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IS THERE A NEED FOR THE M-56 CHASSIS  
AS A CARRIER FOR EITHER THE 4.2-INCH  
MORTAR OR 106MM RIFLE IN THE INFANTRY  
DIVISION BATTLE GROUP

Capt. Robert A Sullivan  
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PREFACE

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The author wishes to acknowledge sincere appreciation to the individuals and departments at the United States Army Infantry School (USAIS) who have assisted and advised him in the preparation of this paper.

I particularly wish to express my gratitude and appreciation to the library staff of USAIS for their efficient and courteous assistance in gathering reference material.

The point of view expressed in this paper is that of the author - not necessarily that of the United States Army Infantry School or the United States Army.

  
ROBERT A. SULLIVAN  
Captain, Infantry

## INTRODUCTION

"Destruction itself is the result of fire power, but fire power, minus ability to maneuver is ineffective both in the offense and in defense." (8:275)

Reports from mankind's first armed battles through the Korean conflict substantiate the validity of this quotation. Numerous reports from Korea indicate that combat leaders felt they did not exploit the maximum capabilities of such direct support weapons as the 106 recoilless rifle and the 4.2-inch mortar. Careful evaluation of these reported combat experiences coupled with extensive troop testing has revealed that these weapons cannot be fully exploited because of mobility limitations imposed by their present wheeled carriers.

The Cleveland Ordnance Plant, with technical guidance from the Cadillac Motor Car Division of General Motors Division, has developed a new full-tracked carrier mounting the 90mm gun. This weapon, known as the M56 Scorpion, has been adopted as the basic armament for the Assault Gun Platoon of the Battle Group. Recent experimentation by the Weapons Department USAIS has revealed that the M56 chassis, with very little modification will provide an excellent platform for the aforementioned weapons. (11:8)

It shall be the purpose of this paper to examine the need for adopting the M56 chassis as a carrier for the 106 recoilless rifle or the 4.2-inch mortar. The author is aware that the 4.2-inch mortar has been declared an organic Artillery weapon by Department of the Army. Regardless of the

organic responsibility of the weapon, the author assumes that it will still be the Battle Group commander who dictates its employment on the battlefield.

In order to establish or discount the need for the adoption of the M56 it will be compared with only those carriers which are presently available with one exception. These vehicles include the present wheeled carriers of the weapons, the M38A1 1/4 Ton Truck and the M39 3/4 Ton Truck, the M-84 Heavy Mortar Carrier, and the XM-274 mechanical mule. The one exception is the T-257, a mortar carrying vehicle of the T-113 series currently being tested by the Continental Army Command Infantry Test Board located at Fort Benning. The availability of this series is considered to be mid range. (6)

The discussion will be developed by investigating the answers to two questions:

1. What military capabilities should be inherent in a suitable weapons carrier for the 106 recoilless rifle or the 4.2-inch mortar?

2. How do the military characteristics of the M56 chassis compare with the present wheeled and tracked carriers available or under test and development?

Very little unclassified information has been published regarding the M56 carrier. The information obtained through personal interviews constitute a major portion of the discussion on the carrier.

Several annexes are included as a portion of the paper to amplify certain points and to assist the reader with detailed information in various phases of the discussion.

## DISCUSSION

Mobility, firepower, protection and communications are accepted as the main factors which will influence operations on the future battlefield. Firepower has apparently reached its' ultimate strength through release of tremendous energy within the structure itself and, as a result, protection through the use of a material shield has become most difficult. The obvious and most urgent method of counterbalancing this unfavorable situation created by the introduction of atomic power must lie in the radical improvement of vehicle and weapons carrier mobility.

"To close with the enemy by means of fire and maneuver in order to capture or destroy him." This is the mission of the Infantry Division Battle Group. (10:3) Throughout history military commanders have realized that in order to have effective fire and maneuver on the battlefield, you must have effective mobility. The ancient Romans, as well as the Greeks, realized the importance of mobility, and utilized the chariot to great advantage. "...Thus we read of the 900 iron chariots of Sisera as giving him great advantage against the Israelites. The Phillistines in their war against Saul had 30,000 chariots." (3:306)

The following combat example stresses the importance that should be attached to providing more mobility to the crew-served weapons of the Battle Group. On May 19, 1951, near P'ungam-Ni, Korea, the 3rd Battalion of the 15th Infantry was given the mission of securing the village of P'ungam

Ni and the high ground to the north. The enemy appeared to be elements of the 31st Chinese Division, one of their best fighting units. (9:15)

As the friendly forces crossed the line of departure, it was apparent from the observation post that the CCF unit was seeking cover from our artillery fire by remaining in reverse slope positions. The enemy could be observed running into prepared positions on the forward slope of the hill as the artillery preparation ceased and the attack progressed. The use of organic mortar fire to destroy the unconcealed enemy as they moved to their positions was not considered feasible due to the proximity of our troops to the target. The battalion commander decided to use his 105 recoilless rifles, employing direct fire to assist in routing the enemy. There also existed a need to eliminate the automatic weapons fire which was inflicting heavy damage on the attacking forces. (9:15)

The movement of the recoilless rifles into position was slowed and hampered because of the poor road net and the fact that the wheeled carriers could not traverse the rice paddies and open irregular Korean terrain effectively. As a result of this ineffective cross-country mobility, the attack bogged down and many casualties were inflicted on the friendly units. After an extended time lag the recoilless rifles moved into effective supporting positions, and the attack moved forward. The unit eventually accomplished its mission. (9:15)

The need expressed for mobility in this combat example is not only applicable to the recoilless rifles of the rifle company but also to the 4.2-inch mortars in the Mortar Battery of the Infantry Division Battle Group.

