

45.57-4H

US ARMY ARMOR SCHOOL

Fort Knox, Kentucky

4 February 1957

SUBJECT: Fully Tracked Armored Division

Reference: Ltr., Staff Study Assignment, General
Subjects Department, US Army Armor School,
1 November 1956.

1. Problem. To determine the practicability of having
a fully tracked Armored Division.

2. Assumption.

- a. U.S. forces cannot anticipate air supremacy in
initial stages of any future conflicts.
- b. Future convoys will provide lucrative targets for
enemy tactical atomic weapons.

3. Facts Bearing on the Problem.

- a. Tactical employment of the Armored Division requires
a high state of mobility.
- b. Two thirds of the vehicles of the Armored Division,
TO&E 17R, are wheeled vehicles.
- c. The Armored Division, TO&E 17R, currently utilizes
almost 100% wheeled vehicles in logistical support.

4. Discussion.

- a. Tactical employment of the Armored Division requires
a high state of mobility. (Annex A)

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- (1) The mission and capabilities of the Armored Division are predicated upon the mobility of the division in all types of terrain and weather.
- (2) Previous operations by U.S. and German Armor Divisions over difficult terrain have brought forth the conclusions that the wheeled vehicles as we know them today were not capable of operation over much of the terrain the Armored Division was committed to.
- (3) Future operations against our most likely belligerents, ie, USSR and/or Red China, would find us operating in areas that have very few roads capable of withstanding the traffic of military forces in good weather and the majority of which become bottomless mires in rain.
- (4) The above possibility makes it readily apparent that it will be almost mandatory if we are to survive any future conflict on the land masses of Eastern Europe and Asia, that serious consideration be given to a much improved means of supply, evacuation and transportation for areas where road nets are inadequate for our means and can at times be considered as non-existent. A logical answer to the problem is to equip the currently wheeled elements of

the division with track laying vehicles. There will be an additional tactical advantage achieved and maintained through employment of a fully mobile Armored Division, utilizing tracked vehicles throughout.

- (5) The advent of atomic and thermo nuclear weapons designed for tactical as well as strategic employment will have a direct affect on the employment of armor in the future. The greatest affect will be evidenced in the principle of mass. No longer will our forces be able to remain massed on the battlefield and in bivouac areas for extended periods of time. Maximum dispersion will be our only means of salvation. Forces of the future must have the inherent capability of moving rapidly from widely dispersed positions to a mass formation, executing the missions assigned and just as rapidly returning to dispersed areas, thereby negating the affects of an enemy nuclear blast.
- (6) Achievement of the desired capability will require a much more mobile Armored Division than the one in existance today. The Armored Division of the future must be able to maneuver without regard to existing roads in

order to achieve more security and enable it to gain and maintain the potential of moving with maximum speed to gain surprise, to attack in mass and to acquire tactical advantage over the enemy. The Armored Division of the future must additionally be capable of rapid and wide dispersion in order to prevent offering a profitable atomic or thermo nuclear target. This capability will require maximum reduction of the current long logistical tail of the Armored Division.

- (7) In order to eliminate the majority of this tail and still retain the ability for self-sustained operations, the Armored Division must have designed for its' service and support elements, tracked vehicles capable of supporting the combat elements, with mobility equal to that of the combat elements. Lack of support to the tracked combat elements of the German Panzer Divisions in Russia was mainly attributed to the lack of mobility of the supply and support echelons. Adequate supply and support to those combat elements might well have changed the entire course of World War II.

b. Wheels and tracks of present Armored Division.

(Annex B)

- (1) The currently organized Armored Division, TO&E 17R, consists of 2311 wheeled vehicles of all types, compared to 1074 tracked vehicles of all types.
- (2) With the exception of a small number of administrative type $\frac{1}{4}$ ton trucks, to be utilized in rear area missions, the entire organization can profitably be equipped with track laying vehicles.
- (3) Research and development personnel of this country should have no great difficulty in designing track type vehicles to replace the wheeled vehicles currently employed in the Armored Division. The principles are not new, but have many precedents in modern history, of both warfare and civilian development.

c. Logistical vehicles of the Armored Division. (Annex C.)

- (1) The logistical support of the Armored Division of today, with the exception of the M-74 recovery vehicle, is entirely on wheels. As a result, the combat element of the division is seriously hampered in "punching" power, by its' road-bound support. This is important both in roles of

conventional employment and future atomic employment.

