TM 9-875B

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

1½-TON 2-WHEEL CARGO TRAILER M104 AND 1½-TON 2-WHEEL WATER TANK TRAILER M106

DEPARTMENT OF THE ARMY • OCTOBER 1951

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TM 9-875B

1½-TON 2-WHEEL CARGO TRAILER M104 AND 1½-TON 2-WHEEL WATER TANK TRAILER M106

DEPARTMENT OF THE ARMY • OCTOBER 1951

United States Government Printing Office
Washington : 1951

This manual is correct to 23 August 1951

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *17 October 1951*

TM 9–875B is published for the information and guidance of all concerned.

[AG 451.3 (8 Oct. 51)]

BY ORDER OF THE SECRETARY OF THE ARMY:

OFFICIAL:
WM. E. BERGIN
Major General, USA
The Adjutant General

J. LAWTON COLLINS
Chief of Staff, United States Army

DISTRIBUTION:
Tech Svc (1); Arm & Svc Bd (2); AFF (2); AA Comd (2); OS Maj Comd (10); Base Comd (2); MDW (3); Log Comd (5); A (20); GHQ (2); D (2); B (1); R (1), 9 (2); Bn (1), 9 (2); C (1), 9 (2); FC (2); Sch (5) except 9 (50); Gen Dep (2); Dep 9 (10); PE (Ord O) (5), OSD (2); PG 9 (10); Ars 9 (10); Dist 9 (10); SPECIAL DISTRIBUTION:
For explanation of distribution formula, see SR 310–90–1.

CONTENTS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual contains instructions for operation and organizational maintenance of the 1½-ton 2-wheel cargo trailer M104 and 1½-ton 2-wheel water tank trailer M106 for the using organization, and instructions for field and depot maintenance for ordnance maintenance personnel.

b. This first edition manual is published in advance of complete technical review. Any errors or omissions will be brought to the attention of the Chief of Ordnance, Washington 25, D. C., ATTN. ORDFM-Pub.

c. The appendix contains a list of current references, including supply catalogs, forms, technical manuals, and other available publications applicable to the matériel.

d. TM 9–1827A contains disassembly, cleaning, inspection, repair, and assembly information on the compressed air reservoir, brake chamber, and brake hoses, tubing, and fittings.

e. TM 9–1827C contains repair and rebuild instructions on brake wheel cylinders and the hydraulic master cylinder.

f. TM 9–1825E contains repair and rebuild instructions on electrical connectors.

g. In this manual, the terms "left" and "right" are used with respect to the driver sitting in the seat of the towing vehicle. The left side is also known as the "road side" while the right side is known as the "curb side."

2. Maintenance Allocation

a. Organizational Maintenance Allocation. In general, the prescribed organizational maintenance responsibilities will apply as reflected in the allocation of tools and supply parts in the appropriate columns of Department of the Army Supply Catalog ORD 7–8 SNL G–754 and in accordance with the extent of disassembly prescribed in

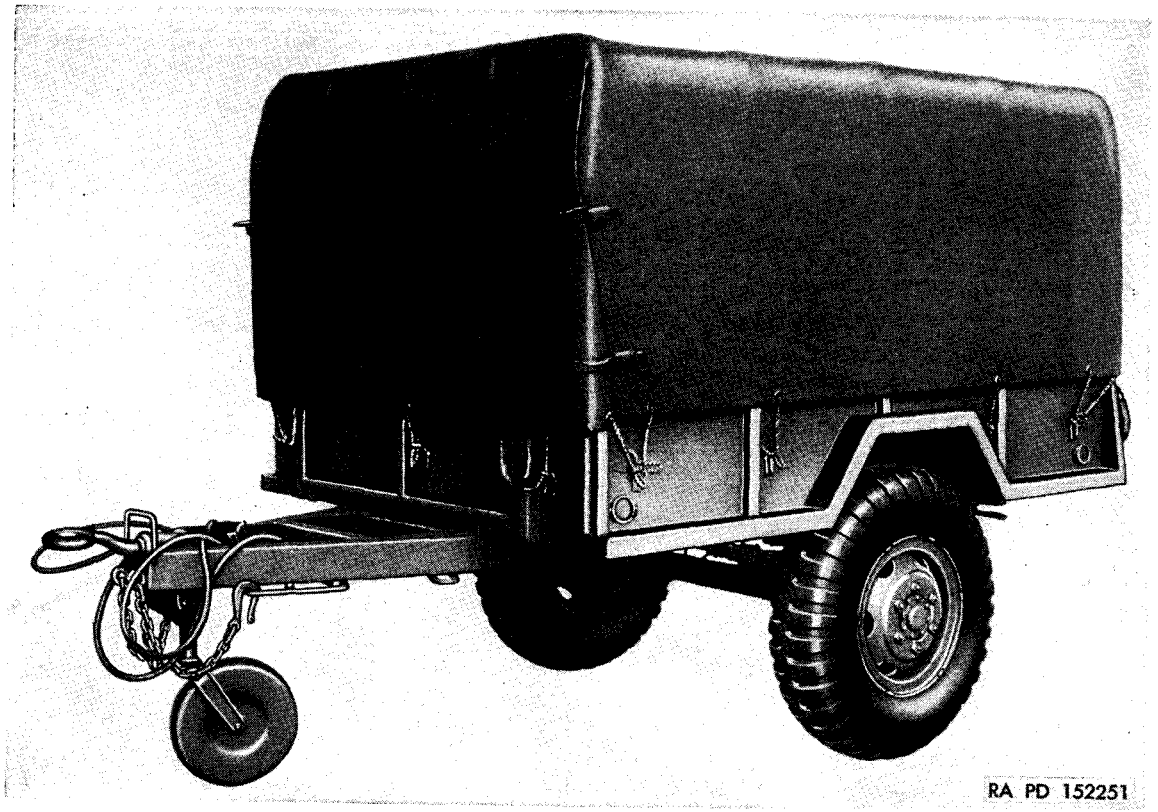


Figure 1. Left-front view of cargo trailer M104.

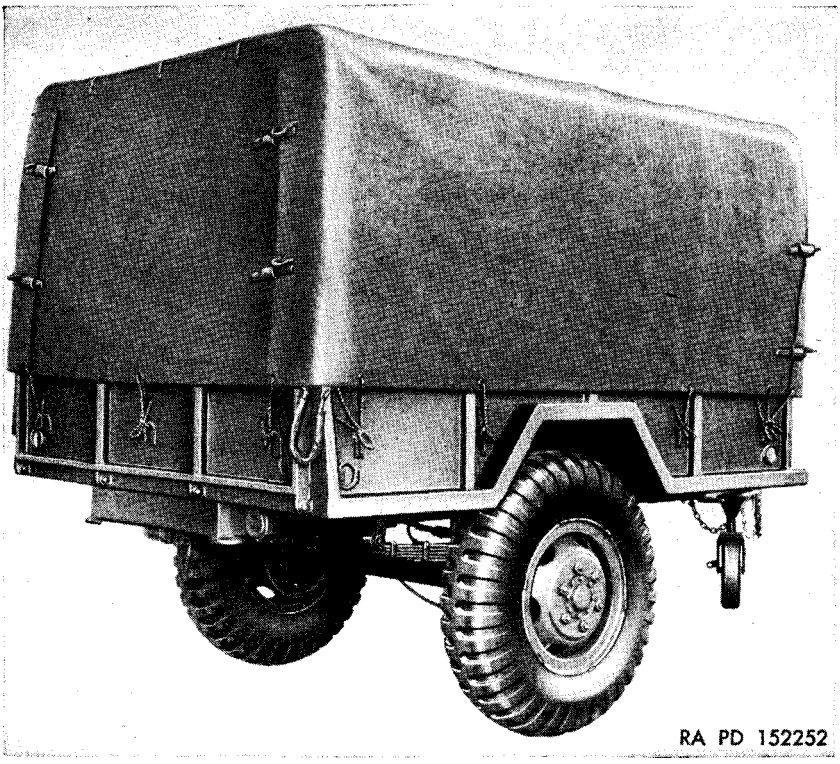


Figure 2. Right-rear view of cargo trailer M104.

this manual for the purpose of cleaning, lubricating, or replacing authorized spare parts. In all cases where the nature of the repair, modification, or adjustment is beyond the scope or facilities of the using organization, the supporting ordnance maintenance unit should be informed in order that trained personnel with suitable tools and equipment may be provided or other proper instructions issued.

b. Field and Depot Maintenance Allocation. The publication herein of instructions for complete disassembly and rebuild is not to be construed as authority for the performance by field maintenance units of those functions which are restricted to depot, shops and arsenals. In general, the prescribed maintenance responsibilities will be reflected in the allocation of maintenance parts listed in the appropriate columns of ORD 7–8 SNL G–754. Instructions for depot maintenance are to be used by maintenance companies in the field only when the tactical situation makes the repair functions imperative. Supply of parts listed in the depot guide column of ORD 8 supply catalogs will be made to field maintenance only when the emergency nature of the maintenance to be performed has been certified by a responsible officer of the requisitioning organization.

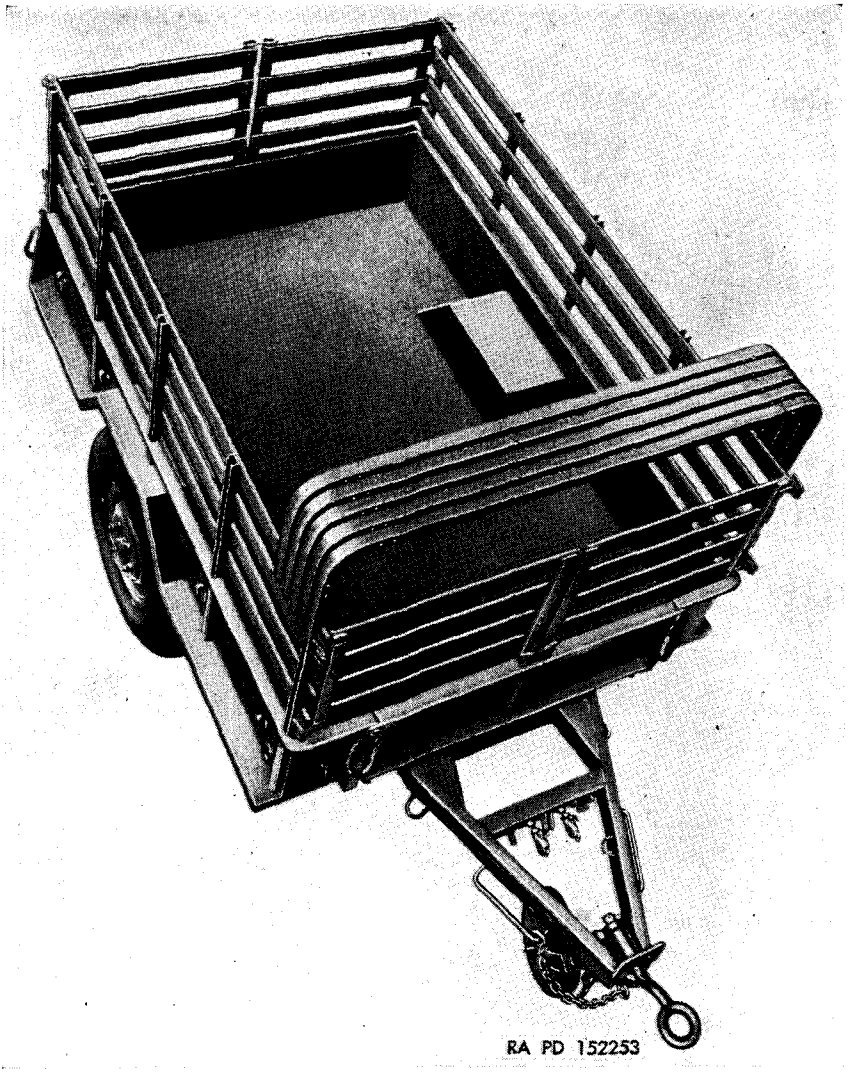


Figure 3. Top view of cargo trailer M104—paulin removed (roof bows in auxiliary stakes).

3. Forms, Records, and Reports

a. GENERAL. Forms, records, and reports are designed to serve necessary and useful purposes. Responsibility for the proper execution of these forms rests upon commanding officers of all units operating and maintaining this equipment. It is emphasized, however, that forms, records, and reports are merely aids. They are not a substitute for thorough practical work, physical inspection, and active supervision.

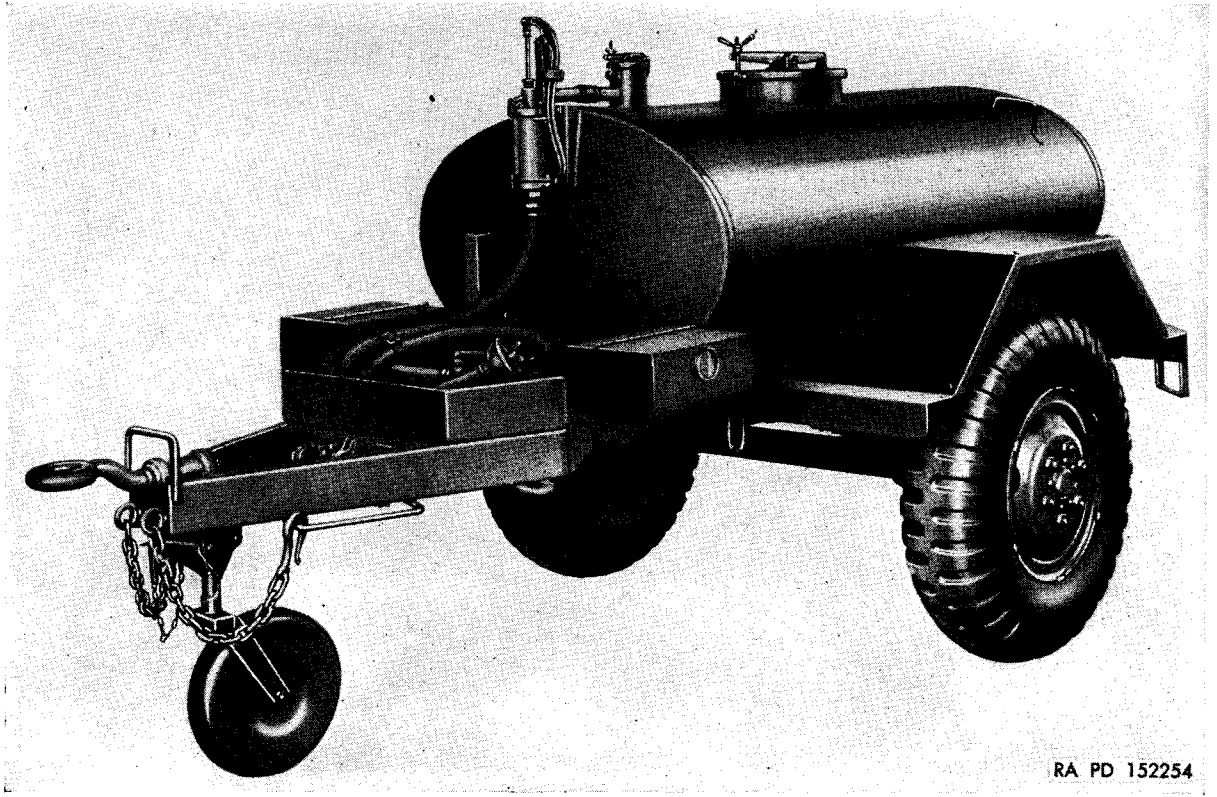


Figure 4. Left-front view of water tank trailer M106.

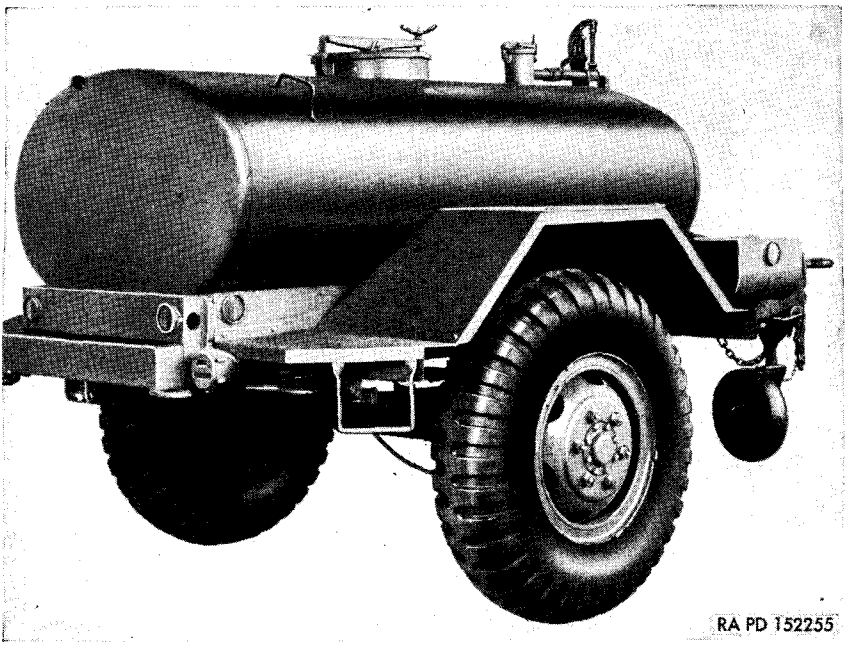


Figure 5. Right-rear view of water tank trailer M106.

b. Authorized Forms. The forms generally applicable to units operating and maintaining these vehicles are listed in the appendix. No forms other than those approved for the Department of the Army will be used. For a current and complete listing of all forms, refer to current SR 310–20–6. For instructions on use of these forms, refer to FM 9–10.

c. Field Report of Accidents. The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in the SR 385–10–40 series of special regulations. These reports are required whenever accidents involving injury to personnel or damage to matériel occur.

d. Report of Unsatisfactory Equipment or Materials. Any suggestion for improvement in design and maintenance of equipment, safety and efficiency of operation, or pertaining to the application of prescribed petroleum fuel, lubricants, and/or preserving materials, will be reported through technical channels, as prescribed in SR 700–45–5, to the Chief of Ordnance, Washington 25, D. C., ATTN: ORDFM, using DA AGO Form 468, Unsatisfactory Equipment Report. Such suggestions are encouraged in order that other organizations may benefit.

