

RESTRICTED

**TECHNICAL BULLETIN }
No. 758-1 — 1758-1 }**

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MEDIUM TANK, M4A2

Prepared under the direction of the
Chief of Ordnance

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MEDIUM TANK, M4A2**Section I****INTRODUCTION**

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1. PURPOSE AND SCOPE.

TB-758-1 and TB-1758-1 are intended to serve temporarily (pending the publishing of TM 9-758, now in preparation) to give information and guidance to the personnel of the using arms charged with the operation and maintenance of this materiel and for the use of ordnance maintenance personnel.

2. CONTENT AND ARRANGEMENT.

This Technical Bulletin is planned chiefly to cover those units of the tank that differ largely from the corresponding units of tanks already in use, with particular emphasis on the two-cycle water-cooled twin six-cylinder Diesel engines, controls, instruments, and lubrication. Units and accessories of this tank that are common to previous tanks, and therefore covered by existing Technical Manuals, are not detailed herein, but will be covered fully in the forthcoming TM 9-758 and TM 9-1758.

3. REFERENCES.

The appendix at the end of this Technical Bulletin lists all Standard Nomenclature Lists, Technical Manuals, and other publications, applying to the materiel described herein.

4. DESCRIPTION.

a. The medium tank M4A2 is an armored full track-laying vehicle, powered by twin six-cylinder, two-cycle, water-cooled Diesel engines. The two engines are mounted side by side, in a compartment in the rear of the hull, separated from the rest of the tank by a steel bulkhead. The operator steers the tank by means of two levers located in the front end of the hull. The tank has five forward speeds and one reverse. The tank is equipped with radio and an intro-tank telephone system.

b. The turret armor front is 3-in. thick, sides are 2-in. thick, and rear is 2-in. thick. The top of the turret is 1-in. thick. The armor on the sides of the hull is 1½-in. thick and the front slope is 2-in. thick.

c. The turret can be rotated by a hydraulic system or by hand. The turret platform rotates with the turret.

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d. An auxiliary electrical generating system, consisting of a generating set powered by a one-cylinder gasoline engine, charges the batteries when the Diesel engine generators are not operating.

5. TABULATED DATA.

a. General

Weight (approximately).....	60,600 lb
Over-all width.....	8-ft. 7-in.
Ground clearance.....	18 $\frac{5}{8}$ -in.
Tread (center to center of tracks).....	
Height to top turret.....	8 ft. 8 $\frac{3}{4}$ -in.
Over-all length.....	19-ft. 5 $\frac{7}{8}$ -in.

b. Engine. GM Diesel, Series 71, Model 6046, twin six.

Rated horsepower (at drive shaft).....	375
Number of cylinders (each engine).....	6
Weight of engine with accessories.....	4855 lb

c. Armament. NOTE: Some early model M4A2 Medium Tanks were equipped with a 37 mm. gun, and a caliber 30 machine gun in a fixed mount in the bow, in addition to the armament listed here.

1 gun, 75 mm., M3.

1 gun, machine, cal. .30, M1919A4 (combination turret mount).

1 gun, machine, cal. .30, M1919A4 (flexible—ball mount in front plate).

1 gun, machine, cal. .50, M2H.B (flexible—race mount on turret hatch).

1 gun, submachine, cal. .45 Thompson (carried on brackets within tank).

2 mount, tripod, machine gun, M1928A1, cal. .30, M2.

d. Protected vision. Protected vision is provided for the driver and crew by the use of steel shutters (open-and-shut type) at vision slots, and by indirect vision devices called periscopes. There are five periscopes on the M4A2 tank. The periscopes for the assistant driver and the gunner are telescope equipped. The remaining three periscopes are of the plain vision type.

e. Seats. Adjustable, padded, chairtype seats, equipped with safety belts, are provided for driver, assistant driver, and gunner. Round, padded seats, not equipped with safety belts and of the snap down type, are provided for the loader and tank commander.

f. Protective padding. Parts of the interior are padded with sponge rubber, to protect the tank crew from injury.

g. Communication.

(1) Radio.....	{ SCR 245 Sending and receiving Voice 15-25 miles Code 30-45 miles	
(2) Telephone.....		Intra-tank

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MEDIUM TANK, M4A2**h. Armor thickness.**

Hull, Front Slope	2-in.	Bottom	1/2-in.
Rear	1 1/2-in.	Turret: Front	3-in.
Sides	1 1/2-in.	Sides & Rear	2-in.
Top	3/4-in.	Top	1-in.
		Rear	2-in.

i. Turret. Cast armor plate: 360° traverse.

j. Diesel fuel and lubricating oil.

Fuel oil capacity.....150 gallons

Engine lubricating oil capacity (two engines, 8 gal. each) 16 gallons

k. Performance.

Maximum sustained speed on pavement (approx.).....25 mph

Maximum allowable engine speed.....2100 rpm

Engine idling speed..... 350-400 rpm

l. Crew. 5 men.

m. Tracks.