- (2) Present logistical support is predicated upon the two and one half and five ton trucks. When good road nets are available, these vehicles can adequately perform their mission, however, due to their lack of cross country mobility, they become hopelessly bogged down under adverse conditions.
- (3) The lack of a cross country capability by our support elements has created a major engineer requirement which could in most part be eliminated by equipping the support with vehicles capable of operation independent of the road nets. This would in turn allow the engineers more time to concentrate in direct support of the combat elements.
- (4) Adoption of tracked vehicles would facilitate evacuation and recovery of front line casualties by allowing the maintenance personnel and sections to more closely follow the lead elements of the units engaged. The evacuation of personnel casualties would be even further improved since aid men could move under fire in lightly armored track vehicles directly to the

casualty.

- (5) Resupply of front line units, including those in contact, could be accomplished more rapidly and with less restriction than at present if tracked cargo vehicles were employed.
- (6) The cargo carriers of the future should not be a conversion of the tank chassis as employed today, but rather a lightly armored tracked vehicle capable of employment under fire with the same cross country mobility as the tactical tracks of the division. Research and development should not find it too difficult to produce a vehicle with the desired characteristics. Such a vehicle could resupply the combat elements at almost any time or place.
- (7) Adoption of a fully tracked armored vehicle replacement for the current wheeled elements of the Armored Division would present an increase of POL requirements, thereby increasing the logistical support by higher echelons.

5. Conclusions.

- a. The missions of the Armored Division and past employment, indicate that there is a definite requirement for a more mobile support and supply echelon in the division.

- b. The terrain occupied by our potential enemy contains inadequate road nets to sustain military operations.
- c. The successful employment of armored units in the areas occupied by our potential enemy in any future conflict would be completely dependant on the ability of self support from the intregal support and supply units of the Armored Division.
- d. With the exception of the M-74 recovery vehicle, the logistical support of the Armored Division is lacking in cross country capability and must as a result be considered road bound.
- e. Development of atomic and thermo nuclear tactical weapons will require employment of rapidly moving independant units, for success in future conflicts.
- f. Replacement of the wheeled vehicles of the Armored Division, by tracked vehicles would greatly increase the maneuverability of the division.
- g. The POL requirements of a fully tracked Armored Division would be somewhat heavier than those of the present division.
- h. Recovery and evacuation would be facilitated by adoption of fully tracked vehicles throughout the Armored Division, by allowing the recovery personnel of higher echelons to more closely follow the combat elements.

i. A fully tracked Armored Division would reduce the time spent by the Engineer Battalion on maintenance of roads and result in more economical utilization with the combat elements.

6. Recommendations.

- a. Action should be taken with a view toward adopting a fully tracked Armored Division.
- b. Research and development personnel should undertake the development of tracked vehicles to replace those wheeled vehicles currently in use in the Armored Division. Priority of research should be given to development of the tracked supply vehicles to replace the wheeled cargo carriers of the front line elements.
- c. A requirement be established that the supply and support elements necessary for combat must be capable of following and going up to the combat elements, not the combat elements utilizing their cross country mobility to make their way back to the semi-mobile support elements.

d. That the attached letter (Annex D) be signed and forwarded to Commanding General, The U.S. Army Armor Center, with recommendations as listed above.

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THE UNITED STATES ARMY
KEITH MEYER
Capt, Armor

ARMOR SCHOOL POSITION

ANNEXES: A- Tactical Employment of the Armored Division.
B- Wheels and Tracks of Present Armored Division.
C- Logistical Support of the Armored Division.
D- Letter to Commanding General, U.S. Army Armor Center.

CONCURRENCES.

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ANNEX A

TACTICAL EMPLOYMENT OF THE ARMORED DIVISION

1. The tactical employment of the Armored Division, fully tracked, would continue along the lines as dictated in the current mission and capabilities of the Armored Division, TO&E 17R.¹ The basic changes would result from the increased ability to accomplish the missions and give a truer conotation to the capabilities of exploitation, attack of deep objectives, counterattack, penetration, pursuit and rapid movement. This would be especially true in areas such as USSR and Red China, where road nets are inadequate to sustain the movement of military traffic and the logistical support could not be realized through utilization of wheeled transport.²

2. The wheeled vehicles of current design have proven themselves incapable of sustaining a fast moving tracked combat element in cross country operations.³ This was especially true of the military operations in Russia as evidenced by the German Panzer Divisions of World War II.⁴ The Germans based their suppoer of the Panzer elements on the mobility of wheels rather than tracks. As a result, the German Armor, which could quite easily negotiate the poor Russian roads and negotiate the difficult terrain, was seriously handicapped by the inability of the supporting elements to keep pace with

the spearheading tracks.⁵ This in itself would be justification for an increase in the number of tracked vehicles organic to support and service units, even if only to the extent that immediate resupply of the fast moving tracked vehicles of the combat elements could be accomplished.