The 4.2-inch mortar (M-30) is one of the few heavy mor-

tars employed by the armies of today that does not have the capability of tactical mobility. It cannot be moved from one firing position to another without complete disassembly. The Russian army today possess heavy mortars which are self-propelled on tracked carriers.

What military characteristics should be inherent in a suitable weapons carrier for the 106 recoilless rifle or the 4.2-inch mortar? Each characteristic will be discussed in a separate paragraph.

Cross-Country Mobility. The need is present for a vehicle which can move readily on such varied and difficult terrain as mud, sand, snow, and rocky slopes. It would be highly desirable for the carrier to have amphibious capabilities. This would facilitate close fire support to maneuver elements which are mechanized in amphibious personnel carriers. The weapons carrier on the atomic battlefield must have the mobility to concentrate rapidly to deliver massed fire and disperse as the tactical situation dictates.

Rapid Displacement. Closely related with cross-country mobility is effective and rapid displacement. Continual development and improvement of enemy target detection devices will require numerous displacement of our crew-served weapons. Enemy counter-mortar fire may be delivered on friendly mortars only seconds after they have fired a round. The best defense against this threat is to mount our crew-served weapons on a carrier which will afford rapid displacement.

Speed of Action. To assist in reducing the time that elapses once the target is sighted until effective fire is brought upon it our carrier must facilitate the rapid action of the weapon it mounts. Our present wheeled carrier for the mortar requires that the weapon be off-loaded and assembled before firing. If we adopted a carrier from which

the weapon could be fired at all times this would greatly speed up action for the mortar family. In considering this characteristic it should also be noted that the carrier must allow the weapon to retain its ground mount capability when the tactical situation dictates.

Cost. The cost of the carrier commensurate with the capabilities it provides the tactical commander is a definite consideration at the budget level. A problem in this area rests with the feasibility of replacing the present interim carrier with an improved but likewise interim carrier such as the M-56 or the M-84. In order to effectively propose appropriations for production of a carrier budget, planners will explore the feasibility of producing a common power pack and suspension system to be utilized with the different configurations which are required. If manufacturers could fulfill a requirement such as this it would reduce costs, speed of production, interchangeability of parts and decreased maintenance requirements. This highly desirable program would produce what planners presently refer to as the common carrier. (5)

Target Attractiveness. With the threat of accurate and devastating fire which the enemy can bring on located targets, it is imperative that our weapons' carriers' present a low silhouette at all times. A weapon carrier which is light in weight and highly maneuverable would present a very difficult target to the enemy.

Flexibility. The flexibility a selected carrier can afford a commander is a very important criteria to be considered. A carrier which has all of the characteristics discussed here will naturally provide the greatest flexibility. A carrier that can perform additional duties if required would be invaluable to the small unit commander. A carrier

which could be utilized as a high density cargo or ammunition carrier when the weapon it normally carries is employed in a ground mount position would be an example of desired flexibility. In the same vein of thought, a carrier which could move a demolition team or small raiding patrol cross country rapidly would be useful.

Air-Lift and Air-Drop Capability. When necessity exists, all vehicles employed with the Pentomic Battle Group must have an air lift capability. In order to meet this requirement, engineers will need to examine all weapons carriers to insure that they do not have excessive weight. This weight reduction is not only essential from the standpoint of making air transportability practical, but also to achieve the maximum efficiency in operation and maneuverability that is required. It is anticipated by military planners that troops may be employed by aircraft to the corners of the globe in case of war. In order to effectively employ such direct support weapons as the 106 recoilless rifle and the 4.2-inch mortar, their carrier must be air lifted with the troops. An air-drop capability must exist for the carrier in the Airborne Division and it would be an added desirable feature for the Infantry Division. An additional highly desirable feature would be a lift capability with short distance movement by our organic helicopter.

Crew Protection. Protection against small arms fire, shell fragments, nuclear radiation, and thermal effects would give a weapon crew tremendous psychological advantage and perhaps a greater incentive to fight. In our Army, as well as foreign armies, new vehicle developments are emphasizing fire power, mobility and efficiency of operation rather than ballistic protection.

Logistical Requirements. The carrier selected should

require a minimum of logistical support at Battle Group level. Such considerations as ammunition storage capabilities, requirements for refueling during a normal combat day, and added maintenance requirements must be explored. Maintenance at the driver level is very important. However, we must take into consideration also the 2nd and 3rd echelon requirements that a tracked vehicle would impose if adopted. (14)

In recognizing the increased importance of certain vehicle characteristics in the revised tactical concepts of the Infantry and Airborne Divisions, it is apparent that considerable effort must be expended to provide the commander with a weapons carrier which will more effectively support our current weapons system.

Maximum effort must be directed toward optimum trafficability, under all conditions of climate, weather and terrain, an increased battlefield day, and maximum maneuverability and flexibility of employment. Our carrier must be air transportable and air droppable. A decreased logistical support requirement and maximum interchangeability of vehicles and spare parts also must be considered as important features. The above statement does not mean to infer that the other characteristics are not important, because they must all be molded together to give us the ultimate carrier.

How do the military characteristics of the M-56 chassis compare with the present wheeled and tracked carriers available as carriers for the 106RR or the 4.2-inch mortar?