Note. Do not report all failures that occur. Report only REPEATED or RECURRENT failures or malfunctions which indicate unsatisfactory design or material. However, reports will always be made in the event that ex-

ceptionally costly equipment is involved. See also SR 700–45–5 and printed instructions on DA AGO Form 468.

Section II. DESCRIPTION AND DATA

4. General

a. The cargo trailer M104 (figs. 1, 2, and 3) and the water tank trailer M106 (figs. 4, 5, and 6) are mounted on identical chassis and

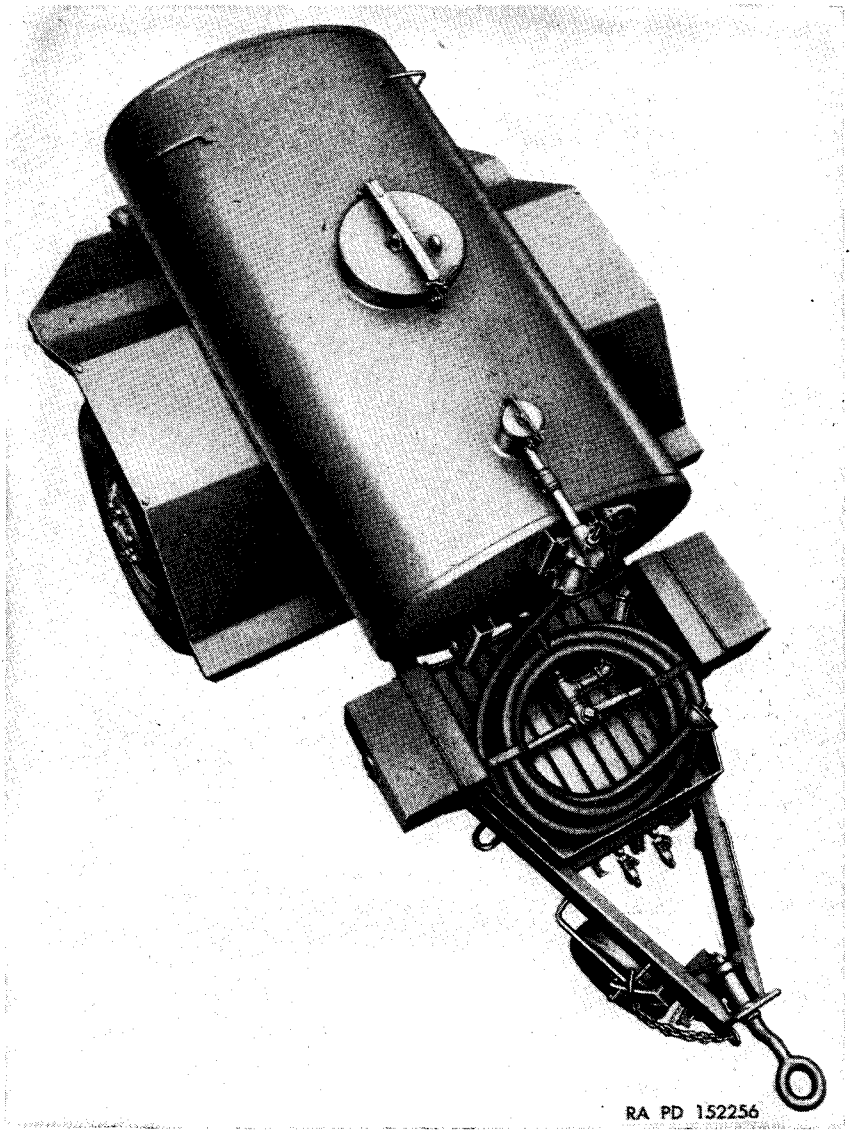


Figure 6. Top view of water tank trailer M106.

are designed to be towed by the 2½-ton 6 x 6 cargo truck M34 or similar vehicle. Tires, wheels, brakes, and springs of these trailers are interchangeable with like components of the cargo truck M34.

b. These trailers have been designed to be towed over prepared roads with loads of 5,500 pounds at speeds as high as 50 mph and to be towed over unimproved roads, trails, and open rolling terrain with loads to 3,000 pounds at speeds as great as 30 mph. Also, they have been designed for fording hard bottom water crossings where the trailer will be completely submerged.

5. 1½-Ton 2-Wheel Cargo Trailer M104

a. The cargo trailer M104 (figs. 1, 2, 3, and 7) has a low-side body of welded sheet metal construction, reinforced by tapered, box-type posts. It has a floor of formed, interlocking sections, resistance-welded together to provide a floor with integral cross members. Wheel housings are welded integral with the body. The body is attached both by bolts and welds to the "A" frame of the chassis.

b. The body is 9 feet, 2 inches long and 6 feet, 2 inches wide with 1 foot, 6-inch sides (inside dimensions). The body has front and rear tail gates. They are hinged at the floor line and are latched in closed position by the hooks of the welded tail gate chain assemblies.

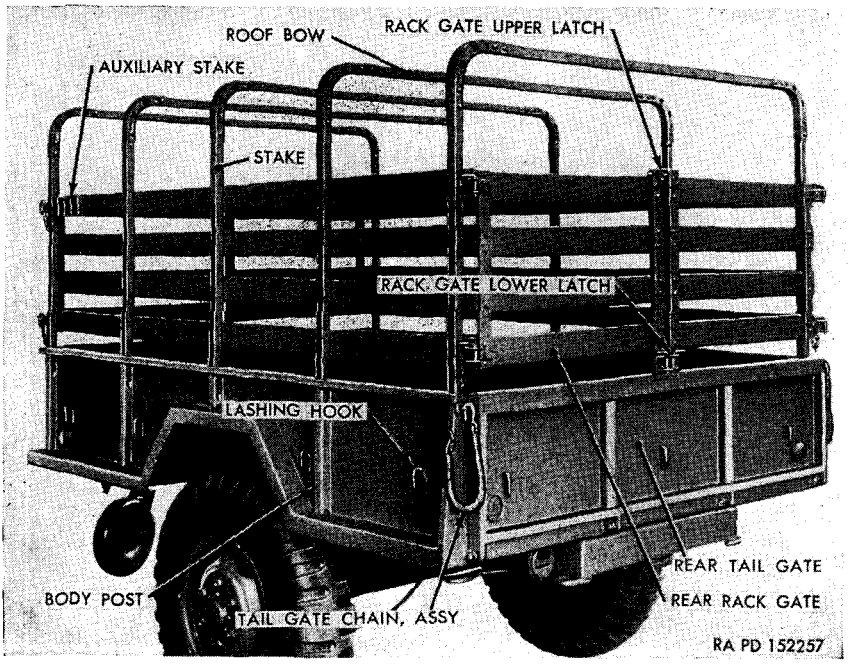


Figure 7. Body of cargo trailer M104.

c. The body is surmounted by 2-foot, 3-inch removable racks at the sides and hinged front and rear rack gates. The racks have hardwood slats and pressed steel stakes, which fit into sockets in the body posts and are secured by bolts. Rack gate hinges permit the gates to be swung 270 degrees and to be latched to the upper side rails by the same latches used to secure the gates in closed position. Rack gates latch together at the top as well as to the tail gates. Latches have non-removable latch pins. The removable hinge pins are secured to rack hinges by welded chains.

d. The side racks are surmounted by removable roof bows (fig. 7). The roof bows support a waterproof paulin which incloses the cargo-carrying portion of the vehicle and which is tied down to lashing hooks welded to the body and tail gates.

e. With paulin in place, the vehicle has an inside height of 5 feet. When greater load height is required, roof bows may be removed and placed in auxiliary stakes at the forward ends of the upper rack slats (fig. 3).

6. 1½-Ton 2-Wheel Water Tank Trailer M106

a. The water tank trailer M106 (figs. 4, 5, 6, and 8) is equipped with a 400-gallon capacity welded aluminum water tank. The body frame of the tank, which is attached by bolts to the **A** frame of the

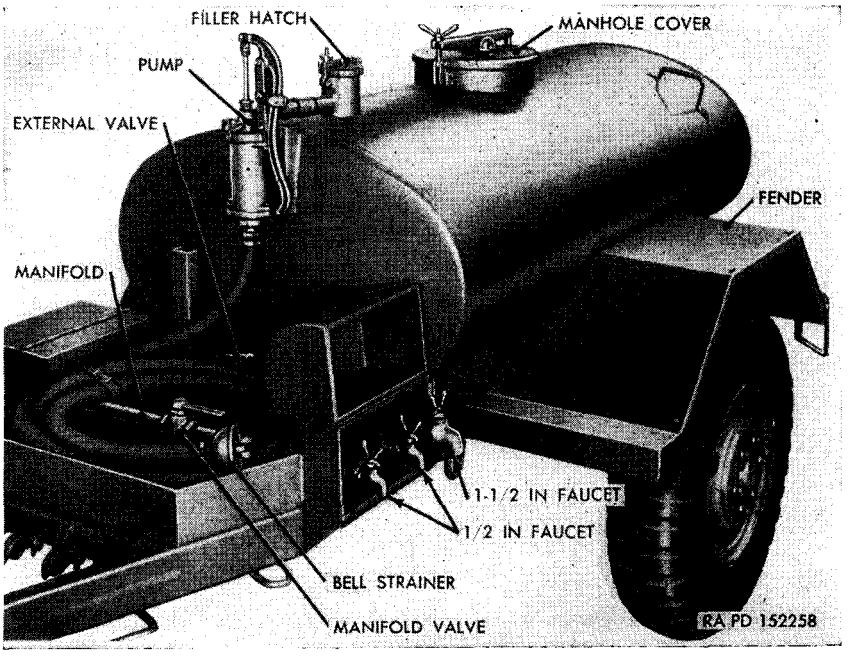


Figure 8. Water tank equipment of water tank trailer M106.

chassis, differs from the frame of the cargo body. It has a slat-floored extension in front of the tank for the piping assembly and the suction hose. The extension is flanked on either side by a welded metal faucet box. Boxes have hinged, spring-latched covers.

b. The tank is equipped as follows:

(1) Manhole with hinged, latching cover (fig. 8). Cover is equipped with vent to equalize pressure inside and outside the tank. Cover may be removed, fitted into, and pinned into a bracket on the front of the tank with the same pin that is used to pivot the cover in its latch on top of the tank.

(2) Filler hatch (fig. 8) with latching cover and removable sleeve strainer for filling the tank from a free-flowing source which can be run into the hatch.

(3) Hand-operated water pump (fig. 8) with 25 feet of suction hose and bell strainer for filling the tank from a source from which the water must be pumped. When not in use, the hose is coiled and held by straps on the extension in front of the tank.

(4) Spring-loaded external valve (fig. 8) with hold-open handle at the bottom of the front of the tank for releasing water into the piping assembly and for shutting off the water before it can reach the piping assembly.

(5) Manifold valve (fig. 8) for controlling the flow of water to the manifold of the piping system.

(6) Manifold of piping system (fig. 8) to two ½-inch faucets on the left side of the trailer and two ½-inch faucets and one 1-inch faucet on the right side and separate piping from the external valve to a 1½-inch faucet on the left side.

(7) Drain plug in the bottom of the tank at the rear for draining the tank while cleaning and flushing (fig. 25).

c. Fenders (fig. 8) are bolted to the tank frame. These fenders have adjustable side extensions which may be removed and bolted in extended position in the event that dual tires are used on this vehicle. The fenders are provided with rear extensions and steps with artificially roughened horizontal surfaces, and the tank is equipped with hand grips for the convenience of the operator in reaching the manhole and filler hatch.

7. Chassis Frame

(fig. 9)

a. The chassis frame consists of pressed steel channel side rails reinforced by seven pressed steel channel cross members and four steel plate gussets, all welded into a single unit.

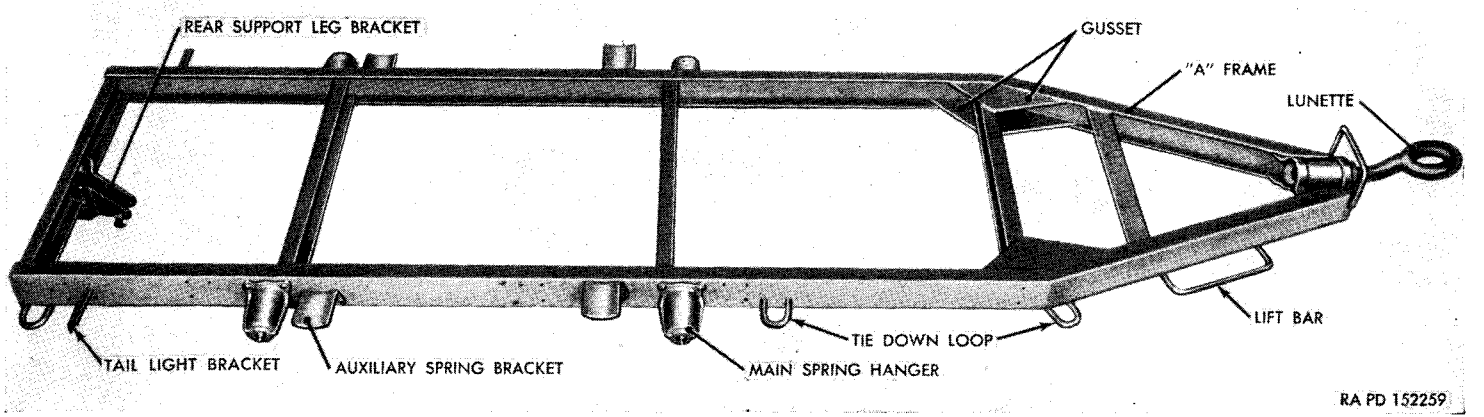


Figure 9. Chassis frame—M104 and M106.

b. Main spring hangers and auxiliary spring brakets are riveted to the side rails. Lift bars, tie-down loops, stops, lugs, cable anchors, and tail lamp, front caster, and rear support leg brackets are welded to the frame. The tapered shank of the lunette is fitted into the bore of the drawbar boss, welded between the two cross members in the nose of the **A** frame, and is held by a washer, lunette nut, and cotter pin.

8. Springs and Axle

a. Main springs, by means of **U** bolts, (fig. 10) connect the tubular axle to the chassis frame. To provide additional spring support for heavy loads and road shocks, the main springs are supplemented by auxiliary springs.

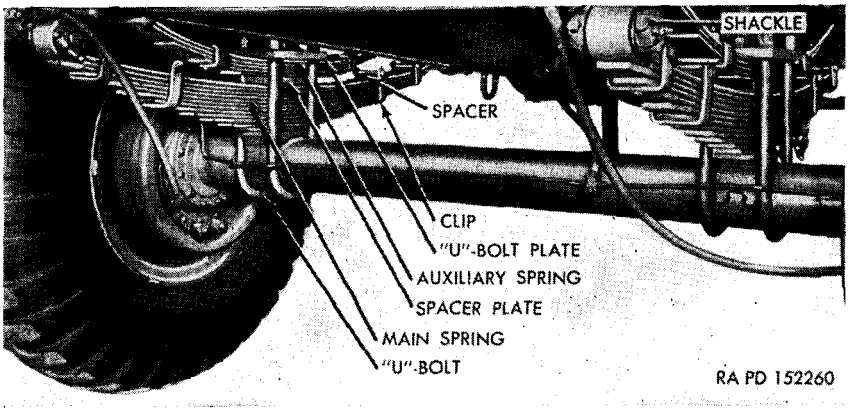


Figure 10. Main springs, auxiliary springs, and axle.

b. Main Springs.

(1) The main springs (fig. 10) are of semi-elliptic type with 12 leaves held together by a center bolt and four clips. The end of the center bolt is deformed over its nut to prevent it from coming loose. Two clips are riveted to the fourth leaf and the seventh leaf. Each clip is closed at the top by a bolt which passes through the clip and a spacer and is held by a nut over which the end of the bolt has been peened.

(2) The ends of the two upper and longest leaves of each spring are wrapped around bronze bearings.

(3) Both ends of each spring are shackled to spring hangers which are riveted to the chassis frame (fig. 9).

(4) The forward end of each spring is held by a shackle pin which fits into bores in the shackle and the bearing in the

double-wrapped end of the spring. The shackle pin is retained by a pinch bolt through the lower, outer end of the hanger.

(5) The rear end of the spring is suspended in a swinging shackle to permit the spring to flex freely. The shackle is supported on a shackle pin in the rear spring hanger. The rear end of the spring is held between the two arms of the shackle by another shackle pin. The upper pin is retained by one cap screw while the lower one is held by two cap screws. The upper bore of the shackle is fitted with a bronze bearing.

(6) All of the shackle pins are identical and are drilled and grooved for pressure lubricating fittings and have cap screw grooves near each end.

c. AUXILIARY SPRINGS.

(1) The auxiliary springs (fig. 10) are of semi-elliptic type with five leaves held together by a center bolt and two clips. The nut of the center bolt is secured by having the end of the bolt peened over it. Clinch type spring clips are riveted to both ends of the fourth leaf.

(2) The auxiliary springs are clamped to the tops of the main springs and the axles by **U** bolts and **U**-bolt plates. When under load, the ends of the auxiliary springs contact cammed surfaces of the auxiliary spring brackets.

d. AXLE.

(1) The tubular axle (fig. 10) has an OD beam size of 4½ inches. The spindles have a nominal inner diameter of 2⅝ inches and a nominal outer diameter of 2 7/16 inches. The axle has welded spring pads on which the springs are mounted, and welded or forged brake adapter collars to which the brake backing plates are riveted or bolted.

Note. Axles of different designs are used on these vehicles. These axles are interchangeable, varying in construction but not in essential measurements.

(2) The main springs rest on the spring pads of the axle with the heads of the center bolts in recesses in the pads. The auxiliary springs are mounted on the main springs with spacer plates separating them (fig. 10). The spacer plates have holes which accommodate the nut on the main spring center bolt and the head of the auxiliary spring center bolt.