3. If the destiny of this country is to include possible conflict with the USSR and/or Red China, as our most likely belligerents, it becomes readily apparent that action must be taken to eliminate the handicap the Armored Division is currently operating under. As currently organized, approximately two-thirds of the Armored Division falls into the category of road-bound vehicles.⁶ This wheeled element of the division cannot be economically retained if it is to hamper the movement of the division.⁷

4. Current Department of the Army doctrine requires units to be prepared to deploy and form over great areas to prevent or nullify the affects of atomic or thermo nuclear weapons.⁸ The must be capable of self sustained operations over a wide area to include self sustained support in logistics.⁹

NOTES FOR ANNEX "A"

- 1
Reference Data for Armored Units, The Armor School,
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- 2
Encyclopedia Americana, Terrain evaluation of USSR &
land mass of China Mainland.
- 3
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- 4
Ibid passim.
- 5
Ibid passim.
- 6
Ref. data TAS.
- 7
B.H. Liddell Hart, Defense of the West (New York:
William Morrow and Company, 1950) p 229.
- 8
Gen. Maxwell D. Taylor, C/S U.S. Army, talk to Assn. of
U.S. Army, Army, Dec. 1956 issue.
- 9
Ibid passim.

ANNEX B

WHEELS AND TRACKS OF PRESENT ARMORED DIVISION

1. As currently organized under TO&E 17R, the U.S. Armored Division consists of wheels to tracks on a ratio of 2 to 1. This gives the division the drawback of having the cross country tracks supported by a relatively imobile tail of wheeled vehicles. The tail of our division (the wheeled vehicles) is much too long for the head (tracked vehicles). It is believed that the wheeled vehicles of the division can be replaced by suitable tracked vehicles, thereby increasing the mobility and combat effectiveness of our Armored Division to a very high degree.

2. It is reasonable to expect that economy would call for a small number of administrative type $\frac{1}{4}$ ton trucks to be retained within the division to carry out rear area missions where-in roads can be utilized and cross country mobility is not an absolute requirement. The number to be utilized for these missions would have to be worked out on an individual basis and should be based on experience factors encountered in actual utilization of the fully tracked division. Even the $\frac{1}{4}$ ton truck must be considered as incapable of negotiating the difficult terrain of USSR during muddy weather, as proven by tests made by Germans during WWII, and therefore should be discounted as

3

an effective vehicle for the combat elements.

3. The concept of utilizing tracked vehicles in the various roles of the Armored Division is not new. Practically every wheeled type vehicle of the division has been replaced on an interim basis by a track vehicle at one time or another, when additional traction was required or light armor protection was needed.

a. The British Army has utilized to an effective degree, the Bren-gun fully tracked carrier in a reconnaissance role, for many years. A version of this vehicle could readily be developed and utilized to replace the $\frac{1}{4}$ ton trucks currently utilized in the U.S. Armored Division.

b. The French Army developed and produced a small fully tracked carrier which towed a fully tracked trailer, for supply of front line infantry units, in 1931. This type of operation could be utilized to replace our current $\frac{3}{4}$ ton truck and a larger version could be developed, utilizing the trailer technique, to replace our $2\frac{1}{2}$ ton and 5 ton trucks, currently utilized in the Armored Division.

c. U.S. forces in Korea found the M-75 utility vehicle could readily be transformed into a field ambulance which provided much additional cover to the wounded and allowed for transport over even the most difficult of terrain.

d. It is fully within reason to conclude that our research and development personnel could develop relatively

light weight fully tracked vehicles to replace any of
the wheels currently in use in the Armored Division. ⁷

4. Lessons learned by the German Army in World War II, as applied to the land mass of Russia can be pointed to as examples of future difficulties for the U.S. Army. ⁸

a. In the Ukraine area of Russia, the hard surface roads constitute only 7 per cent of the total roads. In the Dniepr Plain region, this percentage is considerably lower; the surfaced roads existing mainly in the industrial section of the Donets region. Only the main roads have a foundation filling with gravel surface. All other roads are dirt, which has been plowed, graded and rolled to a 25 ft. width, with some ditches along the sides. All of the roads are passable in dry weather, but when rain falls, they quickly become impassable. During the rainy season these roads become bottomless mires for long periods of time.