Each track..... 79 shoes

Track shoe width..... 12 1/8-in.

Ground contact..... 3346 sq. in.

Section II

OPERATION INSTRUCTIONS AND CONTROLS

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6. GENERAL INFORMATION ON CONTROLS.

a. Accelerator and hand throttle. A foot accelerator is located at the left of the transmission housing, convenient to the driver's right foot. In conjunction with the pedal, hand-operated throttles (one for each engine) are provided, mounted in a bracket on the front slope in a line above the pedal and within easy reach of the driver's right hand.

b. Steering lever. Two steering levers are mounted on the floor in front of the driver's seat. To steer the vehicle, pull back on the steering lever on the side toward which it is desired to turn. Pulling back either one of the levers slows down the track on that side, while the speed of the other track is correspondingly increased to assist the turning action. In all turns there is power on both tracks at all times.

c. Brakes. (1) **Service brakes.** Pulling back simultaneously on both steering levers slows down or stops the vehicle, depending on the effort applied.

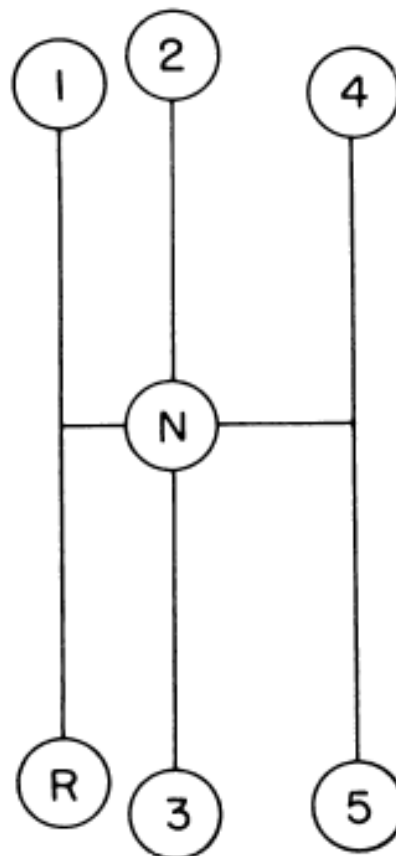
(2) **Parking brake.** The parking brake lever is located on the upper rear end of the transmission housing to the right side of the driver. It is a transmission brake and should never be used for any purpose other than parking.

d. Clutch. The clutch pedal is located along the hull left side, convenient to the driver's left foot. To permit shifting of gears, the clutch is disengaged by depressing the clutch pedal. When the pedal is depressed, the engine runs idle. **CAUTION:** Do not ride the clutch at any time as serious damage will result. The driver must keep his foot off the pedal except when declutching.

e. Gearshifting. Shifting of gears in the transmission for speed changes is accomplished by the gearshift hand lever, located on the transmission, to the right of the driver. The positions of the gearshift lever for the various speeds are shown in the diagram

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MEDIUM TANK, M4A2**RA PD 2712****Figure 1—Gearshift positions**

(Fig. 1). The operation is the same as in automobile gearshifting. The gearshift lever is equipped with a latch which prevents accidental shifting into first speed or reverse. The latch must be released by pressing down the button on top of the lever before shifting into first speed or reverse.

7. PRESTARTING INSPECTION.

Before the engine is started the prestarting inspection outlined in paragraph 15 must be carried out.

8. STARTING INSTRUCTIONS.

a. **Cold weather starting.** When the temperature is below 40 F the following procedure, which utilizes the air heater, should be used. Start one engine at a time.

- (1) Be sure gearshift lever is in neutral.
- (2) Release parking brake.
- (3) Turn on the air heater ignition switch ("B" Fig. 2) on the instrument panel.
- (4) Open the engine throttle to idling position.
- (5) Hold down the clutch pedal.

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(6) Engage the starter while operating air heater pump on instrument panel.

(7) Release the pump plunger by turning the knob counterclockwise, and operate the pump with smooth, even strokes, using a firm pressure of ten pounds or more on the pumping stroke. If the weather is extremely cold, a few additional strokes of the air heater pump, after the engine starts, will be helpful.

(8) When the engine starts, regulate the throttle to reduce engine speed. Push the air heater plunger all the way in and turn clockwise until the spring catch engages.

(9) Turn off the air heater ignition switch.

(10) Follow the same procedure to start the second engine.

b. Starting both engines with one starter. At normal temperatures, both engines may be started with one starter. Also, when only one engine can be started by the procedure outlined in paragraph 8 a, above, the steps outlined below may be followed to start the second engine. (1) Be sure gearshift lever is in neutral.

(2) Release parking brake.

(3) Open the engine throttles to idling position.

(4) Depress the clutch pedal.

(5) Engage the starter, starting one engine.

(6) Adjust the throttle to 800 to 1000 rpm engine speed.