(3) A **U** bolt on each side of the stacked-up springs holds them in position. The **U** bolts fit around the axle, up the sides of the springs, and through holes in a **U**-bolt plate on top of the auxiliary spring where the **U** bolts are secured by double nuts. A hole in the **U**-bolt plate accommodates the nut of the auxiliary spring center bolt.

971845° 51——2

9. Service Brakes

a. General. When the braking system of the trailer is properly connected to the service braking system of the towing vehicle, the service brake pedal on the towing vehicle operates the brakes on both vehicles. Trailer parking brakes (par. 10) are operated independently of the service brakes.

b. Type of Service Brakes. Service brakes are of the type known as "air-over-hydraulic." Air pressure is used to operate the hydraulic braking system, applying the brakes with automatically increasing pressure in direct ratio to the pressure applied at the foot pedal of the towing vehicle.

c. Units of the Service Brake System on Trailer (fig. 11). The service braking system on the trailer consists of the relay-emergency valve, brake chamber, master cylinder, hydraulic brake wheel cylinders, air reservoir, service air line, emergency air line, air filters, and the brake mechanisms inside the brake drums which actually apply the brake linings to the drums.

d. Compressed Air Supply on Towing Vehicle. To produce and maintain a constant supply of compressed air to operate and actuate the hydraulic braking system, the towing vehicle is equipped with: an *air compressor* driven by the power plant of the towing vehicle; *reservoirs* which store a supply of compressed air; a *governor* for controlling the compression of air; an air *gage* for showing the pressure of air in the system; a *safety valve* to insure against excessive pressure; and *air lines*, *air hose couplings*, *air hoses* and *shut-off cocks* to convey compressed air to the service brake control system on the trailer.

Note. Although these units are located on the towing vehicle, all must operate effectively to assure proper performance of the trailer service brakes.

e. Operation of Service Brakes (fig. 11).

(1) *Filling trailer air reservoir.* When the brake air hoses are connected between the towing vehicle and the trailer and the air shut-off cocks on the towing vehicle are opened, air flows through the EMERGENCY air line, air filter, and relay-emergency valve to fill the air reservoir on the trailer. Air pressure is built up to equal the pressure in the towing vehicle's system.

(2) *Applying trailer service brakes.* When pressure is applied to the brake pedal of the towing vehicle, air pressure is directed through the SERVICE air line to the relay-emergency valve. This valve releases compressed air from a reservoir on the trailer to a brake chamber attached to a hydraulic master cylinder. The action of the air chamber causes the master cylinder to develop hydraulic pressure which

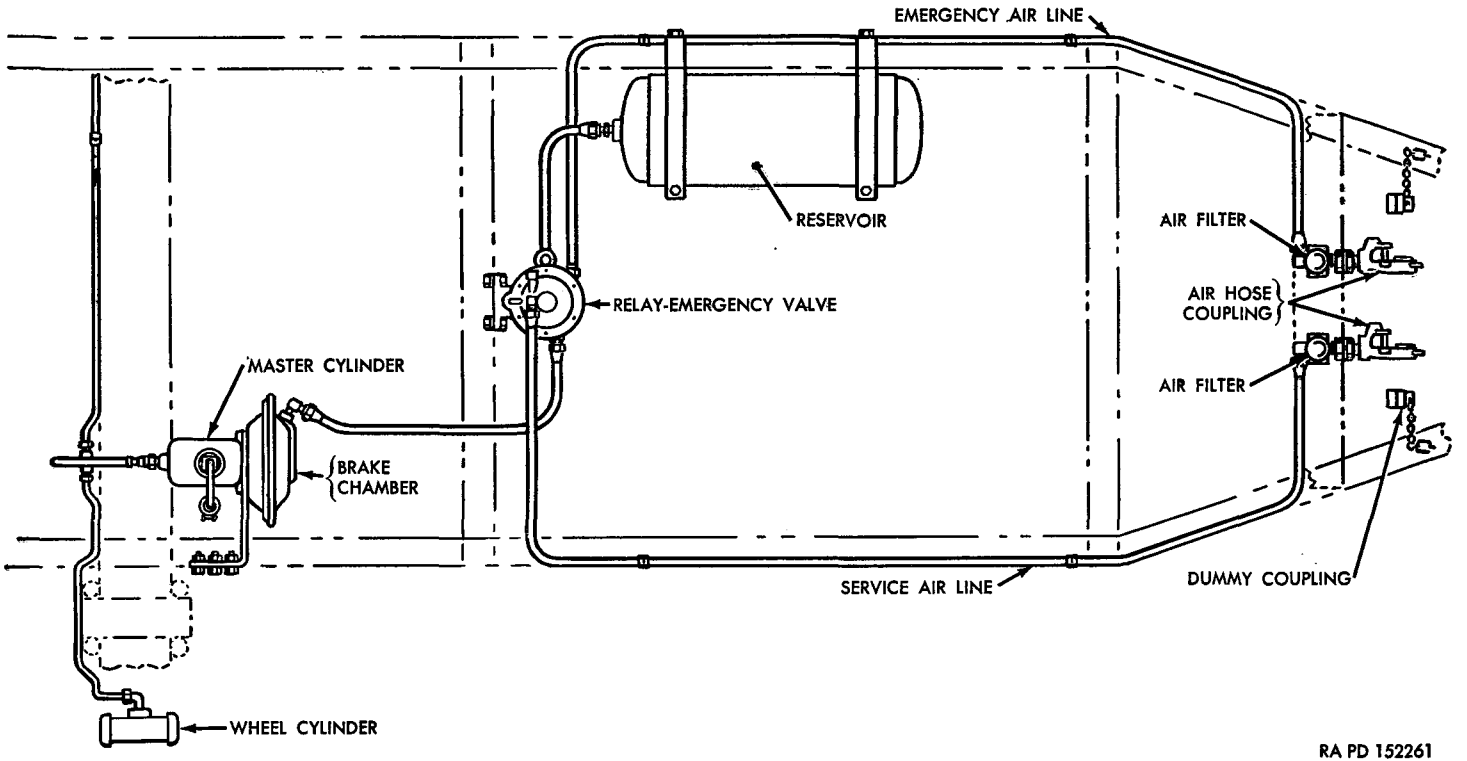


Figure 11. Schematic diagram of braking system on trailer.

moves pistons in wheel cylinders in the wheel brake mechanisms. These pistons force brake shoes against the brake drums.

(3) *Releasing trailer brakes.* When the brake pedal on the towing vehicle is released, a drop in pressure in the SERVICE air line causes the relay-emergency valve to release the compressed air from the trailer braking system and springs pull the brake shoes away from the drums to release the brakes. The extent of brake release, like the amount of brake application, is in direct proportion to the pedal movement on the towing vehicle.

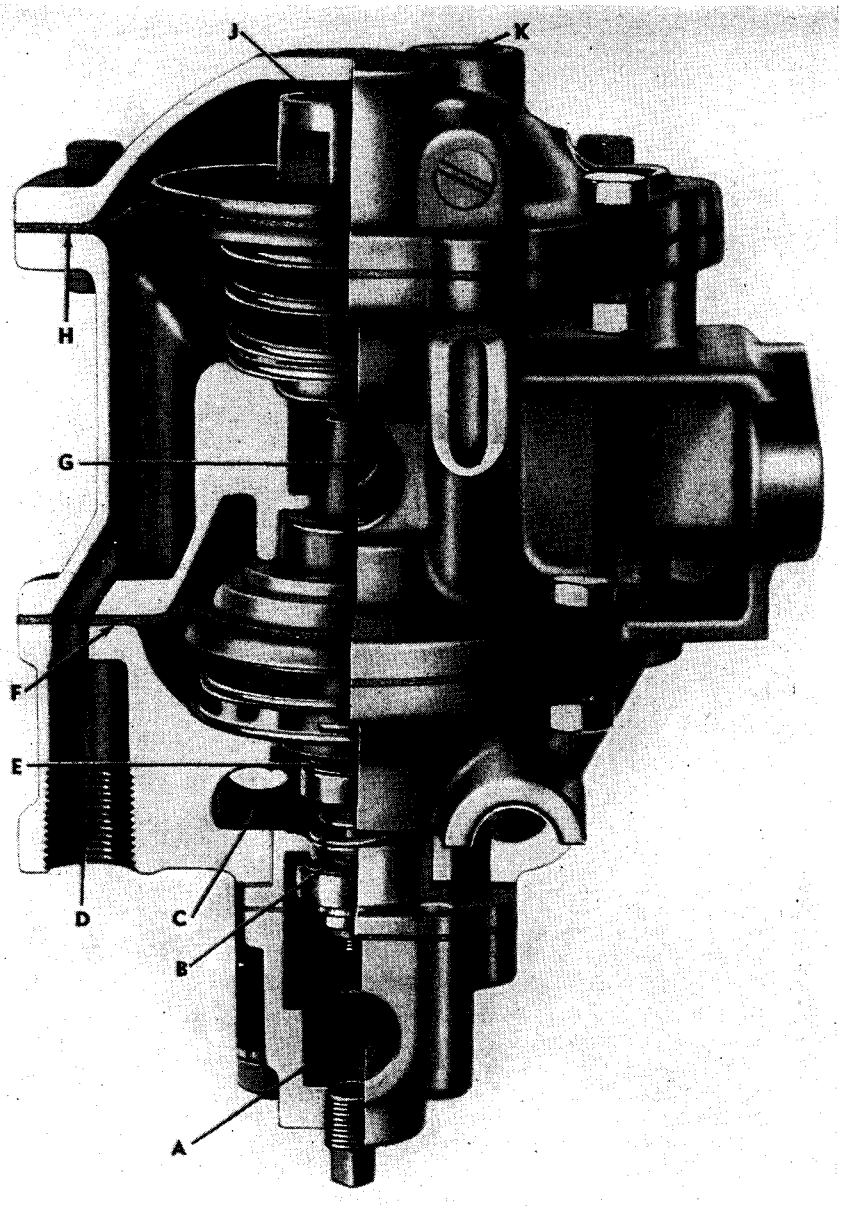
f. Relay-emergency valve (figs. 11 and 12). The relay-emergency valve directly controls the service brakes on the trailer. It speeds brake action by releasing air from the reservoir on the trailer directly to the brake chamber, eliminating the loss of time that would result if sufficient air to operate the brakes had to travel from a reservoir on the towing vehicle to the trailer brake chamber. In addition, this valve controls the flow of air to and from the trailer reservoir and it automatically applies the brakes in the event that the trailer breaks away from the towing vehicle or there is a serious leak in the emergency air line.

(1) The relay-emergency valve is actuated by changes in air pressure in the service air line. These changes in air pressure are in direct proportion to the pressure applied to the brake pedal of the towing vehicle.

(2) The relay-emergency valve (fig. 12) has a sectional body separated by an upper and a lower diaphragm and connected by three internal valves and a number of air passages. Provisions are made for connections to the emergency air line, the service air line, reservoir, and brake chamber, and to exhaust compressed air that has been used.

(3) To provide a service brake application, air entering the service line port on the top of the valve (fig. 12) flows down through a passage to the cavity at the top of the lower diaphragm. Air pressure acting upon the lower diaphragm causes the diaphragm and plunger assembly to move downward, closing the exhaust valve and opening the inlet valve, allowing air to flow from the reservoir to the brake chamber. A small port permits air to reach the underside of the diaphragm to equalize the pressure on it and to hold the brake application in direct relation to the pressure applied on the brake pedal.

(5) Lowering the air pressure in the service line, due to release of the brake pedal on the towing vehicle, causes the spring



A—TO AND FROM RESERVOIR
B—INLET VALVE
C—TO BRAKE CHAMBER
D—EMERGENCY LINE PORT
E—EXHAUST VALVE
F—LOWER DIAPHRAGM
G—EXHAUST PORT
H—UPPER DIAPHRAGM
J—EMERGENCY CHECK VALVE
K—SERVICE LINE PORT

RA PD 152264

Figure 12. Cutaway view of relay-emergency valve.

and air pressure beneath the lower diaphragm of the relay-emergency valve to lift the diaphragm and exhaust valve plunger, closing the inlet valve and opening the exhaust valve. This permits the air in the air chamber to rush through the open exhaust valve, up through the hollow exhaust valve plunger and out the exhaust port. Whether all the air is released or to what extent the brakes are reapplied is determined by how much and in which direction the brake pedal on the towing vehicle is operated.

(6) To fill the air reservoir on the trailer, air from the towing vehicle flows through the emergency line port near the bottom of the relay-emergency valve (fig. 12), up a passage on one side of the valve, through the normally open emergency check valve in the upper portion, down another passage on the other side of the valve to a cavity at the bottom, and out through a tube to the reservoir.

(7) This round-about passage of the air provides a means for operating the emergency feature of the valve. If anything should cause a drop of pressure in the emergency line, such as the trailer breaking away from the towing vehicle, the emergency air hose being detached, or a serious leak developing in the emergency line, air attempts to force its way out the same way it got in. In doing so it closes the emergency check valve at the top of the unit and applies pressure to the top of the upper diaphragm. All diaphragms, connecting linkage, and valves are pressed downwardly, closing the exhaust valve, opening the inlet valve, and releasing air from the reservoir to the brake chamber to set the brakes.

(8) The brakes may be released after an emergency application by hooking up the emergency air hose and letting the air flowing to the reservoir lift the upper diaphragm of the relay-emergency valve, open the exhaust valve, and relieve the air pressure, or by opening the drain cock on the trailer air reservoir, relieving the air pressure.

(9) The relay-emergency valves on these trailers have a special feature which relieves the pressure automatically within several hours if the brakes have been set by an emergency application. The emergency valve in these units seats on a porous plug which contains such minute air passages that they do not affect the normal operation of the valve yet these air passages release the pressure if the brakes are set for a period of hours. This provision has been made to protect the rubber parts of the system from the damaging effects of prolonged high pressure.

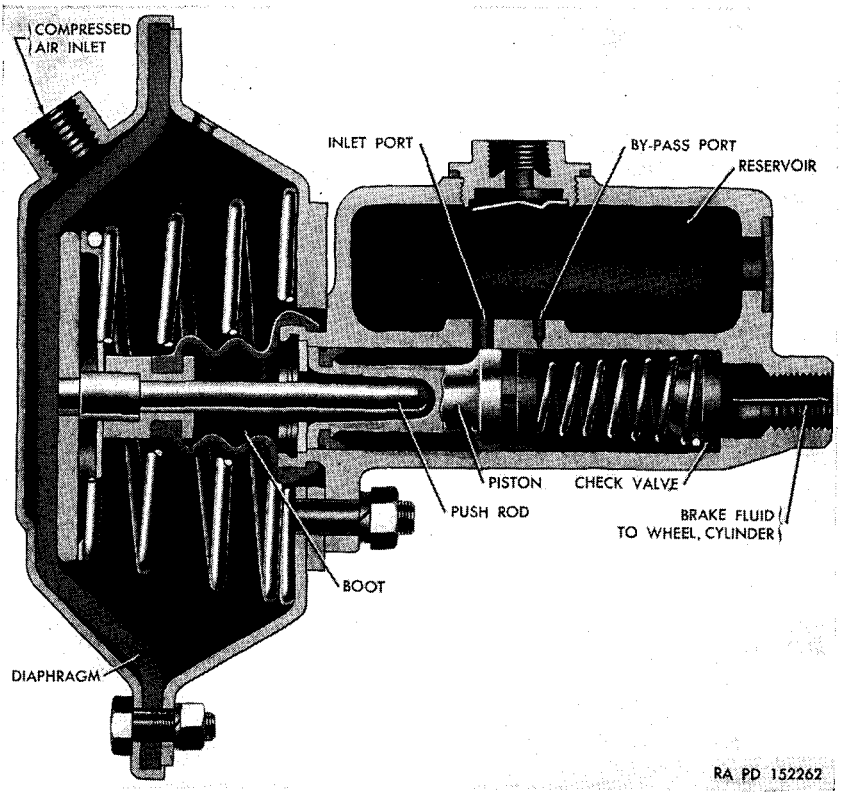


Figure 13. Cutaway of brake air chamber and hydraulic master cylinder.

g. Brake Air Chamber. The brake air chamber (figs. 11 and 13) converts air pressure into mechanical motion to operate the hydraulic master cylinder.

(1) The brake chamber consists of two dished plates between the edges of which a diaphragm of rubberized fabric is secured by the same screws and nuts which hold the plates together. The diaphragm is airtight and divides the chamber into a non-pressure and a pressure side. The diaphragm responds to slight variations of pressure. The pressure side of the chamber has no opening except for a threaded inlet for a tube to admit compressed air. The non-pressure side is open to the atmosphere through breather and inspection holes.

(2) A spring in the non-pressure side of the chamber holds a push-rod plate against the diaphragm and forces both the plate and the diaphragm into the pressure side of the chamber when the device is in released position. A brake push

rod is mounted at the center of and at right angles to the push rod plate. One end of the push rod protrudes from the non-pressure side of the chamber.

(3) When compressed air is admitted into the pressure side of the brake chamber, the diaphragm and push rod plate are forced into the non-pressure side and the push rod is forced outwardly to perform its work. When the pressure is relieved, the spring returns the rod and plate to released position.

h. Hydraulic Master Cylinder. The master cylinder (figs. 11 and 13) is mounted with the brake chamber on a bracket fastened to the inside of the right chassis side rail over the trailer axle. The master cylinder converts movement of the brake chamber push rod into hydraulic pressure with which to apply the brakes. The push rod of the brake chamber directly contacts a piston inside the master cylinder. This piston is displaced by pressure from the push rod to create hydraulic pressure in proportion to the pressure applied by the push rod. A rubber boot protects the push rod and piston-end of the master cylinder from exposure to foreign matter.

(1) The body of the master cylinder is divided in two. The upper portion serves as a reservoir for brake fluid. The lower portion is a horizontal cylinder. The reservoir has a filler opening and plug at the top. An inlet port and a by-pass port connect the reservoir and cylinder.

(2) The cylinder bore is fitted with a metal piston with a rubber primary cup at its head, a piston return spring, and a double check valve. The piston end of the cylinder is sealed with a secondary cup to prevent fluid from leaking out; the other end has a threaded opening through which fluid passes to and from the wheel brake cylinders.