The M-56 chassis whether mounting the 106RR or the 4.2-inch mortar retains basically the same military characteristics. The specific differences can be noted in Annex A and Annex E.

The M-56 was designed and manufactured as a carrier for

the 90 mm gun. In order to mount the 106, a simple kit was designed and fabricated which would adapt the weapon to the carrier.

The 4.2-inch mortar presented a bigger problem. A special base plate was manufactured to accommodate the rotator of the standard base plate, and a special stand was made for the bridge. The weapon was then fired from the carrier, with each successive round being fired at a progressively higher charge. A total of 16 rounds were fired at maximum charge with no apparent damage to the carrier. Slight deviation noted after each round was no greater than when the mortar is fired from the ground. (11:10)

The manufacturer's representative at the test checked the chassis with stress gauges and determined that damage had not occurred to the vehicle. It is questionable whether the results of this test were conclusive because of the number of rounds which were fired. The basic load for the 4.2-inch mortar is 225 rounds. (10:135) The carrier should be subjected to the firing of a basic load over a specified period similar to combat conditions. This would give a more valid insight as to whether any damage would occur to the vehicle after extended firing.

The tests which have been conducted with the M-56 have proven beyond a reasonable doubt that the carrier has unlimited cross-country mobility mounting either weapon. It is capable of climbing a slope approaching 70 percent. It can readily cross a 4 foot span, negotiate a 30 inch vertical climb and is capable of obtaining speeds of up to 28 miles per hour. (14)

The Weapons Department at USAIS has assigned project officers in each of their sub-committees to test the vehicle mounting their respective weapons. The individuals responsi-

ble on the mortar and recoilless committees are very enthusiastic over its cross country agility. (13)

The M-56 does not have an amphibious capability. This is considered by many to be a serious deficiency in its mobility capabilities. The manufacturer has indicated that if a requirement exists, an amphibious capability and armor protection against small arms and fragmentation can be added to the present vehicle with a resultant increase in weight of about 6000 pounds. (12) A picture of this vehicle is shown in Annex D.

In recent desert tests conducted by the Armor Board at Yuma, Arizona, the M-56 was driven up and down a 105 foot slope of sand. The vehicle was also backed up and down the 40 to 50 percent slope. It ascended the forward slope in twenty-four seconds, and negotiated it backward in twenty-three seconds. The carrier was driven sideways on the slope and at some portions the sand completely covered the idlers and came halfway up the sides of the road wheels. In each case the tracks continued to pull and the carrier moved forward with ease. The maneuverability of the vehicle in heavy sand was considered excellent by the test board. (13)

This carrier mounting the weapons under consideration will provide rapid displacement and speed of action. The agility and maneuverability characteristics of the vehicle will enable it to present only a fleeting target to enemy fire. Counter-mortar fire on the carrier will have to be a direct hit in order to put the weapon out of action due to the rapid displacement capabilities of the carrier. A carrier from which the 4.2-inch mortar can be fired without assembly and disassembly and still retain it's ground mount capability is an excellent feature which the M-56 provides.

The M-56 mounted 106 recoilless rifles would be able to

more effectively support combat assaults as a result of its speed of action and rapid displacement capabilities over rough and varied terrain. The company commander can utilize them with one platoon and when the tactical situation dictates shift the weapons physically to give close support to another platoon perhaps separated by thousands of yards. Tests at USAIS have shown that as many as 6 mortar rounds can be fired and the carrier can be moving to another location before the first round hits the target.

The M-56, mounting either the 106 recoilless rifle or the 4.2-inch mortar, is fully air transportable and air droppable from present cargo aircraft. In April, 1958, the M-56 was successfully lifted by an H-37 helicopter, using external slings. The aircraft had no difficulty lifting the M-56 stripped with a weight of 8500 pounds. With the 106 and kit, an added weight of 1000 pounds, the helicopter operated at near maximum power to lift the vehicle, but once airborne had sufficient power to haul it two miles. (11:11)

The configuration of the M-56 does not provide any type of crew protection against enemy fire and shell fragments. Those favoring the adoption of the carrier feel that its speed and maneuverability on the battlefield will overcome this deficiency. It would be very difficult to provide complete ballistic protection against the tremendous firepower being developed by our enemies. Military experts feel that a skinned aluminum or other type light armor protection would save a number of lives and also give the crew great psychological advantage in nuclear warfare. (13)

The complete logistical requirements for the M-56 have not been fully investigated because of its limited use in the field under all conditions.

Experience thus far indicates that 1st echelon main-

tenance will not exceed that of the 1/4 ton truck. (14)  
The band type track eliminates track adjustments, and first echelon maintenance consists solely of lubricating, adding engine and transmission oil, and normal tightening and spot painting.

Beyond first echelon maintenance it is expected that the normal maintenance problems associated with tracked vehicles will be present with the M-56. A battle group is presently authorized two tracked vehicle mechanics to maintain the eight organic tracked vehicles. If the M-56 were adopted as a carrier for the weapons under discussion, an additional sixteen tracked vehicles would be added. An increase of tracked mechanics would also be in order, if proper maintenance was to be performed. To partially alleviate this problem perhaps more responsibility for maintenance could be placed on the vehicle crew.

