type" wheels and bearings for all trailers was here clearly demonstrated.

The Headquarters tractor had leaky pistons, and an all night job was necessary to make repairs.

Armor bolts had sheared off and the number of broken gas-lines and leaking tanks had increased.

The nine-inch track shoes on tractors for which the eleven-inch shoe could not be obtained were showing signs of giving out. The under surfaces became concaved and cracks appeared at the link lugs.

The pounding of the main gas tanks on the wooden supports separated

⁶ See Photograph No. 5.

⁷ See Photograph No. 6.

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them at the rolled flanges and though the cracks were soldered this was found to be impracticable, as they soon leaked at the points where they had been soldered. Later on, at Dalton, Georgia (October 4th), new wooden supports were installed, but in spite of this the tanks continued to give trouble during the entire march.

The door shield hinges on a number of tractors had been strained, due to the door being folded back on the top armor while the tractor was running. Though the door shields are arranged to allow the tractor to be run with them closed, heating of the engine is more liable to occur when this is done than when they are open and the need of a fastening on the top plate was seen.

The next march, to LaFollette, Tennessee, was made on September 28th. The diary of the march shows: Two and one-half miles of good, rock surfaced road, with grades up to about twelve per cent., followed by nine miles of narrow, rough and rocky mountain road (we were now in the Cumberland Mountains) with many steep grades, estimated up to about twenty per cent.⁸

After passing over this stretch, the road dropped into a valley, where it ran over a soft fill of reddish loam, which had become most undesirable for motor traffic, as a result of a hard rain which had fallen during the night of September 27-28th.⁹ The trucks reached this stretch before noon, and it was well after 3 o'clock in the afternoon before the tractors succeeded in dragging them through the worst holes and had returned and pulled their own carriages to the hard road beyond. Here the road was rough and narrow with many grades.

Darkness fell soon after the Supply Column and the two leading batteries reached camp, while the last vehicles of the rear battery did not arrive until early morning.

About six miles from LaFollette a F.W.D. truck slipped from the road and rolled down the mountain side to a point where it was stopped by trees, about eighty feet below the road. It was towing a motor-cycle which also went over with the truck.

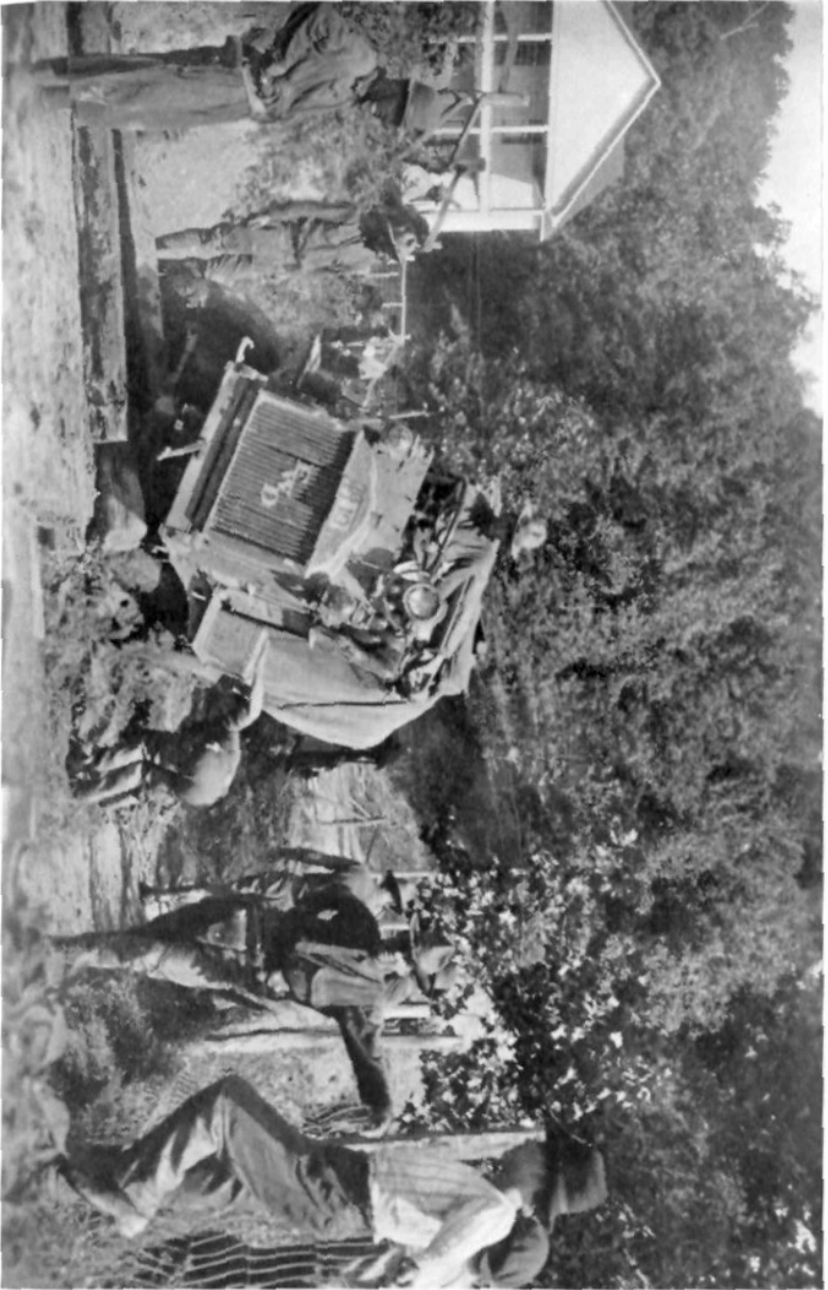
Though two men were on the truck and two on the motor-cycle all four succeeded in jumping clear when the vehicles left the road.