(3) When the brake chamber push rod presses against the master cylinder piston, the piston moves toward the threaded-opening end. A very slight movement causes the piston and cup to close the by-pass port. Then, the pressure stroke starts and fluid is forced through the inner part of the check valve and out through the threaded opening into lines and wheel cylinders.

(4) When push rod pressure is released, the return spring pushes the piston back toward its former position. Liquid returns to the master cylinder from the wheel cylinders and lines by lifting the check valve from its seat. Any lack of liquid in the master cylinder is made up by liquid which flows from the reservoir through the inlet port and the by-pass port.

(5) With the piston in released position, the primary cup is held against the piston and the by-pass port should be open. This prevents pressure from building up due to expansion of the fluid or permits additional fluid to enter the cylinder to make up for loss or contraction. Brake chamber push rod travel must be kept within definite limits to prevent blocking of the by-pass port.

(6) The reservoir of the master cylinder is fitted with a device that permits it to breathe without admitting water when the vehicle is submerged. This is a gooseneck tube to which a length of hose is affixed.

i. Hydraulic Brake Wheel Cylinders (figs. 11 and 14). The hydraulic brake wheel cylinders are mounted on the brake backing plates between the upper ends of the brake shoes inside the brake drums. A wheel cylinder actuates the shoes in each wheel brake, pressing them outwardly to force the brake linings against the brake drums. Brake cylinders have metal cylinder covers.

(1) The wheel cylinders have open ends and are fitted with opposed pistons and rubber cups. The cups act as seals to prevent loss of fluid. A spring between the cups holds them against the heads of the pistons. A rubber boot, snapped

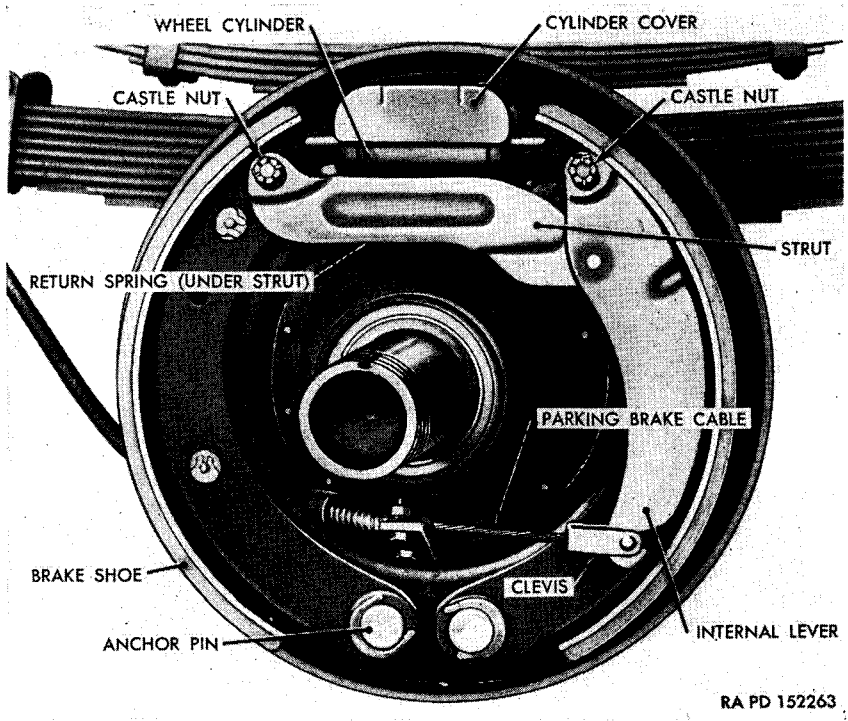


Figure 14. Wheel brake mechanism.

over each end of the wheel cylinder, protects the piston from foreign matter and serves as a guide for the connecting link which bears on the end of the brake shoe.

(2) Fluid enters the wheel cylinder between the opposed pistons and causes them to move outwardly and push their connecting links against the ends of the brake shoes to bring them in contact with the brake drum. Fluid enters the cylinder from the back through an adjustable hydraulic tee. The back of the cylinder is also fitted with a bleeder screw to permit air to be "bled" from the system (par. 55).

j. Trailer Air Reservoir. The reservoir (fig. 11) is a metal tank fastened t othe inside of the left chassis side rail by strap-like brace-fastened to the inside of the left chassis side rail by strap-like brackets. It is connected by a tube to the relay-emergency valve. It provides a supply of air on the trailer for applying the trailer service brakes. It is enquipped with a drain cock for draining accumulations of moisture and for releasing air pressure in the trailer brake system in the event of locked brakes.

k. Service Air Line. The service air line on the trailer (fig. 11) extends from the air hose coupling (tagged SERVICE) on the right side of the **A** frame cross member, along the inside of the right side rail to an elbow in the top of the relay-emergency valve. Its sole purpose is to transmit changes in air pressure which cause this valve to function. The changes in pressure result from the pedal on the towing vehicle being depressed and the changes are dictated by the extent to which the pedal is depressed and released.

l. Emergency Air Line. The emergency air line on the trailer (fig. 11) extends from its air hose coupling (tagged EMERGENCY), along the inside of the left side rail to a threaded opening in the lower left front of the relay-emergency valve. It transmits compressed air to fill the trailer air reservoir and to maintain the proper air pressure under the control of the relay-emergency valve.

m. Air Filters. Air filters (fig. 11) are connected into the service and emergency air lines directly in back of the service and emergency air hose couplings. Their purpose is to remove any moisture or foreign matter from the air passing through them and to keep it from entering the system. The filters are fitted with removable filter elements, held in place by spring seats and springs. The element is removed by unscrewing the base. The base is fitted with a plug for the drainage of moisture.

n. Service Brake Mechanisms. (fig 14). The wheel brake mechanisms are located within the brake drums and are supported by the brake backing plates. Each brake mechanism has two brake shoes,

the outer surfaces of which are fitted with brake lining. Each shoe is anchored at the bottom on an eccentric anchor pin on which it pivots. Guide pins act as supports for the shoes and help to keep them from chattering or weaving off-center. A hydraulic brake wheel cylinder is mounted between the upper ends of the two shoes. It forces the shoes outwardly to apply the brake linings to the drum.

(1) A return spring, hooked in holes near the upper ends of the brake shoes, draws the shoes away from the drum when they are not being forced outwardly and holds them in contracted or released position.

(2) When the shoes are in released position, cammed surfaces near their upper ends bear upon adjusting cams. These cams, which are held by springs to the outer ends of bolts mounted in the backing plates, are used to perform the minor brake adjustment (par. 54*b*). The springs on the bolts are intended to keep the adjusting cams locked in any position in which they may be set.

(3) The eccentric anchor pins (fig. 14) at the lower ends of the brake shoes are used to relate the brake shoe arc to the contour of the drum and are employed in the major brake adjustment (par. 54*c*).

Note: Either "hairpin" or "C" washer fasteners may be used to secure brake shoes to the guide pins.

10. Parking Brakes

a. General. The parking brakes are actuated mechanically by hand levers (fig. 18) located under and outside the chassis frame in back of the wheels. A cable attached to each of these levers operates a lever-and-strut arrangement (fig. 14) in the wheel brake mechanism to cause the brake shoes to be forced into contact with the brake drum. The same springs employed in service brake operation to draw the shoes away from the drums perform the same operation when the parking brakes are released.

b. Parking Brake Levers. Each parking brake lever (fig. 38) is fitted with a spring-loaded, pivoted latch, which when depressed into the grip of the lever, trips a pawl on a toothed sector. This permits the lever to be moved and set at any position on the sector.

c. Cable and Conduit Assembly. A cable and conduit assembly connects each hand brake lever with its lever-and-strut arrangement in the wheel brake mechanism (fig. 14). The cable is protected by spring-type conduit, which is clamped to the chassis frame and which passes through the brake backing plate and is secured by a bracket over the anchor pins.

d. INTERNAL LEVER AND STRUT (fig. 14). The internal lever and strut is the mechanism by which the parking brake lever and the cable and conduit assembly apply the brake shoes to the brake drum. A clevis on the cable is hooked over the lower end of the internal lever. The internal lever is bolted to the top of the forward brake shoe. One end of the strut is bolted to the top of the rear brake shoe and the other end pivots on an integral pin in back of and near the top of the integral lever.

e. FUNCTIONING OF PARKING BRAKE MECHANISM. When the cable is pulled by the parking brake lever, the internal lever and strut force the brake shoes outwardly into contact with the brake drum.

Note. The bracket that secures the end of the cable and conduit assembly to the backing plate may be either bolted or riveted to the backing plate.

11. Hubs and Brake Drums

a. The brake drums (fig. 15) and wheels are mounted on the hubs. The brake drum is attached to the rear of the hub through a dished brake drum adapter. The adapter is secured to the hub by eight cap screws and lock washers and to the drum by 10 bolts and lock nuts. These bolts also secure the oil slinger and one of them retains the inspection hole cover.

b. The oil slinger is a metal plate with a flanged hole in the center which protects the brake linings from lubricant. The inspection hole permits the brake lining clearance to be checked. A hub cap and gasket, fastened by eight cap screws over the center of the hub, excludes moisture and foreign matter.

c. The wheels are bolted to a collar on the outer end of the hub with six wheel stud nuts. Nuts for the right wheel (marked R) have right-hand threads and those for the left wheel (marked L) have left-hand threads. Nuts must be turned in the opposite direction to the normal forward rotation of the wheel to be loosened or removed.

Note. Because of the difference in the threads on studs and nuts, right and left hubs are not interchangeable unless studs are removed and proper ones for the side on which wheel is to be used are substituted.

d. The weight of the trailer and load is carried on two opposed, tapered roller bearings in each hub. The bearing cups are a press fit in the hubs. The cones and rollers are removable for cleaning and lubrication. The bearings are adjusted and the hub is held on the spindle of the axle by an adjusting nut, an identical jam nut, and the bent-over edge of a keyed, flat metal ring called the wheel nut lock. A grease seal is fitted on the spindle, back of the inner bearing, to protect the brake linings from lubricant.

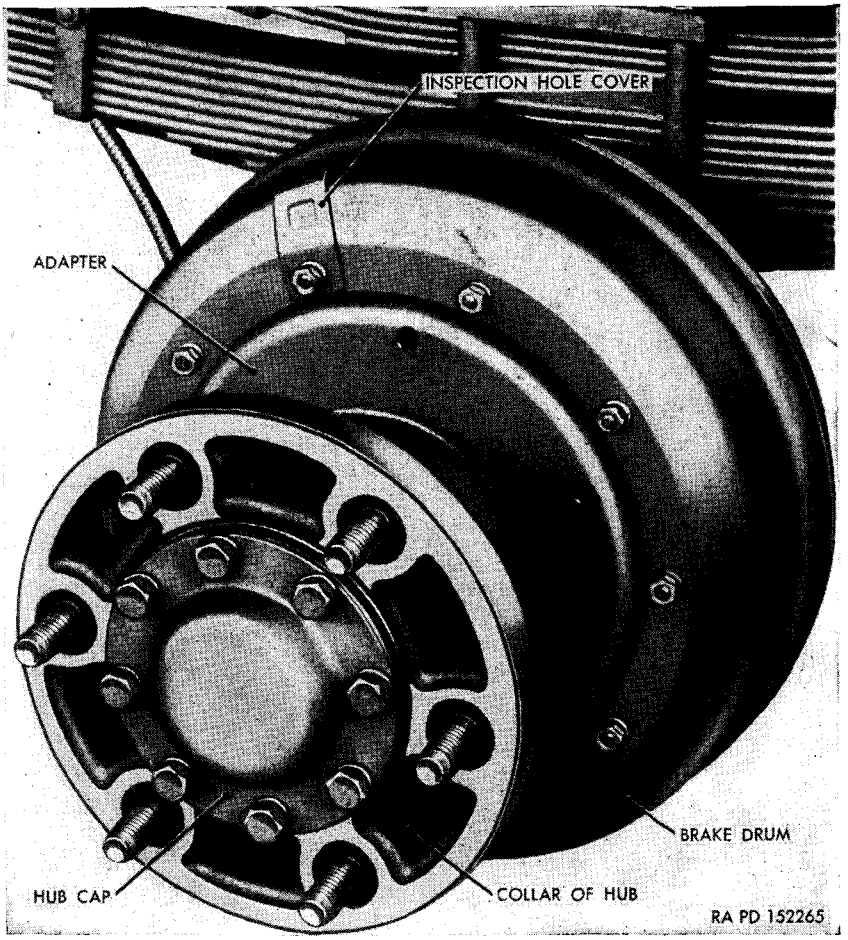


Figure 15. Hub and brake drum.

12. Wheels and Tires

a. Wheels. Offset, disk-type wheels (fig. 16) are bolted to the hubs (par. 11*c*). Wheels have removable, split lock rings to secure the tires to the rims.

b. Tires. Tires are of military-pneumatic type, of mud and snow tread (non-directional) design, size 11.00 x 20, 12-ply rating with controlled bead. Tires are equipped with tubes and continuous flaps. Six bead clips are spaced equally on each side of each tire. Tires should be inflated as follows:

(1) Highway driving ..... 50 psi
(2) Cross-country driving ..... 35 psi
(3) Sand driving ..... 15 psi

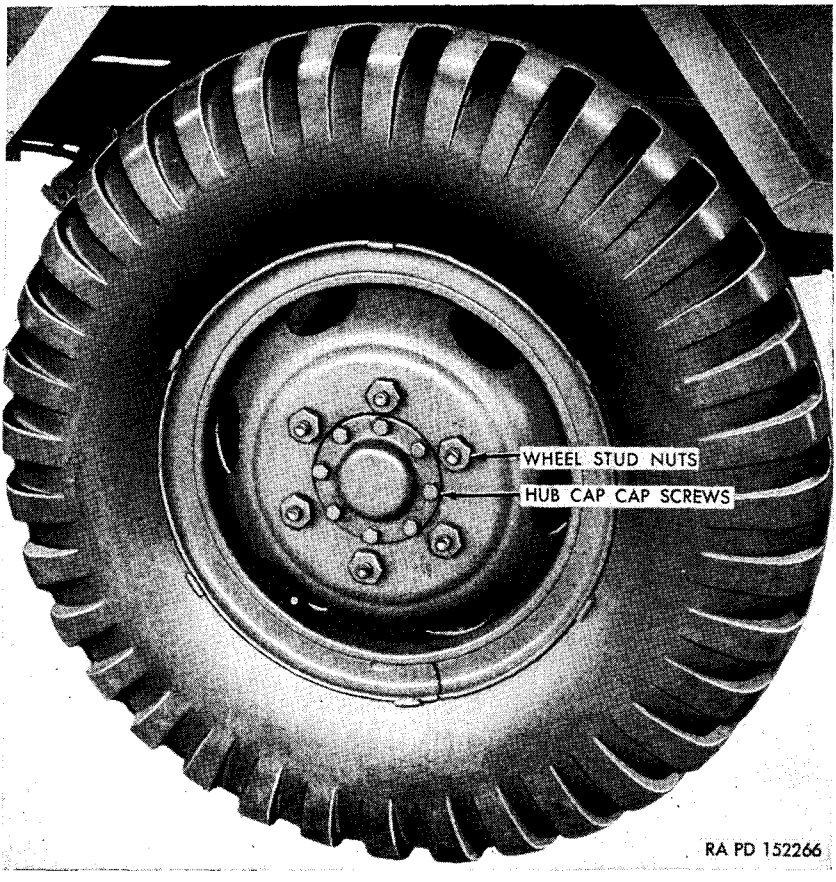


Figure 16. Wheel and tire.

13. Front Caster

a. The front caster (fig. 17) is hinged beneath the drawbar portion of the "A" frame. It is lowered and pinned in vertical position to support the front end of the trailer when the trailer is not coupled to a towing vehicle. It is raised and pinned in horizontal position when trailer is to be towed.

b. The caster has a metal wheel, straddle-mounted between the arms of the caster yoke. The wheel rotates on an axle held in the yoke by lock rings. The yoke spindle swivels in bearings pressed into the hub of the caster mounting bracket. The bracket is hinged to the frame bracket welded beneath the front end of the "A" frame. The hinge pin is held by lock rings.

c. The caster is held in vertical position by a lock pin which is inserted through the two forward holes in the frame bracket and the forward cross tube in the caster mounting bracket. It is held in hori-

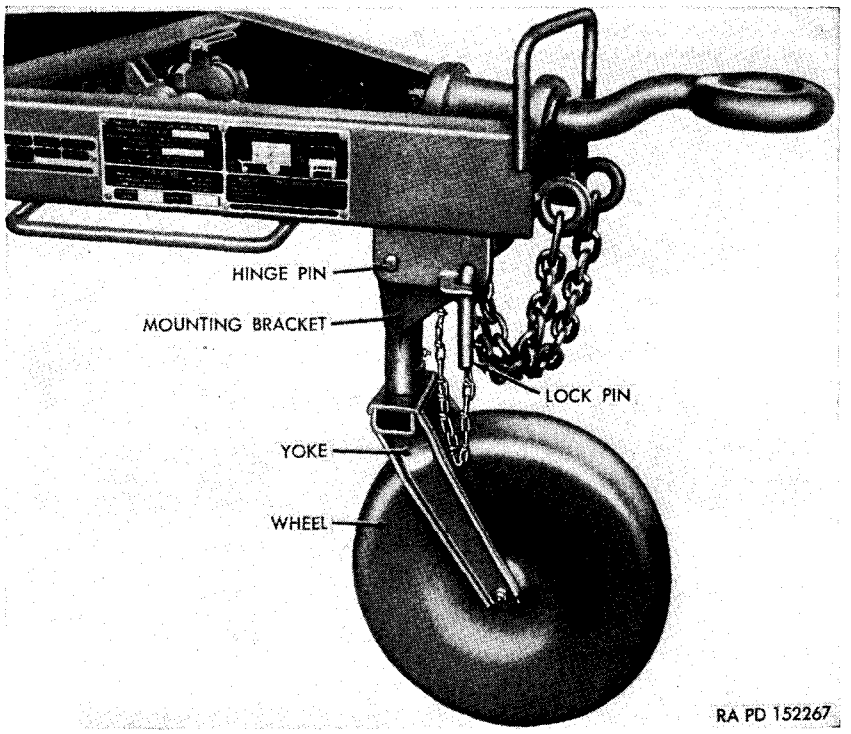


Figure 17. Front caster in vertical position.

zontal position (fig. 22) by inserting the same lock pin through the lug on the side of the caster yoke and the two lugs on the front of the "A" frame cross member. The lock pin is attached by a chain to the caster mounting bracket to prevent loss.