The fuel consumption of the M-56 is greater than the present wheeled carriers. The fuel capacity of the vehicle is 70 gallons. When mounting the 106 recoilless rifle, its cross-country range is 128 miles traveling at 10 miles per hour. With the 4.2-inch mortar the range is reduced to 118 miles. This will impose an additional fuel resupply burden on the battle group in order to realize the maximum capabilities of the M-56. This limitation does not seem to pose a major problem as the manufacturer has indicated that with simple engineering changes the fuel capacity can be increased considerably. (13)

Ammunition resupply problems would be greatly reduced if the M-56 were adopted. Ammunition kits have been developed at the Infantry School which greatly increase the ammunition carrying capabilities of the M-56 over the present wheeled carriers. These kits require no engineering or fabrication

to produce. The M-56 while mounting the 4.2, can carry 68 rounds of ammunition and 24 rounds while mounting the recoilless rifle. (5)

The cost involved in the adoption of a carrier such as the M-56 is a very important consideration, as budget cuts continue to plague the Department of Defense. The present cost of the vehicle is \$15,000. It is estimated that it would cost \$8,400,000 to equip the antitank squads of all Army rifle companies with the M-56 carrier. (11:12)

There are two schools of thought regarding the economic feasibility of adopting the M-56 as the ultimate carrier for the weapons under discussion. One argues that it would be wasteful not to utilize this existing vehicle, which is the result of a \$11,000,000 development program. The other warns that careful evaluation must be made of the economics involved in replacing an interim carrier with what they consider another interim carrier at the cost of \$14,000 per vehicle. As a rebuttal to this limitation, a recommendation has been made to utilize the M-56 in one of its many capabilities such as a cargo carrier, if a optimum carrier is produced in the future.

It has already been established that the M-56 carrier is versatile and flexible. The manufacturer has additionally indicated that the vehicle is capable of being employed as a high density cargo carrier, an open personnel carrier, a medical evacuation vehicle, or a tractor with a draw bar pull up to 10,000 pounds.

The 106 recoilless rifle, its crew and combat load of ammunition constitute a gross overload for its present wheeled carrier, the M38A1 1/4 ton truck. The vehicle is a rugged and versatile vehicle which has the capability to provide high-speed mobility over road nets and relatively level ter-

rain. However, it has great difficulty negotiating with this overload off roads and it cannot approach the cross-country capability of a tracked vehicle. Heavy vegetation and forestry limit movement of the wheeled vehicle. Natural obstacles such as gulleys, badly eroded terrain, deep sand, steep slopes, swamp and tundra all seriously hamper their movement. The wheeled vehicles do have the same fording capabilities of the M-56 carrier. (13:11)

Six rounds of ammunition can be carried on the vehicle when it is combat loaded with its crew. This presents the rifle company commander with an ammunition resupply problem which is very difficult to overcome.

The 4.2-inch mortar with its present carrier must be off loaded by the crew and assembled before it is ready for firing. This is waste of valuable time at the expense of denying fires to the Infantryman at a time when he is in need of the fire support. Before it can be displaced to a new firing position, the weapon must be disassembled and loaded into the vehicle. Rapid displacement and speed of action are seriously hampered by the present carrier.

The Carrier, Light Weapons, Infantry, 4.4 XM-274 has been tested as a carrier for the 106 recoilless rifle. The tests indicate that the mechanical mule does not offer sufficient improvement over the 1/4 ton truck in cross-country mobility under all conditions of weather or in ammunition-carrying capability to warrant its adoption as a carrier. Its questionable ability to move over extended distances rapidly under its own power is a factor which makes it even less desirable than the present carrier. Its limited range and speed do not satisfy the requirements for operations over the extended distances envisioned for future battlefields. (5)

The M-84 Mortar carrier is essentially a M-59 Infantry Personnel Carrier which has been modified with a special mount for the 4.2-inch mortar. The complete vehicle characteristics and data are found in Annex G. A picture is shown in Annex H. The carrier is presently organic to the Armored Infantry Battalion of the Armored Division.

It is so designed that the mortar fires over the rear of the vehicle. The mortar can be dismounted from the carrier and assembled on its standard ground components which are stowed on the roof and under the floor of the M-84. Ammunition is carried in upright bins inside of the vehicle.

This lightly armored vehicle provides excellent cross-country mobility. It has the ability to move readily in varied and difficult terrain. Its additional weight makes it less agile and maneuverable in heavy sand, mud and snow than the M-56. The M-84 is amphibious, fording of lakes or rivers can be undertaken with little preparation. It can negotiate a stream or river whose flow does not exceed 3 miles per hour. This was demonstrated in September 1955, when units of the 2nd Armored Division "...set a pattern for future river crossing operations by putting infantry mounted in M-59 carriers across the Rhine River, a major military obstacle throughout history, in a matter of minutes." (4:7)

The M-84 carrier provides speed of action and rapid displacement for the mortar which it mounts. The capabilities of the 4.2-inch mortar are limited since the mortar can be traversed only 920 of its 6400 mile capacity. The maximum and minimum elevation at which the weapon may be fired is also restricted because of the configuration of the vehicle. Since the mortar can only fire over the rear of the vehicle, a target beyond the traverse capability of the mortar requires that the vehicle move so that the mortar is pointed

in the desired direction. (15)

A very desirable feature of the M-84 carrier is the protection it affords the crew from small arms and overhead artillery fire when the carrier is buttoned up.

During an exercise conducted in 1955, M-59 Personnel Carriers were positioned less than 4000 yards from ground zero of an atomic detonation. The M-59 provided ample protection to the personnel from blast and heat effects at that distance. (4:8)

The large silhouette of this carrier make it a prime target on the battlefield. Because of its configuration and size, it is very difficult to conceal from the enemy.