b. The example of the German 24th Panzer Division move of about 150 miles from Nikopol to Novo Ukarainka during the period 27 January 1944 to 8 February 1944, exemplifies the difficulties of such terrain. The division started the march with about 85 per cent effective strength and ended the march with the combat value of the division reduced by two thirds and almost all of its' supply vehicles lost. This was a direct result of the inability of their vehicles to negotiate the muddy terrain.

c. The main lesson learned by the Germans was

that motorized and mechenized formations, whose vehicles were not especially constructed for operation in mud, are to be regarded as practically imobile during the muddy season.

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- 1
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- 2
B.H. Liddell Hart, Defense of the West (New York: William Morrow and Company, 1950), p 229.
- 3
March of an Armored Division During the Muddy Season, translated and digested by the Military Review from an article by Dr. F.M. von Senger und Etterlin in "Wehrkunde", Germany, March 1955, Military Review, XXXV, No 6 (September 1955), p 107.
- 4
Tanks and Armored Vehicles, Icks, p 182.
- 5
Major Lamar M. Prosser, "Put 'em on Tracks", Combat Forces Journal, Volume 3 (April 1953), p 45.
- 6
Armor, Volume LXVI, January-February 1957, p 77.
- 7
Prosser, passim.
- 8
Terrain Factors in the Russian Campaign, DA Pamphlet 20-290 prepared by the Historical Division, Dept. of the Army, (Washington: Government Printing Office, 1951) passim.
- 9
von Senger und Etterlin, passim.

ANNEX C

LOGISTICAL SUPPORT OF THE ARMORED DIVISION

1. With the exception of the M-74 recovery vehicle, the Armored Division is supported logistically by wheeled vehicles. ¹ There are ample examples that the roadbound support vehicles of the Armored Divisions are not capable of supporting the divisions over adverse terrain. The German Panzer elements in Russia found that the mud was able to stop their tracked vehicles, not by halting the tracks, but by preventing the wheeled transports from providing the fuel that the motors needed to keep the tracks moving. ² Only by providing the support elements of the division with tracked vehicles, which have the same cross country mobility as the combat elements, will we be able to declare that we have a truly mobile Armored Division. ³

2. Predicated upon the assumption that we will be adequately equipped with good road nets to support our future armored operations, the current $2\frac{1}{2}$ ton and 5 ton trucks can, under normal conditions, meet the demand. When subjected to adverse conditions such as mud, however, the desired cross country mobility is lacking ⁴ and the support train must falter and finally halt. Even the road network of our potential enemies can be construed to come under the heading of difficult terrain, when saturated with rain. ⁵

3. If we are to retain our current wheeled logistical

tail of the division, there must be major thought given to the amount of engineer work that it will take to keep our lines of communication (roads) open for travel, and where will the material come from to accomplish this task?

The cross country supply created by our needs for dispersion, as provided for in current U.S. Army doctrine for the Atomic battlefield,⁶ would reduce the role of road maintenance of the front line engineer units and would allow them to concentrate on their duties in direct support of the front line elements.

4. Adoption of the fully tracked vehicles would allow our supporting Ordnance a much greater ability to more closely support the lead elements of the division and would free more of the front line personnel currently engaged in support duties for actual combat duties.

5. Utilization of fully tracked vehicles with light armor would allow medical evacuation of the personnel injured in the forward areas to a much greater degree. Utilization of the M-75 utility vehicle in Korea proved the system has much merit⁷ and the development of a vehicle specifically for medical evacuation would undoubtedly create a much more efficient utilization and life saving capability. The tests on the reorganization of the current Armored Division incorporate parts of this theory.

6. Resupply of the front line units, by utilizing a

vehicle with mobility equal to the fighting vehicles will remove the theory of "pulling back" to resupply. It is only reasonable to believe that all measures to accomplish this system of support should be tested.

a. Past wars, from the beginning of history have proven the need for immediate and constant resupply of the fighting elements of the force. Napoleon discovered that his inability to support his long supply line in Russia was to become his most potent enemy. His only alternative was to throw his army on the city of Moscow for subsistence and winter quarters. He soon found that the enemy had left him with only pestilence for his troops and a plan, which they accomplished, to burn what rations and shelter Moscow offered. This scorched earth program has been followed in wars since and forces all plans for maneuver to be based on what the Army can itself provide for the troops. Any captured supplies in this day and age must be considered as sheer bonus.

b. While engaged with a dogged enemy, in future operations, our forces may easily find themselves in a position of being unable to reduce the pressure on the enemy by falling back to a safer area for resupply, but must rely on the supplies following him in close proximity. If this is to be the case, our present system of supply is inadequate. The current wheeled columns are neither sufficiently armored to operate in areas of possible trouble nor do they have the traction to allow them to follow over difficult terrain.