14. Rear Support Leg

a. The rear support leg (fig. 18) is hinged at the rear of the chassis frame. It is lowered into contact with the ground to give the trailer rear-end stability for loading and unloading. When not in use, it is raised and pinned to the support bracket (fig. 24).

b. The leg has an inner tube which telescopes into an outer tube. A circular foot is welded to the base of the inner tube. A cross tube is welded to the top of the leg to accommodate the hinge pin which secures the support leg to the chassis. A lock pin, chained to the outer tube, pins the leg up in traveling position.

c. The inner tube has an operating nut at its upper end which is rotated on a screw in the upper end of the outer tube to give the leg a range of adjustment in length of ten inches. The foot is provided with handles to facilitate rotating the inner tube. The lower end of

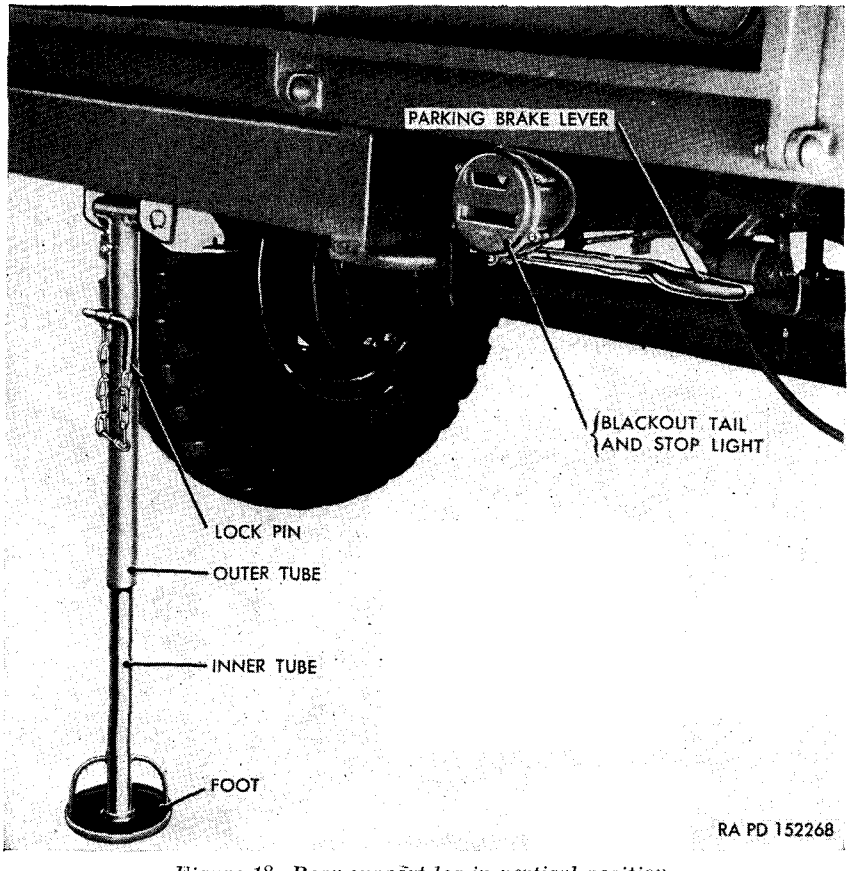


Figure 18. Rear support leg in vertical position.

the screw is deformed during manufacture to prevent the inner tube from rotating itself loose and becoming lost.

15. Lights and Wiring

a. Lights on the trailer are controlled by the light switch on the instrument board of the towing vehicle through the trailer receptacle on the rear of the towing vehicle, the intervehicular cable, and the receptacle and harness on the trailer. The system is protected by a circuit breaker on the towing vehicle. Lights with the same purpose, ie, blackout stop lights on both vehicles, are on the same circuit and operate simultaneously on towing vehicle and trailer. All wires pertaining to the same circuits on both vehicles are identified by numbered metal tags clamped to wires.

b. The trailer is equipped with a tail light assembly at the right rear with blackout tail and stop lamps (fig. 18) and a tail light assembly at the left rear with blackout tail lamp and service stop and tail lamps.

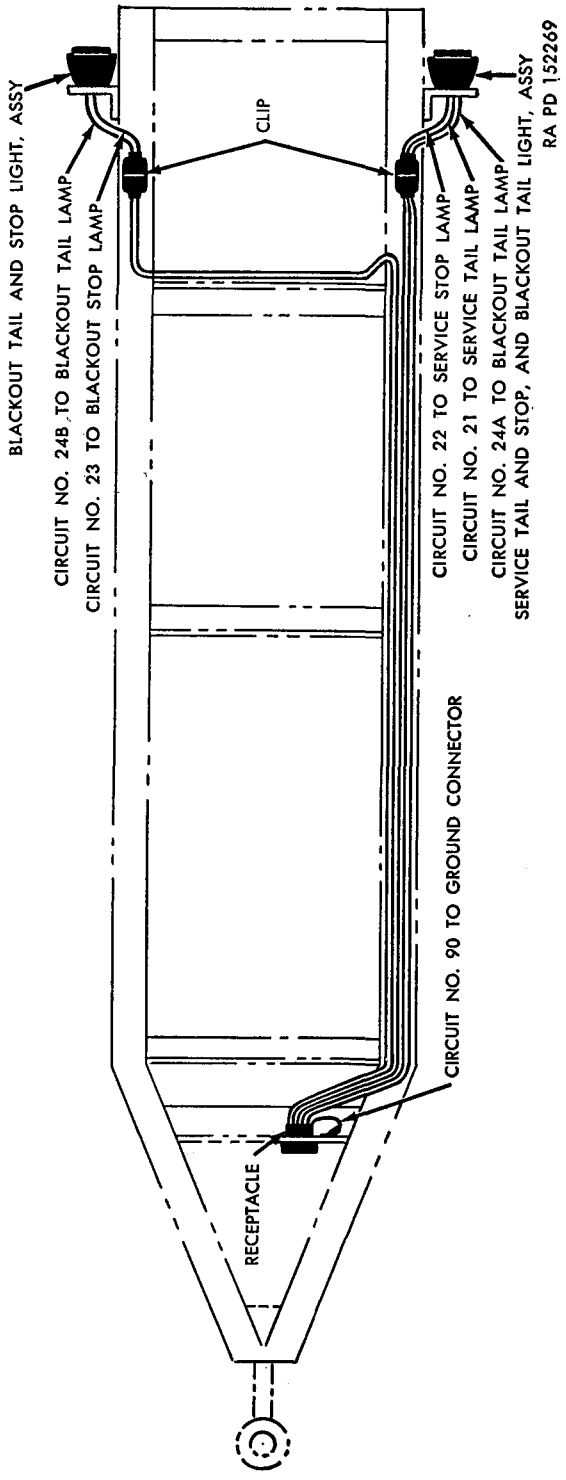


Figure 19. Wiring diagram.

Each vehicle is equipped with two red reflectors at the rear and one red and one amber reflector on each side.

c. Electrical cables are rubber covered with soldered terminals or connectors. The connectors are either plugs or sockets which are forced, one into the other, and covered with metal shells with bayonet-connection edges to hold rubber bushings in place to form watertight joints (fig. 48). Clip assemblies hold the cable in place on the chassis frame. Rubber grommets are provided where the cables pass through the chassis side rails.

d. In addition to circuit No. 90 (fig. 19), which is the ground connection from the trailer receptacle to the chassis frame, there are five circuits on the trailer which are continuations of circuits on the towing vehicle.

(1) Circuit No. 21 to service tail lamp.
(2) Circuit No. 22 to service stop lamp.
(3) Circuit No. 23 to blackout stop lamp.
(4) Circuit No. 24A to left blackout tail lamp.
(5) Circuit No. 24B to right blackout tail lamp.

16. Data and Service Plates

a. Data Plates. The data plates for the cargo trailer M104 (fig. 20) and for the water tank trailer M106 (fig. 21) are located on the right sides of the "A" frames of these vehicles. The plates give the ordnance stock number, manufacturer's serial number, weight and dimension data, shipping cubage, publications pertaining to the vehicle, and delivery and inspection dates.

b. Service Plate. A service plate (figs. 20 and 21) is mounted on the right side of the "A" frame, just to the rear of the data plate. The plate designates the responsible agency for procurement and depot maintenance.

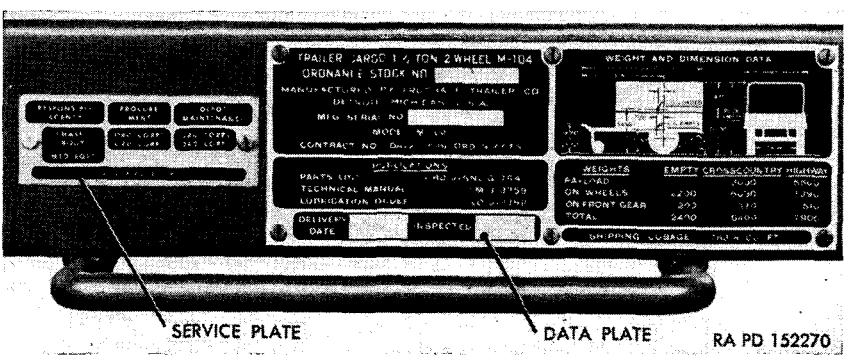


Figure 20. Data plate and service plate, cargo trailer M104.

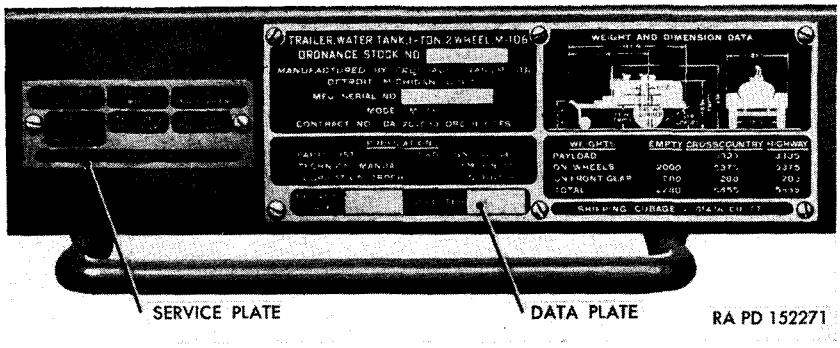


Figure 21. Data plate and service plate, water tank trailer M106.

17. Tabulated Data

a. 1½-Ton 2-Wheel Cargo Trailer M104.

Towing vehicle	2½ ton 6 x 6
Towing facilities	lunette
Dimensions over-all:	
Length	13 ft 9½ in
Width	6 ft 11 in
Height, less paulin (loaded)	8 ft 0¾ in
(empty)	8 ft 3⅛ in
Dimensions inside:	
Length (of body)	9 ft 2 in
(of rack)	9 ft 1¾ in
Width (of body)	6 ft 2 in
(of rack)	6 ft 1 in
Height (to top of side panels)	1 ft 6 in
(to top of racks)	3 ft 9 in
(to underside of bows)	5 ft 0 in
Loading height (empty and on front caster)	3 ft 4 in
Floor height—loaded (chassis level)	2 ft 11⅜ in
Lunette height (adjustable)	2 ft 5¾ in and 2 ft 9¾ in
Track (tread—center to center of tires)	5 ft 9⅝ in
Weights:	
Vehicle	2,400 lb
Payload (hard-surface roads)	5,500 lb
(cross country)	3,300 lb
Center of gravity from ground (loaded)	4 ft 6⅝ in
(empty)	2 ft 8⅝ in
Center of gravity forward of read axle (loaded)	6 in
(empty)	7⅝ in
Angle of departure (loaded)	31 degrees

b. 1½-Ton 2-Wheel Water Tank Trailer M106.

Towing vehicle	2½ ton 6 x 6
Towing facilities	lunette
Dimensions over-all:	
Length	13 ft 7⅛ in
Width (fenders extended)	7 ft 9 in
(fenders retracted)	6 ft 11 in
Height (to top of pump)	6 ft 7¾ in
(to top of tank shell)	5 ft 8¾ in
Dimensions of tank (inside):	
Length	7 ft 5¾ in
Width	4 ft 0 in
Height	2 ft 6 in
Capacity of tank (nominal)	400 gal
Lunette height (adjustable)	2 ft 5¾ in and 2 ft 9¾ in
Track (tread—center to center of tires)	5 ft 9⅝ in
Weights:	
Vehicle	2,280 lb
Payload (hard-surface roads)	3,335 lb
(cross country)	3,335 lb
Center of gravity (loaded)	3 ft 9¼ in
(empty)	2 ft 9¼ in
Center of gravity forward of rear axle (loaded)	10½ in
(empty)	10½ in
Angle of departure (loaded)	31 degrees

c. Axle.

Type	tubular
Make	Timken design
Diameter	4½ in
Spindle (diameter)	2⅝ in

d. Brakes.

Actuation	air-over-hydraulic
Type of brake mechanism	Two-shoe, double-anchor, expanding single cylinder actuation.
Make	Timken design
Size:	
Diameter	15 in
Width	3 in
Operating air pressure	60 psi min

e. Caster.

Type	hinged, offset swivel wheel
Make	Fruehauf
Length (center of pivot to bottom of wheel)	2 ft 0⅝ in
Wheel material	welded pressed steel

Diameter ..... 16 in
Width ..... 4 in

f. FRAME.

Type ..... welded pressed steel
Length (to center of lunette) ..... 13 ft 4 in
(without lunette) ..... 12 ft 7⅛ in
Width ..... 2 ft. 10 in
Side rails (depth) ..... 5 in

g. REAR SUPPORT LEG.

Type ..... hinged, enclosed—screw-controlled telescopic
Make ..... Fruehauf
Length (fully raised) ..... 1 ft 11 in
(fully extended) ..... 2 ft 9 in
Diameter of foot ..... 5⅝ in

h. LIGHTS.

Voltage 24
Lamps:
In blackout tail and stop light assembly:
Blackout tail ..... 3 cp
Blackout stop ..... 3 cp
In service tail and stop, and blackout tail light assembly:
Blackout tail ..... 3 cp
Service stop ..... 3 cp
Service tail ..... 32 cp

i. SPRINGS.

Type ..... semi-elliptic
Material ..... SAE 5160
Optional material ..... SAE 4155 or SAE 9260
Hardness ..... Brinell 388 to 444
Main springs:
Length (center of pins, flat or loaded to 2,250 lb) ..... 4 ft 0 in
Width ..... 2½ in
Number of leaves 12
Thickness of leaves ..... 0.323 in
Rate (average between 1 inch above and below load of 2,250 lb) ..... 780 lb±50 lb
Normal load ..... 2,250 lb
Auxiliary springs:
Length (flat) ..... 3 ft 1¼ in
Width ..... 2½ in
Number of leaves 5
Thickness of leaves ..... 0.291 in
Rate (average 1 inch above and below load of 850 lb) ..... 771 lb±50 lb
Normal load ..... 850 lb

j. TIRES.

Number	2
Size	11.00 x 20
Type	military-pneumatic with controlled bead
Design	cross country, non-directional, rounded corners
Number of plies	12
Tire inflation:	
Highway driving	50 psi
Cross-country driving	35 psi
Sand driving	15 psi

k. WHEELS.

Type	offset, disk type
Rim size	20 x 7.5
Tire retention and removal	split lock ring
Number of studs	6
Diameter of stud circle	8¾ in
Wheel bearings:	
Type	tapered roller
Outer Cup	Timken 3920E
Cone (includes rollers)	Timken 392
Inner Cup	Timken 3920E
Cone (includes rollers)	Timken 3994

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATÉRIEL

18. Purpose

a. When a new or reconditioned vehicle is first received by the using organization, it is necessary for the organizational mechanics to determine whether the vehicle has been properly prepared for service by the supplying organization and to be sure it is in condition to perform any mission to which it may be assigned when placed in service. For this purpose, inspect all assemblies, subassemblies, and accessories to be sure they are properly assembled, secure, clean, and correctly adjusted and/or lubricated.

b. Whenever practicable, the vehicle crew will assist in the performance of these services.

19. Correction of Deficiencies

Deficiencies disclosed during the course of these services will be treated as follows:

a. Any deficiencies within the scope of the maintenance echelon of the using organization will be corrected before the vehicle is placed in service.

b. Deficiencies beyond the scope of the maintenance echelon of the using organization will be referred to a higher echelon for correction.

c. Deficiencies of serious nature should be brought to the attention of the supplying organization.

20. Specific Procedures

a. AIR-BRAKE RESERVOIR. Drain air-brake reservoir (fig. 23) and close drain cock.

b. AIR-BRAKE FILTERS. Drain air-brake filters (par. 58).

c. AIR AND ELECTRIC CONNECTIONS; SAFETY CHAINS. Make sure that these items are in good condition and secure.

d. Electrical Wiring. Examine all accessible wiring for chafing, cracking, and looseness of connections.

e. Tires. Gage all tires (par. 12 *b*). Remove nails, glass, or stones from treads. (If tires are hot, do not reduce pressure.)

f. Wheel and Hub Cap Nuts. Be sure they are all present and secure.

g. Body and Paulin (M104). Inspect these items for damage and presence of ropes and roof bows, condition of racks, end gates, tail gates, and hardware.

h. Frame and Tank (M106). Inspect for damage and presence of metal covers, planking, and tank fittings. Test faucets, valves, and pump. Check the security of locking devices and straps.

i. Lubricate. Lubricate according to instructons in figure 27 (see par. 38). Perform service *j* during lubrication.

j. Springs. Inspect springs for sag, broken or shifted leaves, loose rebound clips, bearings, U bolts, and shackles. Look for oil leaks at seals and gaskets and for brake-fluid leaks at the brake mechanisms.

k. Lamps and Reflectors. Observe if all lamps light with switches on towing vehicle at all "ON" positions and go out with switches in "OFF" positions. Reflectors should be secure and clean.

l. Air Pressure (On Towing Vehicle). With the air brake system of the trailer properly connected to the air brake system of the towing vehicle, observe whether the brake air pressure builds up at a normal rate to the specified maximum limits and then cuts off. Apply brakes and stop engine; there should be no noticeable drop in pressure within one minute.

m. Brakes, Service, and Parking. Service brakes should stop vehcles smoothly without side pull within reasonable distance with one-third reserve pedal travel. Parking brake on trailer should hold the trailer on a reasonable incline with one-third reserve ratchet travel.

n. Unusual Noises. Be on the alert continually for unusual noises from trailer connections, body, or chassis that might indicate damage, looseness of parts, malfunctioning brakes, or inadequate lubrication.