(7) Release the clutch slowly, opening the throttle to maintain the speed of the engine that is running. The engine that is running will then start the second engine. Quickly regulate the throttle of the second engine.

(8) After the engines have started, check all instruments to see that they are functioning and showing the proper readings.

9. ENGINE TEST.

a. As soon as the engine has started, the oil gage should be watched. If the gage does not indicate oil pressure within one-half minute, the engine should be shut down and an investigation made.

b. Warm up the engine by idling at a speed of 800 to 1000 rpm for at least five minutes.

10. OPERATING THE VEHICLE.

a. The driver should be thoroughly familiar with the function and operation of all the controls and instruments before attempting to drive the tank.

b. With the engine warmed up and idling, and all instruments

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showing normal readings, the tank is ready to start. (1) Release the parking brake.

(2) Disengage the clutch by pressing clutch pedal down to the floor and holding it down.

(3) Move the gearshift lever into first gear (Fig. 6).

(4) Gradually release the clutch pedal, at the same time depressing the foot throttle. **CAUTION:** Do not attempt to move the tank in close quarters without the aid of personnel outside the tank serving as a guide.

(5) When the tank has started and is moving at 2 mph, release the foot throttle and depress the clutch again, then move the gearshift lever into the second gear position. Release the clutch and depress the throttle to pick up the load.

(6) The same sequence of operations is repeated for each shift. The tank should be driven in the highest gear that will enable it to proceed at the desired speed without causing the engine to labor. **CAUTION: Do not ride the clutch.** The driver must keep his foot off the clutch pedal while driving, to avoid serious damage to the clutch.

(7) To engage reverse gear, the tank must be at a dead standstill. With the throttle closed to idling speed, depress the clutch pedal, and move the gearshift lever to the reverse position. **CAUTION:** Backing the tank should never be attempted without an observer out front to direct the driver.

(8) To steer, pull back the right-hand steering lever to make a right turn, or the left-hand lever for a left turn. This action slows down the track on the inside of the turn and speeds up the other track, and more power is needed. As the driver anticipates making a turn he must be ready to open the foot throttle to a greater extent, depending on the sharpness of the turn.

(9) To stop the tank release the throttle and pull back equally on both steering levers at the same time, depressing the clutch when the tank has slowed down to two to five miles per hour (depending upon which gear is being used).

(10) The parking brake, located on the transmission housing, should be used only for parking—never while the tank is in motion.

(11) The tachometer, the water temperature gage, and the oil pressure gage give the most satisfactory indications of the engine's performance. Should the indications of any of these instruments appear to be irregular, the engine should be throttled down and the cause investigated. Water temperature should not exceed 190 F.

c. **Use of hand throttles.** (1) On the inside front slope, in line with the driver's right arm and at eye level, is the hand throttle bracket. There are two hand throttle levers, one for each engine. Pushing down on the hand throttle moves the governor link which

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in turn moves the injector control racks toward the full injection position. Pulling up on the hand throttles moves the injector control racks toward the "no fuel" position. When hand throttles have been pulled up as far as they will go, they are in the "no fuel" position and the engines will stop.

(2) In starting push the hand throttles down slowly until the control linkage is felt to seat in the idling position on the governor. Except in an emergency, allow engines to warm up for five minutes by leaving hand throttles in this position.

(3) Between the two hand throttles is a third lever, the throttle lock. By manipulating this lever hand throttles can be locked in any position.

d. Use of clutch lockouts. On the hand throttle bracket, directly above the hand throttle levers, are two nickel buttons of the pull-out type. These pulls control the clutch lockouts, one for each engine. Light wires in flexible housings lead from the pull buttons back to the lockout levers in the clutch pedal linkage. Although the two clutches operate simultaneously when the clutch pedal is operated, the clutch lockouts can be used to lock out either engine. Their purpose is to permit the continued operation of the tank on one engine when the other engine fails. **CAUTION:** Great care must be used in operating the clutch lockouts, as the control wires can easily be pulled out of their connections on the lockout levers. The lockout levers cannot be moved unless the clutch pedal is fully depressed. Before pulling on the lockout cables, push the clutch pedal down as far as it will go.

11. STOPPING THE ENGINE.

To stop the engine, release the foot throttle to idling speed, then throw the hand throttles to the **off** position. When the engine has stopped, shut off the main fuel supply valves.

12. TOWING OR COASTING.

Do not attempt to start the engine by towing or coasting the tank. To do so may cause serious damage to the engine and transmission. To start the engine, use the electric starter.

13. COLD WEATHER OPERATION.

a. In order that the tank may be started and operated with a minimum of difficulty in extremely cold weather, it should be kept in a closed building or shelter whenever possible. Tanks that have been warmed up by operating may be kept warm for a considerable period by covering them with tarpaulins.

b. Under extremely cold conditions it may be necessary, in order to avoid malfunctions, to exercise special precautions in lubricating machine guns and other armament. TM 9-850 gives information covering the proper treatment of such equipment during extremely cold weather.