The motor-cycle was wrecked beyond repair; the truck was not irreparably damaged, though the injuries to it were of a nature which could not be repaired without shop facilities. It was towed to Fort Oglethorpe, Georgia, where it was shipped by rail.

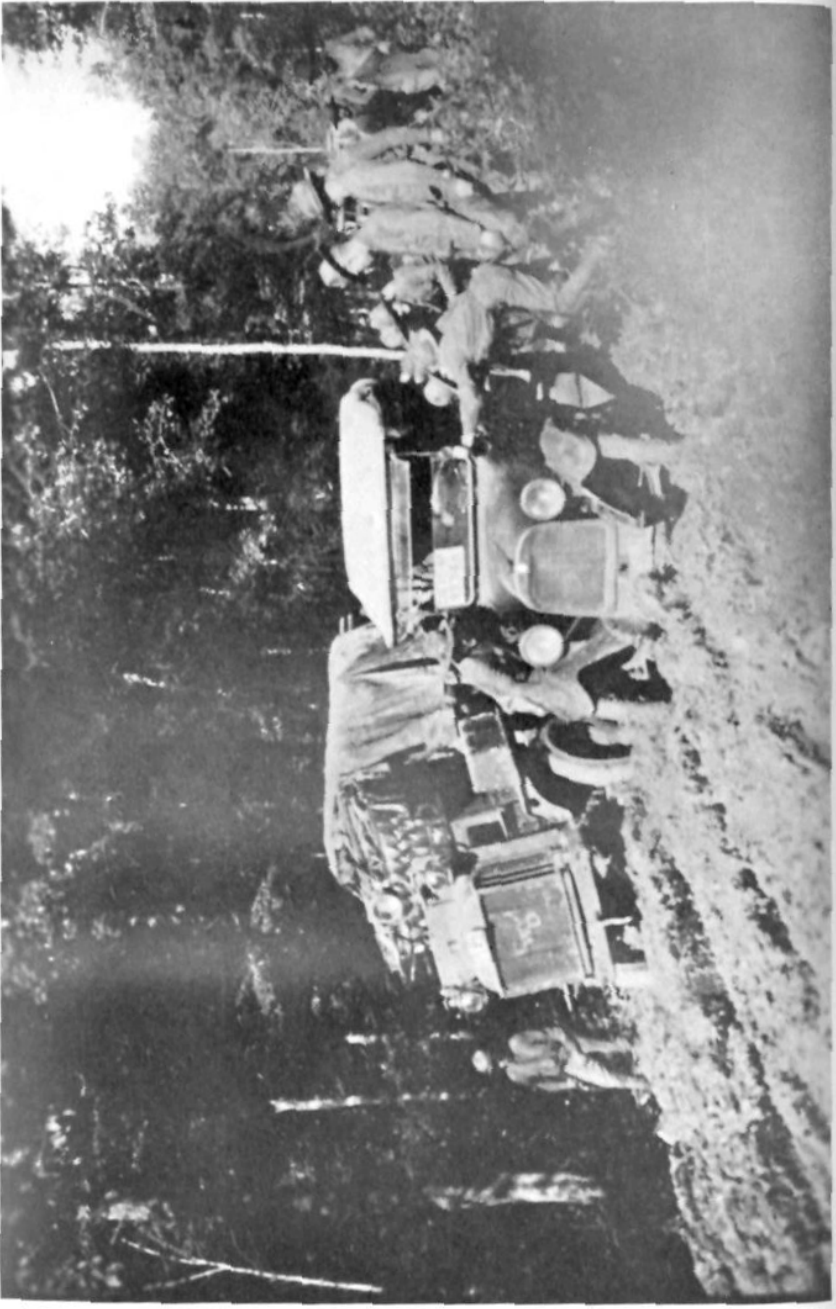
Soon after the truck fell from the road one of the tractors of Battery "A" burned. Due to a broken emergency tank and failure of the vacuum feed system to function it had become necessary to