Section II. CONTROLS AND OPERATION

21. General

This section describes, locates, illustrates, and furnishes the operator with sufficient information pertaining to the various controls provided for operation of the vehicle. It also contains instructions for the mechanical steps necessary to operate the 1½-ton 2-wheel cargo trailer M104 and the 1½-ton 2-wheel water tank trailer M106 under

usual conditions. For operation under unusual conditions, refer to paragraph 33.

22. Lunette

The lunette (fig. 22) is a substantial metal ring mounted in the forward end of the **A** frame. It is fitted over the pintle on the rear end of the towing vehicle to couple the two vehicles.

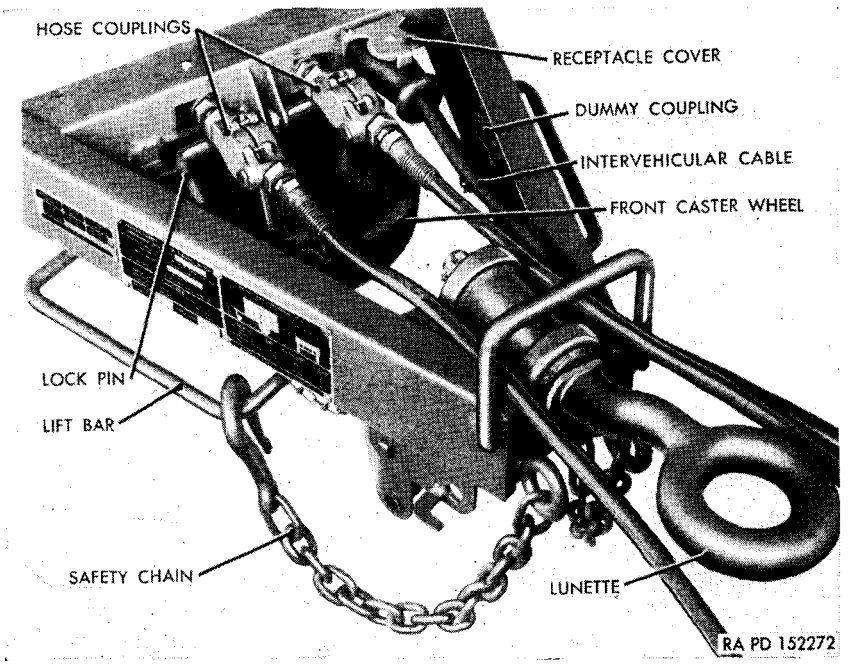


Figure 22. Controls mounted on "A" frame; front caster in traveling position.

23. Safety Chains

The two safety chains (fig. 22) are hooked into the eye bolts at the rear of the towing vehicle to prevent the trailer from becoming detached should the pintle or lunette fail.

24. Air-Brake Couplings

Two air-brake hose couplings (fig. 22) are mounted on the **A** frame cross member. When the air-brake couplings on the towing vehicle are connected by air-brake hoses to these couplings, the service brakes on the trailer may be actuated by the brake controls on the towing vehicle. Dummy couplings are chained to the inner surfaces of the **A** frame. They are provided to exclude dirt from the braking system

and should be fitted to the air hose couplings when these couplings are not connected to those of the towing vehicle.

25. Trailer Receptacle

This receptacle (fig. 19) is mounted on the **A** frame cross member. The inter-vehicular cable (jumper cable) is plugged into the receptacle (fig. 22) and into a similar one on the rear of the towing vehicle. The cable carries separate circuits for the lights on the trailer and permits these lights to be turned on and off from the towing vehicle. The circuits are protected from overload by circuit breakers on the towing vehicle.

26. Front Caster

The front caster is hinged beneath the end of the **A** frame. It is secured by the lock pin in vertical position (fig. 17) to support the front end of the trailer when the trailer is not coupled to a towing vehicle. The caster is raised (fig. 22) and secured with the lock pin when the trailer is to be towed.

27. Air-Brake Reservoir Drain Cock

The reservoir is equipped with a drain cock (fig. 23) for the drainage of moisture and to permit the air pressure in the trailer braking system to be relieved when the brakes are locked and the trailer is to be moved without being connected to the air braking system of a towing vehicle.

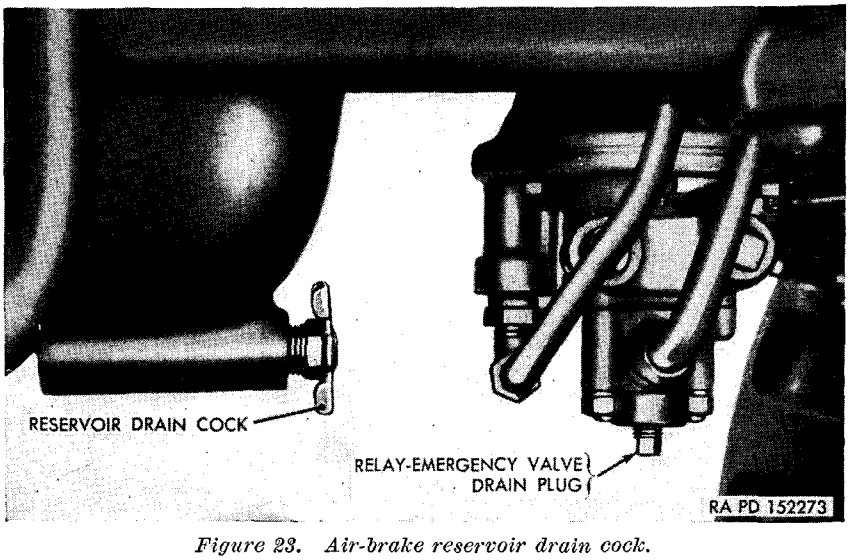


Figure 23. Air-brake reservoir drain cock.

28. Parking Brake Levers

A separate parking brake lever (fig. 18) applies the brake shoes mechanically to the right and to the left brake drums. The levers are attached to the underside of the frame main members back of the wheels. The levers are pulled rearwardly to apply the brakes. A ratchet holds the brake lever in applied position. The pawl is released by depressing the center portion of the handle of the lever.

29. Rear Support Leg

The rear support leg is hinged beneath the rear chassis cross member. The leg is released to vertical position and unscrewed until the foot rests on the ground (fig. 18) when the trailer is to be loaded or unloaded. It is raised (fig. 24) and secured with the lock pin when trailer is to be towed.

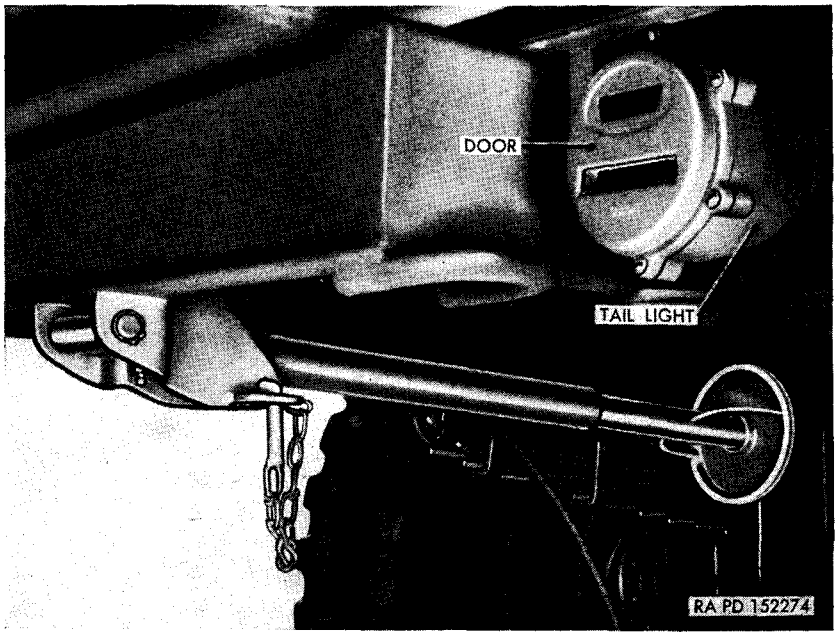


Figure 24. Rear support leg in traveling position.

30. Controls Peculiar to the Water Tank Trailer M106

a. Water Pump Handle. This handle is pumped up and down to cause the pump (fig. 8) to draw water into the tank through the bell strainer and hose assembly from any water source from which the water must be pumped. The handle is held in down position by a strap when not in use.

b. Filler Hatch Cover. The filler hatch cover is unlatched and raised to permit the tank to be filled from a source from which water will flow freely into the filler hatch (fig. 8). The cover is latched closed with an eyebolt wing.

c. Manhole Cover. The manhole cover (fig. 8) is unlatched and raised to permit the tank to be cleaned. The cover is removed to permit the immersion heater to be installed in the tank to keep water in the tank from freezing. Both the manhole cover and the immersion heater are latched with the same eyebolt wing.

d. External Value. The external valve (fig. 8) is installed in the base of the front of the tank. This spring-loaded valve has a hold-open handle to release water from the tank into the piping system. It is closed to permit the piping system to be drained.

e. Manifold Valve. The manifold valve (fig. 8) is installed in the center of the manifold and releases or shuts off water to the five self-closing faucets mounted on the manifold. Valve handle rotates 180 degrees from closed position (with the handle pointed toward the right or curb side) to open position (with the handle pointing toward the left or road side).

f. Self-Closing Faucets. Five self-closing faucets (fig. 8) are mounted on the manifold. One 1-inch and two ½-inch faucets are located on the right side and two ½-inch faucets on the left side. In addition, one 1½ inch faucet is installed on a separate pipe extending from in front of the external valve to the left side of the vehicle.

g. Tank Drain Plug. A square-head drain plug (fig. 25) is located in the bottom of the tank near the rear end. It is used to empty the tank in cleaning and flushing operations.

31. Operation Under Usual Conditions

a. Before-Operation Service. The before-operation services specified in table II, should be performed before using the trailer.

b. Coupling Trailer to Towing Vehicle.

(1) *Connect lunette to pintle.* Place the lunette at the end of the **A** frame over the pintle at the rear of the towing vehicle and lock it in this position. If the trailer is to be moved to the towing vehicle and the trailer brakes are locked, open the drain cock on the air-brake reservoir (fig. 23) to release the trailer brakes. Close drain cock.

(2) *Hook safety chains.* Hook safety chains into the eye bolts, rings, or other provisions for them at the rear of the towing vehicle. This precaution must be taken to prevent the trailer from becoming detached should the pintle or lunette fail.

(3) *Connect brake air hoses.* Remove the dummy couplings from the air-brake couplings on the towing vehicle and trailer and

Figure 25. Water tank drain plug.

connect the brake air hoses, which are part of the equipment of the trailer. Make sure that the coupling marked "SERVICE" on the towing vehicle is hooked up with the coupling marked "SERVICE" on the trailer. This is also essential in connecting the couplings tagged "EMERGENCY."

(4) *Open air shut-off valves.* To energize the trailer braking system, open the two air shut-off valves on the towing vehicle.

(5) *Connect intervehicular cable.* Plug the intervehicular cable (jumper cable), which is part of the trailer equipment, into the receptacles on the towing vehicle and trailer. Check to see that all lights are in working order.

(6) *Raise front caster.* Remove the lock pin which secures the front caster in vertical position, lift the caster and fit the lug on the caster fork between the two lugs on the **A** frame cross member and secure it in this position with the lock pin (fig. 22). The caster must always be raised and locked in traveling position before the trailer is towed.

c. Preparing Trailer For Loading.

(1) *Set parking brakes.* Pull both parking brake levers rearwardly to set the parking brakes on the trailer wheels.

(2) *Lower rear support.* Draw the lock pin which holds the rear support in traveling position and permit the support to hang

vertically. Unscrew the lower portion of the support until the foot makes firm contact with the ground (fig. 18).

d. Driving Towing Vehicle and Trailer. In driving a towing-vehicle-and-trailer combination, the overall length of the unit must be kept in mind when passing other vehicles and when turning. Because the unit is "hinged in the middle," turning and backing are affected. The distribution of weight has its effect on stopping. The following information should prove helpful:

(1) *Turning.* When turning corners, allow for the fact that the trailer wheels turn inside the turning radius of the towing vehicle.

(2) *Backing.* When backing the trailer with the towing vehicle, the towing vehicle is steered in the opposite direction to the direction desired for the trailer. If the trailer is to be backed to the right, the steering wheel of the towing vehicle is turned to the left, or counterclockwise. The front of the trailer will be pushed to the left and the trailer wheels will be steered to the right.

(3) *Stopping.* Braking pressure should be applied gradually and smoothly and brakes should be released when grabbing takes place. A grabbing brake is not operating with maximum efficiency. For maximum efficiency, keep tires just short of the skidding point.

(4) *Parking.* When parking the trailer for an extended period, whether coupled to or uncoupled from the towing vehicle, set the trailer parking brakes. The trailer service brakes should not be left applied for long periods and they have been designed to release part of their pressure automatically if they are left applied.

e. Uncoupling Trailer from Towing Vehicle.

(1) *Unhook safety chains.* Hook them on the lift bars (fig. 22).

(2) *Disconnect brake air hoses.* Close the shut-off valves on the service and emergency air lines at the rear of the towing vehicle. Uncouple the brake air hoses from the towing vehicle and fit dummy couplings to the couplings on the towing vehicle. Leave the brake air hoses connected to the trailer but fit the dummy couplings over the air hose couplings. Dummy couplings prevent foreign matter from entering the brake system.

(3) *Disconnect intervehicular cable.* Pull the plug of the intervehicular cable from the receptacle on the rear of the towing vehicle and place it on the A frame of the trailer. The cable is part of the equipment of the trailer.

(4) *Lower front caster.* Release the front caster from its traveling position by withdrawing the lock pin. Secure the caster in vertical position by lining up the holes in the bracket under the A frame with those in top of caster mounting bracket and inserting the lock pin (fig. 17).

(5) *Disconnect lunette.* Unlatch the pintle and lift the lunette from it. Separate the two vehicles by driving the towing vehicle forward or backing up the trailer. Set the trailer parking brakes.

Section III. OPERATION OF REGULAR EQUIPMENT OF WATER TANK TRAILER M106

32. Loading and Unloading Water Tank

a. Check Condition of Tank Before Loading. Unlatch manhole cover (fig. 8), raise cover, and check to determine if tank is in proper condition to receive and transport water for purpose intended. Clean tank and flush tank, valves, piping, and faucets, if tactical situation permits.

Note. Highest sanitary conditions must be preserved in handling water for drinking purposes.

b. Loading Tank from Overhead, Free-Flowing Source. Unlatch filler hatch cover, raise cover, and check to determine if sleeve strainer is in place and is clean. Direct flow of water into filler hatch (fig. 8). Capacity of tank is 400 gallons. When filled, latch filler hatch cover.

c. Loading Tank from Source from Which Water Must Be Pumped. Position trailer adjacent to water supply on ground as solid as possible.

Note. Weight of trailer will increase approximately 3,300 pounds when filled.

Unfasten bell strainer and hose assembly (fig. 8), turn wing nut to open bell strainer, and place bell strainer in water source. Prime pump by unscrewing priming plug and filling cylinder above plunger assembly with clean water. Operate handle up and down until tank is filled.

Note. When handle is not being operated, strap it to side of pump; otherwise, handle will raise, and prime may be lost.

When tank is filled, drain bell strainer and hose assembly, close bell strainer, coil hose, and strap to extension in front of tank.

d. Drawing Water from Tank. Raise spring-loaded handle of external valve (fig. 8), force it to the right, and latch it behind projection on top of valve body. Water in tank is now free to flow from

large faucet in right faucet box when faucet ears (handles) are squeezed together. To release water to other faucets in faucet boxes, turn handle of manifold valve (fig. 8) 180 degrees (full half-circle) toward right of trailer.

e. Draining Water from Piping and Faucets. Release handle of external valve, permitting valve to close. Squeeze ears of all faucets until water no longer drips. Close manifold valve by turning handle 180 degrees toward left of trailer.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

33. Operation Under Unusual Conditions

a. General.

(1) Cargo trailers require no special preparation for operation under extreme heat or cold, other than the use of proper lubricants. For proper lubrication under these conditions, refer to figure 27.

(2) In the construction of water trailers, provision is made for the use of an immersion-type heater to prevent the water from freezing in areas where temperatures below 32° F exist for a considerable period of time.

b. Extreme Cold.

(1) Wheel bearings should be thoroughly cleaned and hand-packed with the lubricant specified in the lubrication order, as soon as the tactical situation permits.

(2) Check air pressure of tires with tire pressure gage with tire at normal temperature. Do not rely upon appearance of tire for inflation test. Look for tires frozen to the ground, and frozen flat spots where in contact with the ground during long halts.

(3) Carefully remove large collections of ice and caked snow from under the fenders, and where suspended from wiring cables.

(4) Park trailer on planking or brush when ground is muddy or covered with snow, to prevent tires from freezing to the ground. Release brakes and chock wheels if necessary.

c. Extreme Heat.

(1) Great care must be exercised to insure that the wheel bearings are properly packed with the lubricant specified in the lubrication order.

(2) Shield tires from direct heat and rays of the sun whenever possible. It is imperative that proper tire pressures be maintained (par. 17j).

(3) The canvas paulin of the cargo trailer should not be exposed to the direct rays of the sun, unless otherwise unavoidable.

d. Sand or Dust.

(1) Operation under extremely sandy or dusty conditions necessitates frequent inspection, cleaning, and lubrication of the trailer working parts.