The logistical support of the M-84 involves increased fuel resupply and the additional maintenance problems associated with tracked vehicles. The vehicles fuel capacity is 130 gallons which will move the vehicle approximately 100 miles without refueling. This fuel consumption would impart a tremendous refueling burden on the Battle Group.

The cost of the M-84 is \$29,000 as compared to \$15,000 for the M-56 and approximately \$4,400 for the 3/4 ton truck and trailer. (14)

The combat loaded M-84 weighs 46,500 pounds and cannot be air transported by any of our cargo aircraft in operational use at the present time. (15:133) Comparison of the weight of the 4.2-inch mortar (640 pounds) to the weight of this carrier indicates that a much lighter and more economical vehicle could perform the same job.

The T-113 series is a family of vehicles manufactured by the American Food and Machinery Corporation. At the present time the only weapons carrier in the series is the T-257, which carries the 81mm mortar. All of the vehicles in the series are lightly armored and full tracked. They

have basically the same hull structure and suspension system. The cross-country mobility and amphibious capabilities parallel those inherent in the M-59. All of the test vehicles are much lighter than the M-59 and are air transportable by existing cargo aircraft. (6)

Individuals involved in the test program speak very highly of the capabilities of the vehicle. It is ascertained that a family of carriers could be patterned after the existing vehicles when a requirement is presented by the Department of the Army. The availability of the T-113 series is regarded as mid range which encompasses the present through 1965.

The pentomic Battle Group will move to strike the enemy where he is not protected, often across difficult terrain. The supporting weapons must be able to accompany it. The key to success is the unfailing support implicit in the fires of the 4.2-inch mortar battery and the anti-tank squads of the rifle company that are not road bound or subject to immobilization by adverse weather and difficult ground.

## CONCLUSION

Greater distances between units, increased dispersion within tactical units, and greater speed in less reaction time will be common characteristics of the modern battlefield. This will dictate a requirement for a full-tracked weapons carrier which is air-transportable and air-droppable. It should have an amphibious capability and provide a high degree of cross-country mobility under all conditions of weather and terrain. Other desirable features include increased ammunition-carrying capability, some degree of crew protection, and a decreased logistical support.

The M-56 chassis, if adopted as a carrier for the 106 recoilless rifle and the 4.2-inch mortar, would provide the following advantages over the available wheeled and tracked carriers:

1. Rapid cross-country mobility, maneuverability, and agility.
2. A greatly increased ammunition capability.
3. Increased flexibility to include utilizing the vehicle as a cargo carrier, an open personnel carrier, a general utility vehicle, a medical evacuation vehicle, and a tractor with a draw bar pull up to 10,000 pounds when the situation dictates.
4. Excellent displacement and speed of action capability.
5. Provides the 4.2-inch mortar the capability of being fired from its carrier as well as a ground mounted position.
6. The M-56 is a carrier which is in production and could

be placed in the hands of troops in the near future.

The following limitations would be imposed if the M-56 were adopted as a carrier:

1. Increased 2nd and 3rd echelon maintenance requirements over present wheeled carriers.
2. The estimated cost of equipping present units with the carrier would be \$8,400,000.
3. The M-56 does not provide ample crew-protection.
4. An additional fuel resupply problem would be present.

"Streetcars have given way to buses in all urban communities because the old tramlines were not flexible enough to meet the demands of life in a modern city." (12:44)

It is the opinion of the author that our present carriers are not flexible enough to meet the demands of the present or future battlefield and should be replaced by the M-56. In the immediate future research and development must strive to produce a family of full-tracked vehicles utilizing a common power pack, a common suspension system, and a basic hull structure which will provide crew-protection against small arms and nuclear weapon effects.