⁸ See Photograph No. 7.

⁹ See Photograph No. 8.



PHOTOGRAPH No. 5.—HEAVY GOING—SOUTH END OF DETOUR NEAR JELLICO, TENNESSEE.



PHOTOGRAPH No. 6.—MUDDY ROAD IN TENNESSEE.

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place one of the main tanks on the top of the armor, connecting the 3-way valve to it in order to feed gasoline to the carburetor. The tractor had been driven some ten miles in this way when it caught fire and was damaged to such an extent that it had to be shipped from LaFollette to Camp Benning.

Battery "A" was left to camp at LaFollette on September 29th, in order to pull the truck which had gone over the mountain side back on the road and to ship the tractor which had burned. The battalion marched that day to Clinton, Tennessee, where a day's lay-over was to be made.

The Supply Column made the twenty-eight miles in five hours, the Tractor Column in seven hours and thirty-five minutes.

On this march one of the tractors of Battery "B" burnt out three main bearings, as a result of the failure of the oil leads to function properly. The work required to repair the damage which was done was of sufficient extent to make it necessary to ship the tractor.

The battalion was now getting out of the mountainous country, though numerous grades were still being encountered and the rough, rock-surfaced road continued to produce effect upon the fuel system and caused broken truck rollers, track links, etc.

Several stretches of soft loam road on this march would have caused exceedingly bad going for the trucks during wet weather and were even difficult for them with the weather favorable.

Battery "A" joined from LaFollette on September 30th, and the entire battalion marched to Harriman (30 miles) on October 1st.

The country was rolling and the rock-surfaced road in fair condition.

On this march Battery "A" again got into difficulties and a number of its tractors had not reached camp by 6.30 A.M. on October 2nd. The battery was left in camp at Harriman while the rest of the battalion marched to Spring City (25.4 miles) where it was to remain over Sunday. Battery "A" left Harriman at 10.30 A.M., October 2nd, and joined at Spring City that evening.

The march from Spring City to Sale Creek was made on October 4th without any occurrence worthy of note. The Supply Column covered the 24.6 miles at a rate of four and two-tenths miles per hour.

From Sale Creek to Chattanooga the road was in excellent condition, with the exception of a four-mile detour over a rough, unsurfaced country road. The Supply Column arrived in camp at 10.30 A.M.; the Tractor Column at 2.30 P.M.—Distance 28.4 miles.

The camp at Chattanooga was at the base of Signal Mountain, four miles north of the city. Here a one day's lay-over was again made to allow time for repairs to be made.

On October 7th the longest march of the trip was made—from

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Chattanooga, Tennessee, to Dalton, Georgia, a distance of 37.3 miles.