Caution: When repacking the wheel bearings it is necessary to clean the wheel bearings completely before repacking with grease, since sand or dust mixed with the grease forms an abrasive mixture.

(2) Reducing tire pressures will aid in amphibious landings and in operation in soft sand.

Note. Bring tires up to normal specified pressure as soon as soft sand area has been traversed.

e. Fording and Excessive Humidity.

(1) Wheel bearings should be cleansed and hand-packed with lubricant as specified in the lubrication order after each submersion.

(2) Tire pressure should be reduced to aid in amphibious landings (par. 17j).

(3) Cables and terminals must be protected by ignition insulation compound.

(4) Corrosive action on all parts of the trailer will occur in areas of high humidity and during the rainy season. Evidence will appear in the form of rust and paint blisters on metal surfaces and mildew or mold on fabrics, leather, and unpainted wooden surfaces. Protect exterior surfaces by touch-up painting and keeping a film of engine lubricating oil (SAE–10) on unfinished exposed metal surfaces.

(5) A careful watch must be kept for evidence of the presence of moths and termites.

971845°- -51——4

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. PARTS, SPECIAL TOOLS, AND EQUIPMENT FOR ORGANIZATIONAL MAINTENANCE

34. General

Tools and equipment and spare parts are issued to the using organization for maintaining the matériel. Tools and equipment should not be used for purposes other than prescribed.

35. Parts

Spare parts are supplied to the using organization for replacement of those parts most likely to become worn, broken, or otherwise unserviceable, providing such operations are within the scope of organizational maintenance functions. Organizational spare parts, tools, and equipment supplied for the 1½-ton 2-wheel cargo trailer M104 and the 1½-ton 2-wheel water tank trailer M106 are listed in ORD 7–8 SNL G–754, which is the authority for requisitioning replacements.

36. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this matériel are authorized for issue by ORD 7–8 SNL G–754 and by T/A and T/O&E's.

37. Special Tools and Equipment

No special tools and/or equipment are issued to the using organization for maintaining the matériel. However, certain tools and equipment specially designed for organizational maintenance, repair, and general use with the 2½-ton, 6x6, cargo truck M34 and chassis trucks M44, M45, and M46 which may be used with the matériel are listed in table I for information only. This listing is not to be used for requisitioning replacements.

Table I. Special Tools and Equipment for Organizational Maintenance

Item	Identifying number	References		Use
		Fig.	Par.	
REMOVER AND REPLACER, brg cup (inner), thd 1¼–12NF–2, OD 4.540 in, thkns 1 11/32 in.	41–R–2374–630	26, 34	53, *h*, *i*	Used with SCREW 41–S–1047–330 for removing and installing wheel-bearing cups.
SCREW, remover and replacer, thd 1¼–12NF–2, lgh 9 in.	41–S–1047–330	26, 34	53 *h*, *i*	Used with REMOVER AND REPLACER 41–R–2374–630 for removing and installing wheel-bearing cups.
WRENCH, wheel brg nut, sgle-end tubr, oct, size of opng 3⅛ in, lgh 3½ in.	41–W–3748–75	26, 32	53 *b*, *d*	Removing, installing, and adjusting wheel nuts.
WRENCH, wheel stud nut, dble-hd socket, hex, size of opngs 1 1/16 x 1½ in, lgh 10 in.	41–W–3843–15	26, 29	52 *b*, *e*	Removing and installing wheel stud nuts.

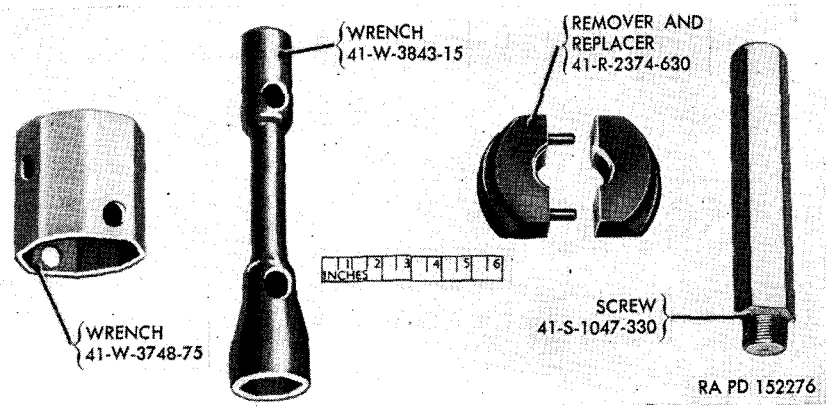


Figure 26. Special tools and equipment.

Section II. LUBRICATION AND PAINTING

38. Lubrication

The lubrication chart (fig. 27) prescribes cleaning and lubricating procedures as to locations, intervals, and proper materials for this vehicle.

39. General Lubrication Instructions

a. Usual Conditions. Service intervals specified on the lubrication chart are for normal operation and where moderate temperature, humidity, and atmospheric conditions prevail.

b. Lubrication Equipment. No lubrication equipment is carried on the trailer. Lubrication equipment supplied with the towing vehicle is to be used in lubricating the trailer. Clean this equipment both before and after use. Operate the lubricating guns carefully and in such a manner as to insure a proper distribution of the lubricant.

c. Points of Application.

(1) Lubricating fittings and wheel bearings are shown in figure 28 and are referenced to the lubrication chart. Wipe the lubricating fittings and surrounding surfaces clean before and after lubricant is applied.

(2) A ¾-inch red circle should be painted around each lubricating fitting.

(3) To lubricate wheel bearings, thoroughly wash out old lubricant with dry-cleaning solvent or volatile-mineral-spirits paint thinner and allow the bearing to dry. Compressed air must not be used on bearings. Carefully introduce the proper lubricant between the rollers by hand, not merely smeared on the outside. Great care must be exercised to see that dirt,

grit, lint, or other contaminants are not introduced into the bearings. If the bearings are not to be installed immediately, wrap them in clean oilproof paper to protect them from dirt.

Note. Before installing repacked bearings, grease seals should be checked and replaced if necessary. Particular attention should be given to the leather insert to make sure that there are no frayed edges, breaks, or splits, and that it is not worn thin.

Coat the spindle and inside of the hub with a thin layer of grease (not over one-sixteenth inch) to prevent rusting.

Note. Do not fill hub with lubricant under any circumstances, as this procedure may cause rupture of the grease seal and result in grease-soaked brake linings.

d. Reports and Records.

(1) Report unsatisfactory performance of matériel or defects in the application or effect of prescribed lubricants and preserving materials, using DA AGO Form 468, Unsatisfactory Equipment Report.

(2) Maintain a record of lubrication of the vehicle on DA AGO Form 460, Preventive Maintenance Roster.

40. Painting

Instructions for the preparation of the matériel for painting, methods of painting, and materials to be used are contained in TM 9–2851. Instructions for camouflage painting are contained in FM 5–20B.

Section III. PREVENTIVE MAINTENANCE SERVICES

41. General

a. Responsibility and Intervals. Preventive maintenance services are the responsibility of the using organization. These services consist generally of before-operation, during-operation, at-the-halt, after-operation, and weekly services performed by the driver or crew and the scheduled services to be performed at designated intervals by organization mechanic or maintenance crews. Intervals are based on normal operations. Reduce intervals for abnormal operations or severe conditions. Intervals during inactive periods may be extended accordingly.

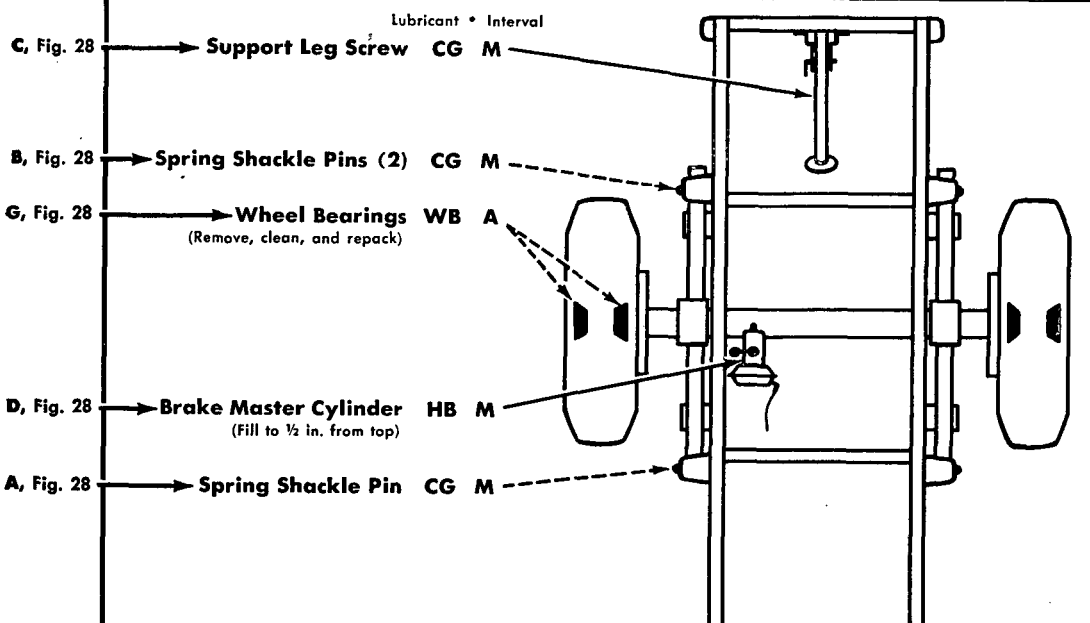
b. Definition of Terms. The general inspection of each item applies also to any supporting member or connection and is generally a check to see whether the item is in good condition, correctly assembled, secure, and not excessively worn.

(1) Inspection for "good condition" is usually an external visual inspection to determine whether the unit is damaged beyond

LUBRICATION ORDER

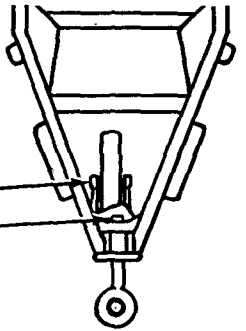
TRAILER, CARGO, 1-1/2-TON, 2-WHEEL, M104 AND TRAILER, WATER TANK, 1-1/2-TON, 2-WHEEL, M106

References: TM 9-875B; ORD 9 SNL G-754



Intervals are based on normal operation. Reduce to compensate for abnormal operation and severe conditions or contaminated lubricants. During inactive periods, intervals may be extended commensurate with adequate preservation. Relubricate after washing or fording.

Clean fittings before lubricating. Clean parts with THINNER, paint, volatile mineral spirits (TPM) or SOLVENT, dry-cleaning (SD). Dry before lubricating. Lubricate dotted arrow points on both sides of the equipment.



KEY

LUBRICANTS	EXPECTED TEMPERATURES			For Arctic Operation See TM 9-2855	INTERVALS
	above +32° F	+40°F to −10°F	0°F to −65° F		
CG—GREASE, lubr, general purpose	**CG** 1	**CG** 0	**OG** 00		**M**—Monthly
WB—GREASE, lubr, general purpose No. 2	**WB**	**WB**	**OG** 00		**A**—Annually
PL—OIL, lubr, preservative	**PL** (Med)	**PL** (Special)	**PL** (Special)		
HB—FLUID, hydraulic brake	**HB**	**HB**	**HBA**		
OG—GREASE, lubr, Ord Dept.	**HBA**—FLUID, hydraulic brake, arctic				

NOTES

1. **OIL CAN POINTS**—Monthly, lubricate all parking brake linkage, Cargo Trailer hinges and latches, and Water Tank Trailer pump handle linkage, with PL.

2. **DO NOT LUBRICATE**—Springs.

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained herein are mandatory and supersede all conflicting lubrication instructions dated prior to the date of this lubrication order.

RA PD 152277

Figure 27. Lubrication chart.

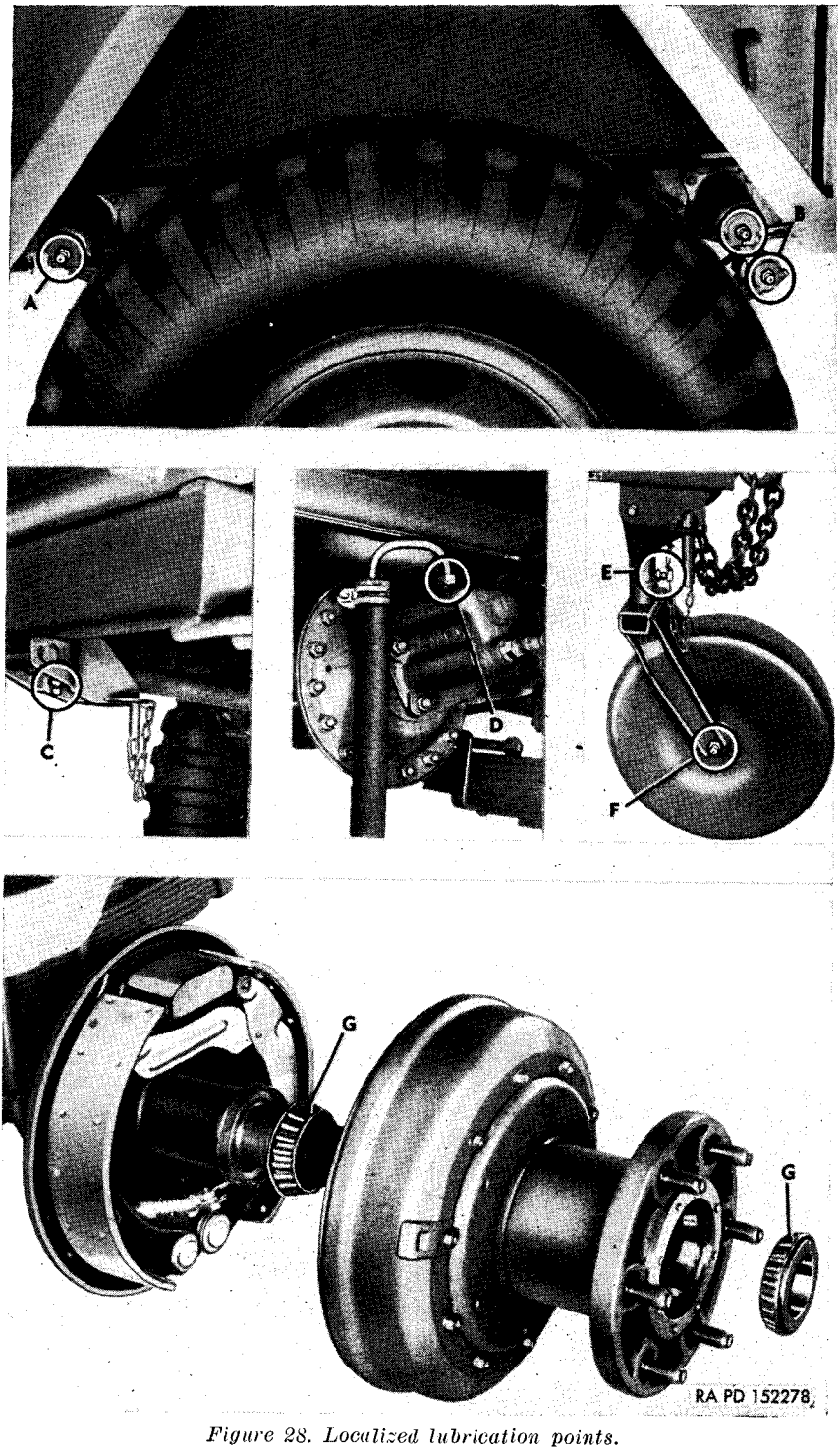


Figure 28. Localized lubrication points.

safe or serviceable limits. The term "good condition" is explained further by the following: not bent or twisted, not chafed or burred, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, not deteriorated.

(2) The inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to see whether it is in its normal assembled position in the vehicle.

(3) Inspection of a unit to determine if it is "secure" is usually an external visual examination or a check by hand, wrench, or a pry-bar for looseness. Such an inspection must include any brackets, lock washers, lock nuts, locking wires, or cotter pins used.

(4) By "excessively worn" is meant worn beyond serviceable limits or to a point likely to result in failure if the unit is not replaced before the next scheduled inspection.

42. Cleaning

a. General. Any special cleaning instructions required for specific mechanisms or parts are contained in the pertinent section. General cleaning instructions are as follows:

(1) Use dry-cleaning solvent or volatile-mineral-spirits paint thinner to clean or wash grease or oil from all parts of the vehicle.

(2) A solution of one part grease-cleaning compound to four parts of dry-cleaning solvent or volatile-mineral-spirits paint thinner may be used for dissolving grease and oil from chassis and other parts. After cleaning, use cold water to rinse off any solution which remains.

(3) After the parts are cleaned, rinse and dry them thoroughly. Apply a light grade of oil to all polished metal surfaces to prevent rusting.

(4) Before installing new parts, remove any preservative materials, such as rust-preventive compound, protective grease, etc.: prepare parts as required (grease, seals, etc.); and for those parts requiring lubrication, apply the lubricant prescribed in the lubrication order (par. 38).

b. General Precautions in Cleaning.

(1) Dry-cleaning solvent (Stoddard-type) and volatile-mineral-spirits paint thinner are inflammable and should not be used near an open flame. Fire extinguishers should be provided when these materials are used. In addition, they evaporate quickly and have a drying effect on the skin. If used without gloves, they may cause cracks in the skin and, in the

case of some individuals, a mild irritation or inflammation. Use only in well ventilated places.

(2) Avoid getting products, such as dry-cleaning solvent, volatile-mineral-spirits paint thinner, engine fuels, or lubricants on rubber parts as they will deteriorate the rubber.

(3) The use of Diesel fuel oil, gasoline, or benzene (benzol) for cleaning is prohibited.

43. Preventive Maintenance by Driver or Operator

a. PURPOSE. To insure mechanical efficiency, it is necessary that the vehicle be systematically inspected at intervals each day it is operated and also weekly, so defects may be discovered and corrected before they result in serious damage or failure. Certain scheduled maintenance services will be performed at these designated intervals. Any defects or unsatisfactory operating characteristics beyond the scope of the driver or operator to correct must be reported at the earliest opportunity to the designated individual in authority. The services set forth in table II are those performed by the driver or operator before-operation, during-operation, at-the-halt, after-operation, or weekly.

b. SERVICES. Driver and crew maintenance services are listed in table II. Every organization must thoroughly school its personnel in performing the maintenance procedures for this vehicle as set forth in this manual.