In order to consider that we have exploited the full potential of the Armored Division, these drawbacks must be eliminated.

7. The cargo carriers that we utilize in the mobile Armored Division should not be merely a conversion of the current tank chassis, but a lightly armored tracked vehicle capable of employment under fire and with the same cross country mobility as the tactical tracks. ¹¹ With research being what it is in the United States today, it is impossible to conceive that they could not come up with a vehicle of the desired characteristics.

a. As early as 1931, the French Army had recognized the need for a fully tracked supply carrier for their infantry forces and as a result designed and produced the Renault Tractor D'Infanterie, which utilized a lightly armored tracked carrier, which pulled a tracked trailer. ¹² This vehicle was able, with its' cross country mobility to bring close support to the infantry forces of the army.

b. We have in the U.S. Army, to a small degree, accomplished this by the utilization of the Weasel, however, this vehicle is limited standard and is still not representative of all that designers can accomplish in this field. This vehicle was additionally designed to support units in areas of deep snows and lacks much in operations in mud.

8. Adoption of a fully tracked Armored Division

would present an increase in POL requirements, if the designers of the vehicles continued to produce the type of vehicles that consume great quantities of gasoline. There is, however, the possibility that they might, in the design, come up with a discovery which would reduce the consumption rate of these vehicles to a more reasonable rate, by incorporation of various fuel saving techniques.¹³ With the increase in systems for providing fuel to the higher echelons in the supply chain, it is possible that even an increase in the needs could be met at that echelon without it presenting too much of an additional burden. With the incorporation of the system of assault pipe lines for fuel, which will run into the Division supply area, the problem may be partially solved.¹⁴ By any means, however, the advantages of an increase in the mobility of our Armored Division will far outweigh the latter problem. Adoption of this theory should in all events not be cast off as unfeasible because of the fuel consumption requirement. Dismissal on those grounds would constitute operation in a negative sphere,¹⁵ to say the least.

9. Adoption of the fully tracked Armored Division would allow support echelons to operate independent of the roads that we have in the past been so dependant upon. If this is the case, our Armored Engineer Battalion will be able to spend more time on the actual front line pioneer work to accomplish the immediate needs of the forward elements and

less on actual road building. The refinements of road building can under these circumstances be left to the rear echelon engineer elements, who will be able to spend more time on the job and would not be considered such a necessity for the combat survival of the army.

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- 1
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- 2
Major Lamar M. Prosser, "Put 'em on Tracks", Combat
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- 3
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article by Dr. F.M. von Senger und Etterlin in "Wehrkunde"
(Germany) March 1955, Military Review, XXXV, No. 6 (Sept.
1955), p 100.
- 4
Ibid passim.
- 5
Ibid passim.
- 6
General Maxwell D. Taylor, C/S U.S. Army, talk to Assn.
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- 7
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- 9
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- 10
von Senger und Etterlin, passim.
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Tanks and Armored Vehicles, Icks, p 182.
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Future trends indicated by utilization of Fuel Injection,

M-48 E-2 Tank.

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Ltr. "Hqs. Continental Army Command, 15 June 1956,
Subj.: Directive Troop Test (Combined) Supply of Gasoline
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Current tests in fuel saving techniques.

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General Maxwell D. Taylor, talk to Assn. of U.S. Army, Army, December 1956.

U.S. ARMY ARMOR SCHOOL
Office of the Assistant Commandant
Fort Knox, Kentucky

Date.

SUBJECT: Fully Tracked Armored Division

TO: Commanding General
U.S. Army Armor Center
Fort Knox, Kentucky

1. It is recommended that action be initiated toward adopting a fully tracked Armored Division.
2. Research and development personnel should be assigned the mission of developing tracked vehicles to replace all of the wheeled vehicles currently in use in the Armored Division. Priority of development should be given to replacement of the current wheeled cargo carriers of front line elements.
3. A requirement for research, development and production should be established that all supply and support vehicles designed for the Armored Division must be capable of supporting the combat elements of the division over all types of terrain.

RAYMOND W. CURTIS
Brigadier General
U.S. Army