Twelve miles of the road was asphalt, or cement, then came about thirteen miles of good macadam road; the remainder being rough, dirt country road. The country was rolling, but no difficult grades were encountered. However, by this time the tractors were giving a great deal of trouble, particularly the gas-lines, tracks, tanks and radiators, and after the first eighteen miles had been passed the "lame-ducks" which fell out from the batteries became more and more numerous.

The supply of spare parts, such as track links, track roller bearings, gas-lines and radiator sections had been exhausted, and the make-shift methods were found to be far from satisfactory. Main gas tanks which had been soldered were continually springing leaks, as the solder would crack from the vibration and pounding of the tank on its support.

By this period of the march the use of oil lamps on the tractors had to a large degree been done away with. Tractors which were brought into camp at night were usually convoyed by motor-cycles.

The upper bolt which secures the oil lamp brackets to the armor of the tractor was responsible for many leaks in radiator sections—the vibration of the armor causing it to chafe a hole in the side of the radiator. Other radiator troubles were caused through the construction of the upper and lower headers of the radiator to receive the overflow pipe. This construction weakened the headers and caused several to crack at these points.

The inaccessibility of the engine of the tractor added greatly to the troubles experienced. Repairs which could otherwise have been made in a few minutes were as a result of this condition, the cause of much lost time and labor.

Between Dalton, Georgia, and Calhoun, Georgia—the battalion made this march on October 8th, the road was rock surfaced, though rough. About five miles from the latter town one of the Liberty Tank Trucks, which was with the Supply Column, broke through a bridge—necessitating a seven mile detour for the Tractor Column over a narrow and exceedingly rough country road.

Battery "A" again had a great deal of tractor trouble on this march, and at 6.30 A.M., October 9th, but five tractors of the twelve still remaining in that battery had reached camp. A day's lay-over was to be made at Cartersville, Georgia, the next halt. The battalion less Battery "A" moved there on October 9th—Battery "A" being ordered to join the following day.

The Artillery Truck was left at Calhoun, to be available for repairs on the tractors of Battery "A."

The battery left Calhoun on October 10th—all tractors reaching



PHOTOGRAPH No. 7.—IN THE CUMBERLAND MOUNTAINS.



PHOTOGRAPH No. 8.—HEAVY GOING—NEW FILL OF WET CLAY.

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Cartersville about noon on October 11th—where orders were received for it to remain for overhauling its matériel and giving demonstrations at the County Fair, which was taking place at Cartersville at this time.

The battalion—less Battery "A"—marched to Marietta, Georgia, on October 11th—21.5 miles—and to Lakewood Park (Atlanta), on October 13th—25.8 miles—where it remained until October 26, overhauling matériel at Lakewood Park and in the M.T.C. shops at Camp Jesup, and giving demonstrations at the Southeastern Fair which was then taking place.

Battery "A" joined from Cartersville on October 25th and marched with the battalion to McCollum, Georgia—26.7 miles—the following day.

The tractors had now become so worn from the rough country that had been traversed that the overhauling which they had received did not produce the results expected. One of the tractors burnt out its connecting rod bearings within a short distance of camp and was returned to Camp Jesup for shipment by rail, and later on during the march, at Greenville, Georgia, more trouble was experienced.

The battalion marched from McCollum to Luthersville on October 27th—21.7 miles—over a rough, rock surfaced road—which had about seven miles of good concrete road near the town of Newnan. By this time the gas-lines were almost entirely replaced by rubber tubing, the gas tanks had been as thoroughly repaired as conditions would permit, and all defective track shoes which could be replaced by the limited supply available at Camp Jesup had been changed.

Battery A had completely overhauled at Cartersville and had replaced all broken and badly worn parts to the extent that an incomplete supply of spare parts allowed.

A twenty-six mile march, from Luthersville, Georgia, to Chipley, Georgia, was made on October 28th.

Three tractors from Battery A became unserviceable on this march—one from a blown out crank case and two from burnt out bearings. One tractor of Battery B also had its bearings burnt out.