ANNEX A - Vehicle Characteristics 106mm Recoilless Rifle  
M-56 Chassis

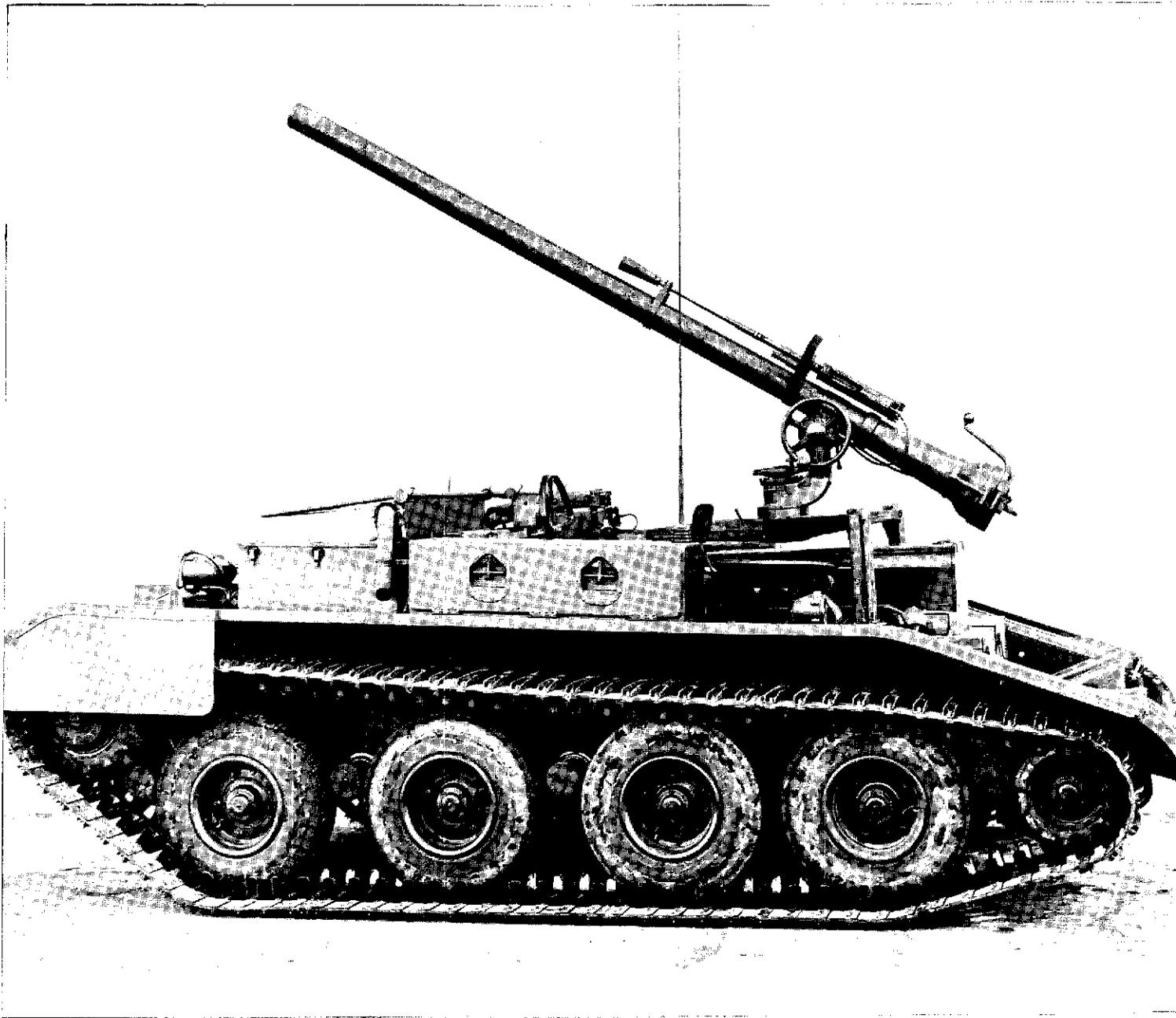
VEHICLE CHARACTERISTICS

106MM RECOILLESS WEAPON - M56 CHASSIS

<u>Dimensions</u>		<u>Fuel</u>	
Overall Length	180-1/2 inches	70 gallons	
Overall Width	101-5/16 inches		
Overall Height	80 inches		
Reduced Height	73-1/2 inches		
<u>Weights</u>			
Cargo Chassis	8,000 lbs. (approx.)		
Combat Loaded w/106MM Kit	10,000 lbs. (approx.)		
Ground Pressure w/Kit	2.7 p.s.i.		
Ground Pressure Less Kit	2.2 p.s.i.		
<u>Fording</u>		<u>Armament</u>	
With Kit	42 inches	106MM B.A.T. Recoilless Rifle	
	60 inches	Traverse - Limited to 170°	
		Elevation - +33° Over Front of Vehicle	
		+27° Over Tripod Leg	
		+31° Over Sides of Vehicle	
		Depression - 8° Over Front of Vehicle	
		- 30° Over Sides of Vehicle	
<u>Performance</u>		<u>Ammunition</u>	
Max. Speed	28 m.p.h.	24 Rounds - 106MM (In Stowage)	
Max. Grade	60%	200 Rounds - 50 Cal. - Spotting Rifle	
<u>Power Plant</u>			
Engine	Continental 6 cyl.		
Transmission	G. M. C. / Allison		
<u>Running Gear</u>			
Torsion Bar Type Suspension			
Band Type Track, 4" Pitch, 20" Width			
8 Wheels, 27" Diameter			
Tires, Pneumatic, Smooth Tread			

Source: Brochure Produced by Cadillac Division of General Motors Car Corporation Titled M56 Vehicle Family

