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WAR DEPARTMENT
OFFICE OF THE CHIEF OF ORDNANCE
WASHINGTON

SECRET
O. C. of O.
Bry. Gen.; Ord. Dept.
Rank & Name
Date 9-12-42.

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TO INSURE PROMPT ATTENTION
IN REPLYING REFER TO
o.o. No. 451.25/2759 (5)
ATTENTION OF

September 11, 1942

MEMORANDUM FOR: The Assistant Secretary of War.

Subject: Defects in American Tanks.

1. Reference is made to your memorandum of August 24th, transmitting copy of a cablegram from Moscow telling of the deficiencies noted in our American tanks by the Soviets. In order to indicate comments on this cablegram the following paragraph numbers correspond to the paragraph numbers in the cablegram:

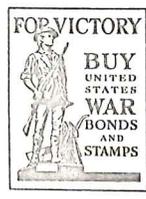
(1) The Ordnance Department, in destroying a number of tanks by gun fire, has not experienced disastrous fires due to the inside rubber linings. The inside rubber, however, has been removed from the tank design because of the critical rubber situation. Gasoline fuel of high quality does not cause the effect of fire to be intensified. In fact, aviation grade fuel specified for the earlier models of tanks has a lower vapor pressure than that of the lower quality fuel now specified.

(2) The fire power of the Medium Tank, M3, was given prime consideration over any of its other characteristics, including that of camouflage. This vehicle, which has greater fire power than any other known tank of equivalent weight, carries its 75 mm. gun, 37 mm. gun, and five cal. .30 machine guns with minimum height and bulk considerations. The Medium Tank, M4, has a lower and more easily camouflaged silhouette. However, this was done at the sacrifice of a very effective weapon--the 37 mm. gun.

(3) The Medium Tank, M3, has one 75 mm. gun, one 37 mm. gun, and five .30 caliber machine guns. The American doctrine of offensive tactics dictated the location

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of weapons. Obviously, all of these cannot be placed on the top of the tank. Hence, some will be masked if the tank is dug into the ground for defensive purposes. In the Medium Tank, M4, the 75 mm. gun will not be masked in hull down position because it is in the turret.

(4) The design of the Medium Tank, M3, never intended direct aimed fire for the bow and machine gun, as the using service concept is that these weapons are to be used for area fire.

(5) The unit ground pressures of our tracks vary from ten to twelve pounds per square inch, depending upon the particular model of M3 or M4 Tank. These figures are considerably below those of most European tanks and have recently been confirmed by Lt. Col. Skinner, the British Army, as ideal for track pressures.

(6) The rubber block track will slip while attempting to negotiate slick grades. For this reason, detachable grousers, which give excellent slope performance, are provided. New steel tracks, now under design made necessary because of the shortage of rubber, will have grousers integral with the shoe. These tracks, however, have a greater damaging effect on roads.

(7) The statement that maintenance difficulties are increased by including gear box and differential in the transmission is contrary to American experience. In our new tanks, we are planning for unit gear trains which will include engine, clutch, transmission, and steering mechanism in an integral unit. In this way, all the working mechanism of the tank can be removed in the field in less than an hour's time.

(8) Our firing tests have demonstrated the need for guards to protect the turret races and these guards are now included in production of the vehicles.

(9) Experience in our army has not revealed that our engines are difficult to start on 15° or 20° slopes. All of our vehicles are tested for operation and functioning of all units on maximum slopes.

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(10) Fires in the air intake tube are common occurrences when proper precautions are not taken in starting or stopping the engines. Overpriming and pumping of the accelerator jet causes raw gas to gather in the air horn, which gas is ignited by backfires. This is an inherent fault of the radial engine which can be minimized only by operating discipline.

(11) Extensive firing tests at Aberdeen Proving Ground, as well as battle experience on the Libyan Desert, have demonstrated conclusively that the open-air intake louvre does not render the motor or any part of the interior mechanism susceptible to damage. Extensive tests at Aberdeen Proving Ground have also shown that the Medium Tank, M3, is exceptionally invulnerable to damage by the so-called "Molotov Cocktail."

(12) New and sturdy electrical switches of the manual reset circuit breaker type are now in production for all tanks.

(13) The Medium Tank, M3, provides exits on both sides, front, top, and turret. No other tank known has as many convenient escape hatches for the crew and arranged in such a manner that, regardless of position of the tank, escape is possible from some protected side. Proving ground tests and battle experience have demonstrated the inadvisability of having doors on the vertical sides of an armored vehicle. Hence, in the majority of our later models of tanks, side doors have been removed and a trap door in the floor substituted therefor.

(14) A number of our generators have become unserviceable, not by overheating, but by the failure of the reverse current cutout in the voltage control box. We have had no difficulty with overheating of generators and are now attempting to find a practical solution to our voltage control box difficulties.

(15) A very thorough study of reticles for all of the major caliber weapons used in tanks has been continuing for over a year. As a result, a new standard type of reticle has been adopted for use in all of our sighting devices which incorporates the best features that we have been able to discover through conference with appropriate

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representatives of all the United Nations and our own Ground Forces. On this new reticle the graduations will still be at 500-yard intervals for the reason that finer graduations have been found to be confusing to the gunner rather than of assistance to him. Experimental work in this country has led to the conclusion that the gunner is able to estimate the intervening ranges better than he can use a more finely divided scale.

(16) The injury to the gunner referred to has not been experienced by our own personnel.

(17) The M48 Shell with the M48 Fuze is the high explosive shell designated for use in the 75 mm. gun. Any shell or fuze of old design must be considered an expedient with ballistics peculiar to the specific shell used.

(18) Armor piercing 75 mm. rounds are of three types--armor piercing, armor piercing capped, and armor piercing capped high explosive. These may be furnished in quantities authorized by higher authority.

(19) The 37 mm. gun in the Medium Tank, M3, is semiautomatic. Because of production difficulties, a few of the early tanks were equipped with the handle-operated breech.

(20) The reticle in the telescope for the 37 mm. gun in the Medium Tank, M3, is marked for ranges and leads and is of a type preferred by our using service for this weapon.

(21) All shell propellants are sensitive to high temperature, and explosions can be expected when tanks are set on fire.

(22) No casualties have been reported from the Libyan theater as the result of flying rivets. Our tanks, however, are now being cast or welded for purposes of greater ballistic strength, better design, and more rapid production with fewer machine tools.

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(23) Every effort is being made to insure that the proper amount of tools are being shipped with Lend-Lease tanks. This in some instances is hard to control due to sinkings and inadequate shipping facilities.

(24) The same comments in paragraph 23 are true for spare parts. Every effort is being made to insure that proper numbers of spare parts are being produced with the tanks.


G. M. Barnes
Brig. Gen., Ord. Dept.
Chief, Technical Division