The road was in fair condition, through rolling country, and the breaking down of so many tractors was—taking into consideration the fact that they had been recently overhauled—a clear indication that the tractors had become so badly worn that the installation of more spare parts than had been available—and the complete overhauling in properly appointed shops—was necessary.

On October 29th, the column marched from Chipley, Georgia, to Columbus, Georgia (35.5 miles), and the following day completed the last ten miles of the march into Camp Benning.

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FUEL CONSUMPTION

The record of fuel consumption for the march indicated that a total of 44,457 gallons of gasoline, 1358 gallons of transmission oil, 4175 pounds of cup grease and 3055½ gallons of lubricating oil was consumed during the entire period that the battalion was en route.

In making an analysis to determine the fuel consumption per mile, it was found that during the first 232 miles the 88 motor vehicles of the battalion consumed an average of 62.8 gallons of gasoline per mile. During the next 100 miles 86 vehicles (2 tractors had been shipped) used an average of 62.7 gallons of gasoline per mile. The next 123 miles the remaining 85 vehicles (one tractor had been lost) 61.2 gallons of gasoline were used.

The transmission oil consumed per mile averaged 2.6 gallons, while 5.5 gallons of engine oil were used.

CONCLUSIONS

It is believed that at least forty per cent. of the tractor troubles were caused by the inexperience of the personnel. The average experience of the tractor drivers was not over two months, and they knew too little of the adjustments and repairs that every driver should be able to do on the road without the assistance of any of the battery mechanics.

The mechanics themselves, though they were at work continuously from the time the battalion left Camp Knox until it reached Camp Benning, were with a very few exceptions too inexperienced to make any but minor repairs to the tractors. The mechanics who were competent to handle the more complicated repairs and make the difficult adjustments were swamped with work, and though the officers did the work of mechanics during the entire march, it was frequently necessary for both the mechanics and officers to work all night on the road, or in camp, in order to keep the motor matériel in running condition.

The tractor drivers and assistant tractor drivers should be thoroughly instructed in carburetor adjustment, clutch adjustment, and should be so familiar with the sound of their motors, when running properly, that they can at once detect the slightest knock in their engine, or discover immediately when the tractor is losing power. If the trouble is one that they cannot handle themselves it should be turned over to the battery mechanics—who will, on long marches, be able to properly handle only the more difficult work.

On the march of this battalion—especially that part of it when there were but two officers per battery—both the officers and mechanics were so occupied in working on the tractors that required immediate attention that they were not able to properly perform, in

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addition, the repairs and adjustments which could have been made by experienced drivers. The drivers though anxious to keep their tractors in shape, were too inexperienced to do the work themselves, and many of the repairs and replacements made at the longer halts would have been avoided had the drivers been more thoroughly instructed.

The fuel system of the present five-ton tractor proved to be unsatisfactory. The gas-lines could not stand the vibration, the tanks—both main and emergency—gave a great deal of trouble, the gas-line connections frequently leaked and the 3-way valve was found to be a constant source of trouble.

The position of the emergency gas tank directly over the magneto was found to be dangerous, for when it leaked gasoline it was liable to fall on the magneto and cause a fire.

The mufflers were soon done away with, as their location was such that the exhaust fumes were carried back in the driver's face, causing asphyxiation.

The heavy armor was responsible for a great deal of trouble. It sheared off bolts, broke radiator sections, made the engine inaccessible, and the weight that it added to the tractor was greatly responsible for the breaking of many rollers and roller bearings.

The tractor tools might be improved upon—many of them were broken or became so badly twisted that they were unserviceable.

The trucks and other motor vehicles stood the test exceptionally well, as did the artillery matériel proper. The "Indian" motorcycles were practically worn out when they arrived at Benning—though it must be admitted that they stood the test better than had been expected.

Above all it was shown that an attempt should be made to standardize as far as practicable all parts which are required on motor matériel, in order that they may be purchased locally when the supply with an organization becomes exhausted.

The tractor in its present state of development is not perfect—by a large margin—for use on such a march as taken by this battalion; but it is believed that many of the defects discovered during the march can, and will, be corrected—and the tractors which will soon be issued to motorized organizations will be far superior to the model which was used on this march.