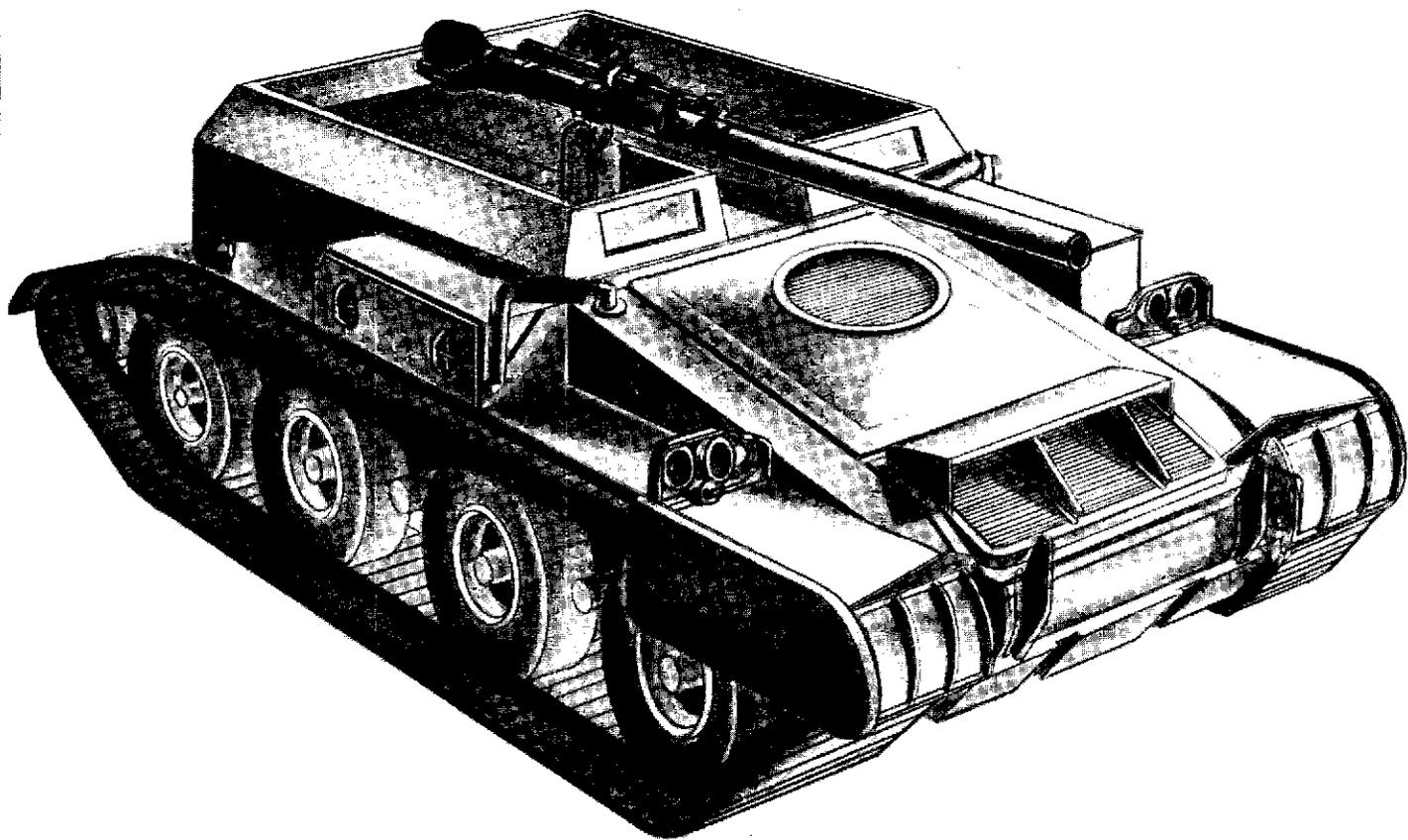
ANNEX B - Picture of 106mm Recoilless Rifle - M56  
Chassis



Source: Brochure Produced by Cadillac Division of  
General Motors Car Corporation Titled M56 Family



ANNEX D - Picture of 106mm Recoiless Rifle - M56  
Chassis (Armored)



106

MM RECOILESS RIFLE ON M56 CHASSIS ( ARMORED )

Source: Brochure Produced by Cadillac Division of General  
Motors Car Corporation titled M56 Family

ANNEX E - Vehicle Characteristics 4.2-Inch Mortar  
M-56 Chassis

VEHICLE CHARACTERISTIC SHEET  
4.2-INCH MORTAR--M56 CHASSIS

<u>Dimensions</u>			
Overall Length	180-1/2	inches	
Overall Width	101-5/16	inches	
Overall Height	61-1/2	inches	
Ground Clearance	12-3/4	inches	
<u>Weights</u>			
Chassis Weight, lb.	8,000		
Gross Weight, lb.	11,876		
Ground Pressure (gross wt.) psi	3.3		
<u>Running Gear</u>			
<u>Torsion Bar Type Suspension</u>			
Band Type Track, 4" Pitch, 20" Width			
8 Wheels, 27" Diameter			
Tires, Pneumatic, Smooth Tread			
<u>Power Plant</u>			
<u>Engine</u>	Continental 6 cyl.		
<u>Transmission</u>	GMC/Allison		
<u>Performance</u>			
Maximum Speed	28 mph		
Maximum Grade	60%		
<u>Armament</u>			
4.2-Inch Mortar, Standard Ground Mount			
Traverse	360°		
Elevation	40° to 65°		
<u>Ammunition</u>			
100 Rounds			
<u>Fuel</u>			
55 Gallons			
<u>Range</u>			
Convoy	(20 mph)		232 miles
Paved Road	(28 mph)		205 miles
Cross Country	(10 mph)		95 miles

Source: Brochure Produced by Cadillac Division of General Motors Car Corporation Titled M56 Vehicle Family

ANNEX F - Picture of 4.2-Inch Mortar - M56  
Chassis

The M56 as a firing platform for the 4.2-inch mortar.



Source: Kotzebue, Albert L., Maj. Inf., Seeley, Wayne L., Capt Inf, Pye, William T, Lt, Armor, "Tracks for the Infantry," Infantry, pp 5-12, October-December 1958.

ANNEX G - Vehicle Characteristics M-84 4.2-Inch Mortar Carrier

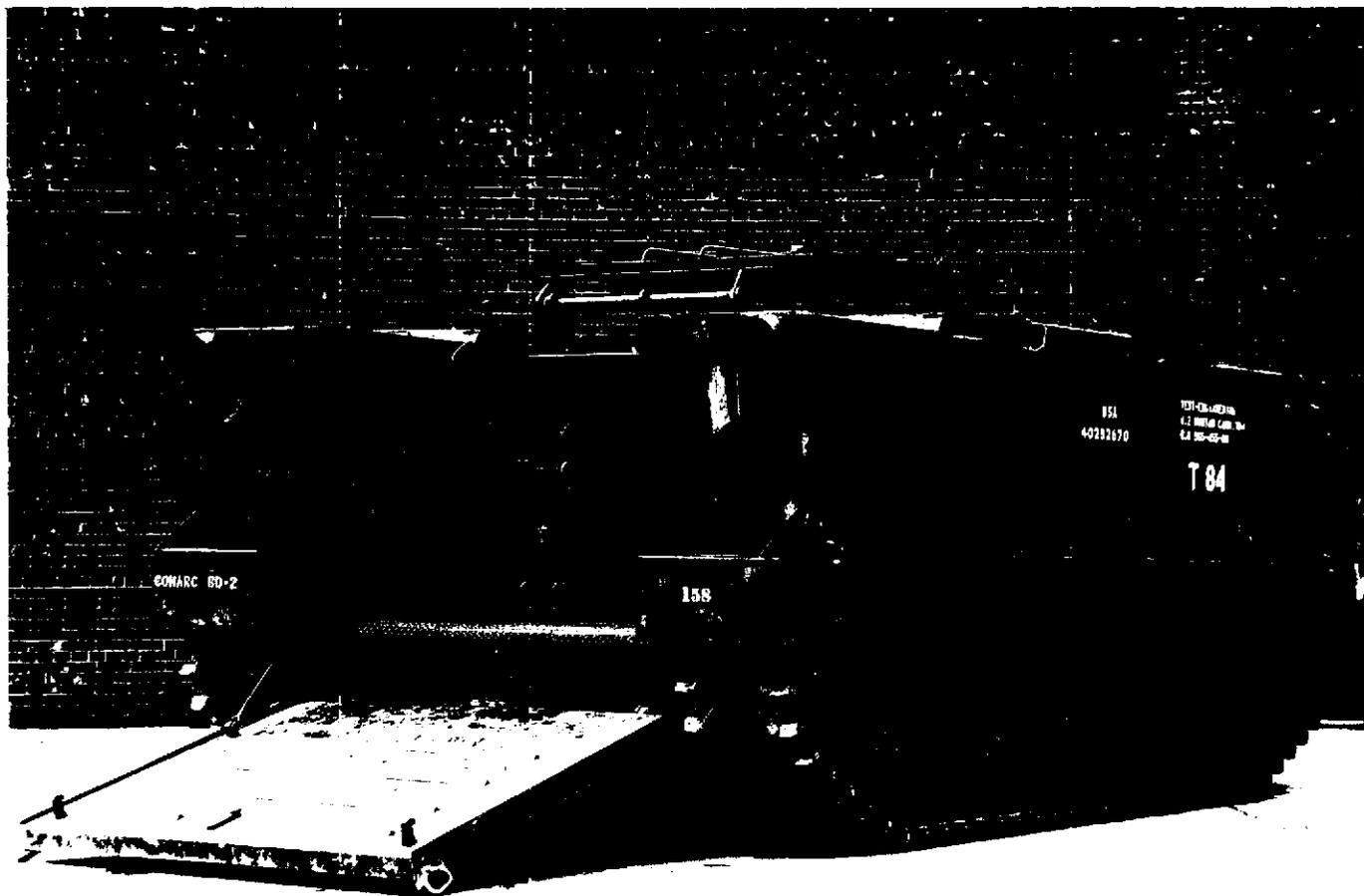
Crew	Suspension System
Six (Including driver and Sq Ldr)	Torsion Bar
Armament	Ground Pressure
1- 4.2-Inch Mortar M30	7.5 PSI
1- Cal 50 Machine Gun	Ground Clearance
	1 1/2 feet
Height	Drive Sprocket
8 feet, 1 1/2 inch	Front
Length	Fuel Capacity
10 feet, 1/12 inch	130 gallons
Width	Performance
10 feet, 8 1/2 inches	Maximum Grade
Weight	60 Percent
Combat loaded: 46,500 pounds	Speed, 33 MPH
Engine	Amphibious
Two GMC M302 (6 cylinder)	Spanning Distance
Transmission	5 1/2 feet
Two GMC Hydramatic w/controlled differential	Vertical Step
Communications	1 1/2 feet
AN/VRC 13	Tentative Ammo Loads
24 Volt Voltage	Mortar 88 rounds
	Cal .50 MG 630 rounds
	3.5 Rockets 10

Characteristics of Mounted Mortar

Elevation 800 to 1100 Mils  
 Traverse 920 Mils  
 Direction of fire Rear

Source: Brochure Produced by Cadillac Division of General Motors Corporation

ANNEX H - Picture of M84 4.2-Inch Mortar Carrier



Source: Plan of Troop Test, Military Characteristics and Data (Fort Knox, Kentucky: Headquarters, The Armor School, Inclosure 2 to 1st Indorsement to Letter, AIBK-SK-F 400.112, 1 November 1956).

ANNEX I - Picture showing air-lift capability  
of M56 by H37 helicopter



The M56 mounting the 106mm rifle can be airlifted by the H37 helicopter.

Source: Kotzebue, Albert L., Maj. Inf., Seeley, Wayne L.,  
Capt Inf, Fye, William T, Lt, Armor, "Tracks for  
The Infantry," Infantry, pp 5-12, October-December  
1958

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