44. Preventive Maintenance by Organizational Maintenance Mechanics

a. INTERVALS. The indicated frequency of the prescribed preventive maintenance services is considered a minimum requirement for normal operation of vehicle. Under unusual operating conditions, such as extreme temperatures, dust or sand, or extremely wet terrain, it may be necessary to perform certain maintenance services more frequently.

b. DRIVER OR OPERATOR PARTICIPATION. The drivers or operators should accompany their vehicles and assist the mechanics while periodic organizational preventive maintenance services are performed. Ordinarily, the driver should present the vehicle for a scheduled preventive maintenance service in a reasonably clean condition.

c. SPECIAL SERVICES. These are indicated by the item numbers (*f* below) in the columns which show the interval at which the services are to be performed, and show that the parts or assemblies are to receive certain mandatory services. For example, an item number in one or both columns opposite a *Tighten* procedure means that the

actual tightening of the object must be performed. The special services are as follows:

(1) *Adjust.* Make all necessary adjustments in accordance with the pertinent section of this manual, technical bulletins, or other current directives.

(2) *Clean.* Clean the unit as outlined in paragraph 42 to remove old lubricant, dirt, and other foreign material.

(3) *Special lubrication.* This applies either to lubrication operations that do not appear on the vehicle lubrication order or to items that do appear but which should be performed in connection with the maintenance operations, if parts have to be disassembled for inspection or service.

(4) *Serve.* This usually consists of performing special operations, such as replenishing brake master cylinder with fluid.

(5) *Tighten.* All tightening operations should be performed with sufficient wrench torque (force on the wrench handle) to tighten the unit according to good mechanical practice. Use a torque-indicating wrench where specified. Do not overtighten, as this may strip threads or cause distortion. Tightening will always be understood to include the correct installation of lock washer, lock nuts, locking wire, or cotter pins provided to secure the tightened nut.

d. Special Conditions. When conditions make it difficult to perform the complete preventive maintenance procedures at one time, they can sometimes be handled in sections, planning to complete all operations within the week if possible. All available time at halts and in bivouac areas must be utilized, if necessary, to assure that maintenance operations are completed. When limited by the tactical situation, items with special services in the columns should be given first consideration.

e. Work Sheet. The numbers of the preventive maintenance procedures that follow are identical with those outlined in DA AGO Form 461, Work Sheet for Wheeled and Half-track Vehicles—Preventive Maintenance Service and Technical Inspection. Certain items on the work sheet that do not apply to this vehicle are not included in the procedures in this manual. In general, the sequence of items on the work sheet is followed, but in some instances there is deviation for conservation of the mechanic's time and effort.

f. Procedures. Table III lists the services to be performed by the organizational mechanic or maintenance crew at the designated intervals. Each page of the table has two columns as its left edge corresponding to 6-month or 6,000-mile and 60-day or 1,000-mile maintenance respectively, whichever occurs first in each case. Very often it will be found that a particular procedure does not apply to

Table II. Driver's or Operator's Preventive Maintenance Services

Intervals					Procedure
Before-operation	During-operation	At-the-halt	After-operation	Weekly	
					Caution: Place all tags describing condition of vehicle in a conspicuous location so they will not be overlooked.
X				X	*Tires.* Gage tires for correct pressure (par. 52 *a*). If hot, do not reduce pressure.
		X	X	X	Remove penetrating objects such as nails and glass. Note any apparent loss of air unusual wear, or missing valve caps.
X				X	*Wheels.* Inspect wheel bolt nuts and hub cap screws to see that they are present and secure.
X				X	*Brake hoses, light cable.* Make certain that brake hoses and intervehicular cable are securely connected and in good condition.
X					*Vehicle equipment.* Visually inspect vehicle publications, including necessary forms.
X			X	X	Operate lights (if tactical situation permits) and observe functioning. Visually inspect reflectors.
X		X	X	X	Visually inspect body, rack, gates, and paulin (M104), tank and equipment (M106). See that nothing will drag on the ground.
				X	Check for any tampering or damage that may have occurred since last inspection.
	X				*General operations.* Be alert for any unusual noises or abnormal condition that might indicate a shifting of the load or defective performance of the trailer.

X				*Brakes.* Any time the brakes are used, consider it a test and note any unusual or unsatisfactory performance.
	X	X	X	*Operating faults.* Investigate and correct or report any faults noted during operation.
	X			Be sure all locking devices are secure. Check load for looseness or shifting.
	X	X	X	*Springs.* Check springs for abnormal sag, broken or shifted leaves, loose or missing rebound clips, pins, "U" bolts, or shackles.
		X		*Air-line filters.* Remove drain plug, drain, replace plug (par. 58*a*).
			X	Clean filter element (par. 58*b*).
		X	X	*Air-brake reservoir.* Drain condensation. Check to see that tank and air-line connections are secure.
		X	X	*Lubricate.* Lubricate in accordance with instructions contained in lubrication order (par. 38).
		X		*Clean.* Clean dirt and foreign matter from body. When practicable, wipe off exterior of equipment.
			X	Wash trailer, if possible; otherwise, wipe off thoroughly.
			X	*Electrical wiring.* Check all accessible wiring and make sure that it is securely connected and supported, and that insulation is not cracked or chafed. Report serious defects.

Table III. Organizational Mechanic or Maintenance Crew Preventive Maintenance Services

Intervals		Procedure
6-month or 6,000-mile	60-day or 1,000-mile	
		ROAD TEST
		Note. When practicable, road-test trailer by towing it with the prime mover. Road test should be confined to minimum distance necessary to make proper observations. If tactical situation does not permit a full road test, perform items 5, 10, 12, and 14 which require slight or no movement of the vehicle.
1	1	*Before-operation service.* Perform the before-operation service as outlined in paragraph 43 as a check to determine if the vehicle is in satisfactory condition to make the road test safely.
5	5	*Brakes (service and parking).* With trailer in motion, test operation of trailer service brakes by operating controls on prime-mover, observing their effectiveness. Note any objectionable noise, side pull or other indication of unequalized brake action. Stop vehicle and test action of trailer emergency brake system by disconnecting EMERGENCY hose to trailer. Apply hand brakes and observe how effectively they hold vehicle, that levers have at least one-third of their travel in reserve, and that ratchets and pawls latch the applied brakes securely.
12	12	*Air-brake system leaks.* With air pressure at the governed maximum and brakes applied, stop engine. There should be no noticeable drop in pressure within one minute. If pressure drops, test all connections in the air-actuated portion of the braking system for leaks by the soapsuds method.
14	14	*Brake-fluid leaks.* Look under the vehicle and at the under surfaces of brake drums and hydraulic-brake units for indications of brake-fluid leaks.
13	13	*Temperatures (brake drums and hubs).* Feel each brake drum and wheel hub cautiously for abnormal temperatures. An overheated drum or hub is an indication of a dragging brake, or a defective, dry, or improperly adjusted wheel bearing; an abnormally cool brake drum may indicate an inoperative brake.
10	10	*Unusual noises.* Be on the alert continually for unusual noises from trailer connections, body, or chassis that might indicate damage, looseness, or inadequate lubrication.

47 | 47 | *Tires and rims.* Inspect and service as follows:

Valve stems and caps. Observe if all valve stems are in good condition and in correct position. See that all valve caps are present and installed securely. Do not tighten with pliers.

Condition. With tires properly inflated (par. 12*b*), examine for cuts, bruises, breaks, or blisters. Remove imbedded glass, nails, or stones. Look for irregular tread wear and for any signs of flat spots, cupping, feather edges, or one-sided wear. Any mechanical deficiencies causing such conditions should be determined and corrected or reported. If tires are worn unevenly but still are serviceable, switch wheels to even the wear.

Any tire with cuts or injuries extending to or into the cord body, or any worn smooth in the center of the tread, must be removed and exchanged for reconditioned or new ones.

Matching. With the tires properly inflated, inspect them for matching as to over-all circumference and type of tread. Tires with differences in over-all circumference in excess of three-fourths inch should not be used on the same vehicle.

Rims. All rims and their lock rings should be in good condition and secure.

52 | 52 | *Wheels, bearings, seals, and nuts.* Inspect and service these items as follows:

Wheels. Inspect for good condition.

Bearings and seals. Inspect for looseness of wheel bearing adjustment. Revolve wheels and listen for indications of dry or damaged wheel bearings. Inspect for lubricant and brake-fluid leaks.

52 | *Tighten.* Tighten hub and cap nuts and screws securely.

52 | ---------- | *Clean bearings and seals.* Remove wheels, hubs, and drums (par. 53). Disassemble the bearings and oil seals. Wash thoroughly in dry-cleaning solvent or volatile mineral spirits paint thinner. Check rollers, cups, cones, and seals to see that they are in good condition and that the cups are secure. If cups are in good condition, it is not necessary to remove them unless the bearings must be replaced, in which case new cups should be installed. See if machined surfaces on which bearings are assembled are in good condition.

Note: Do not lubricate or adjust bearings until any necessary brake services (items 48, 49, and 130) have been performed.

Special lubrication. When all related items have been performed to a point where the wheel bearings are to be reinstalled, lubricate the bearings according to the lubrication order (par. 38).

Caution: Do not pack with lubricant the large cavity in the wheel hubs between the bearings as this will cause leakage past the seals.

Adjust. After lubricating the wheel bearings, install the hub and drum assemblies and adjust the wheel bearings (par. 53*d*). Make sure all hub and cap nuts and screws are secure.

Table III. Organizational Mechanic or Maintenance Crew Preventive Maintenance Services—Continued

Intervals		Procedure
6-month or 6,000-mile	60-day or 1,000-mile	
48	----------	*Brake drums and supports.* Thoroughly clean all dirt and grease from these parts, keeping dry-cleaning solvent or volatile mineral spirits paint thinner away from brake linings and wheel cylinder covers. Examine drums to see that they are in good condition, securely mounted and not excessively worn or scored.
		Wheel cylinders. Observe if wheel cylinders are in good condition and securely mounted. Pay particular attention to end covers to see that they are not deteriorated and that there are no indications of leaks. Look for leaks by pulling the lower part of the end cover away from the cylinder. Replace leaking wheel cylinders (par. 56).
		Tighten. Tighten drum mounting nuts, wheel cylinder nuts and backing plate nuts.
	49	*Brake shoes.* Examine the linings to see whether they are so worn that the rivet heads may contact the drums within the next 60 days of operation. If lining cannot be inspected satisfactorily through the inspection hole, remove the right wheel so the lining can be inspected by the motor officer or motor sergeant. If the linings on this wheel brake must be replaced, remove the other wheel and check its brakes and service if necessary. Be sure to clean, lubricate, and adjust all the removed wheel bearings as described in item 52 above, for the 6-month service and to adjust the brakes as described below in this item.
		Note. A similar inspection of the brake linings should be made if the vehicle has recently been operated in deep water, mud, loose sand, or dirt, any of which may have entered the brake drum.
	49	*Adjust.* Adjust by the minor method (par. 54*b*) if linings have not been removed; adjust by major method (par. 54*c*) if brakes have been relined.
49	----------	*Inspect (drums removed).* Observe whether the linings are in good condition, tightly secured to the brake shoes, in good wearing contact with the drums, free of lubricant or brake fluid, and not excessivley worn. Also see that the brake shoes are in good condition; properly secured, and guided by the anchor pins, connecting links, guides, and springs; and properly returned against their cammed surfaces by the brake shoe return springs. The thickness of the lining above the rivet heads at the most worn section should be sufficient for at least 60 days of safe operation. If the linings are badly contaminated with lubricant or brake fluid, replace all linings on both brakes. If the linings are only slightly contaminated with lubricant or brake fluid, clean them thoroughly.

49	----------	*Clean.* Clean all dust from the linings with a wire brush, clean cloth, or compressed air.
49	----------	*Adjust.* After making the necessary inspections and adjustments in item 130 and adjusting the wheel bearings in item 52, adjust the shoes by the minor adjustment method (par. 54*b*), so that the linings have proper clearance from the brake drums. If new linings have been installed, adjust the shoes by the major adjustment method (par. 54*c*). Check the travel of the brake chamber push rod (par 61*a*) to make sure that it is within the specified limits.
130	130	*Parking brakes (ratchet and pawl).* Observe whether these items appear to be in good condition, adequately lubricated, correctly assembled, and securely mounted. Apply the parking brakes and observe whether they operate to hold the vehicle, leaving a sufficient amount of the total lever travel in reserve. See whether the pawl meshes properly with the ratchet teeth to lock the brake in the applied position. Inspect the ratchet and pawl mechanism for excessive wear. Check operation of the cable in the conduit.
83	83	*Brake lines (fittings, hose, tubing, and air filters).* Observe brake lines, fittings, and hose underneath the vehicle and on the axle to see that they are in good condition and secure. Check hydraulic lines for leaks. Clean air filters (par. 58*b*).
89	89	*Brake air hose and connections.* Observe brake air hoses to see that they are in good condition and free from leaks. See that connecting fittings are in good condition, secure, and not excessively worn.
76	76	*Brake air chamber.* See that the air chamber is in good condition, securely connected and mounted, and free from air leaks. Check brake chamber piston travel (par. 61*a*).
67	67	*Brake master cylinder.* The master cylinder should be in good condition and secure. The hose and tube of the submerged breathing device and the boot between the air chamber and the master cylinder should be properly installed. There should be no indications of fluid leaks.
67	67	*Serve.* Remove dirt from and around the filler plug, remove plug, and fill the master cylinder reservoir to one-half inch of the top. Use only specified brake fluid. Clean the filler plug vent hole and reinstall, using a new gasket when necessary.
69	69	*Air-brake application valve (relay-emergency valve).* See that valve is in good condition and secure. Make serviceability tests (par. 59).
70	70	*Air-brake reservoir.* Observe whether reservoir is in good condition and secure. Drain.
56	56	*Springs (clips, leaves, U bolts, hangers, and shackles).* See that springs are in good condition, correctly assembled, and secure. Spring clips and bolts should be in place; spring leaves should not be shifted out of their correct positions. This may be an indication of a sheared center bolt. Note whether the deflection of both springs is normal and approximately the same. Test the hangers, shackles, and shackle pins for excessive wear by means of a pry bar.

Table III. Organizational Mechanic or Maintenance Crew Preventive Maintenance Services—Continued

Intervals		Procedure
6-month or 6,000-mile	60-day or 1,000-mile	
56	56	*Tighten.* Tighten all spring "U" bolts securely and uniformly.
127	127	*Landing gear (front caster and rear support leg).* See that they are in good condition, correctly assembled, secure, and adequately lubricated. Make sure that they are not bent, that they operate freely, and that their lock pins hold them securely.
128	128	*Axle.* Observe whether the axle is sprung or out of line, and that its attachments and mountings are secure.
80	80	*Frame (side and cross members).* Inspect frame, brackets, side rails, and cross members to see that they are in good condition, secure, and correctly alined. If the frame appears to be out of line, report the condition to the proper authority.
124	124	*Lunette and safety chains.* Note whether these items are in good condition, securely assembled and mounted and lunette is not excessively worn. Tighten all mounting and assembly bolts securely.
125	125	*Electric connections.* The intervehicular cable and receptacle should be in good condition, clean, and secure.
81	81	*Wiring, connections, and clips.* Observe these items underneath the vehicle to see that they are in good condition, properly supported, connected, and secure.
91	91	*Lights (tail, stop, and blackout).* Connect the electric system of the trailer with that of a towing vehicle. Operate the switches on the towing vehicle and note whether the proper lights on the trailer respond. Be sure to check the operation of the stop lights. Examine all lamps to see that they are in good condition and secure. Check for dirty or broken lenses.
92	92	*Safety reflectors.* See that all reflectors are present, in good condition, clean, and secure.
100	100	*Body—cargo trailer M104 (panels, tail gates, racks, rack gates, bows, paulin, and auxiliary stakes).* See that these items are in good condition and secure; that tail gates and rack gates are properly alined and fastened securely; that the paulin and end curtains, straps, buckles, and ropes, and the lashing hooks on the body are all present, in good condition, and secure. Note whether all tail-gate and rack-gate hinges and latches are free-acting and adequately lubricated.

100	100	*Body—water tank trailer M106 (tank, covers, latches and hinges, faucet boxes, slats, pump, strainer, hose, bell strainer external valve, manifold valve, piping and manifold, and faucets.* See that these items are in good condition and secure; that tank is free from leaks, corrosion, and sediment; that faucet box covers open freely and latch securely; that valves and faucets operate effectively and do not leak; and that straps hold the pump handle and the hose securely. Note operation of cover latches and make sure that covers fit tightly. Check the condition of the hose and bell strainer. Test the operation of the pump.
99	99	*Fenders.* These items should be in good condition and secure.
103	103	*Paint and markings.* Examine the paint of the entire vehicle to see that it is in good condition, paying particular attention to any bright spots in the finish that might cause glare or reflection. Inspect vehicle markings and identification for legibility. Include identification plates and their mountings.
85	85	*Vehicle lubrication.* Lubricate all points of the vehicle in accordance with instructions in the lubrication chart (par. 38), and the following: Use only clean lubricant. Keep all lubricant containers and dispensers covered except when withdrawing lubricant. Lubrication of items on the Preventive Maintenance Service and Technical Inspection Work Sheet that are marked with an L (special lubrication symbol) should be omitted on this vehicle lubrication. This will avoid duplication and, in some cases, overlubrication. Before applying lubricant, clean the lubrication fitting or plug, so that dirt will not enter with the lubricant If lubrication fittings, vents, or plugs are found missing or damaged, they should be replaced immediately. Clean the hole in which the new fitting is to be installed, install the fittings, and lubricate the unit. On all unsealed bushings or joints, the lubricant should be applied until it appears at the openings. Open any clogged lubrication passage until lubricant is properly delivered. Wipe off excess lubricant that may drip onto brakes, rubber parts, or detract from the vehicle's appearance.

TOOLS AND EQUIPMENT

135	135	*Publication and Standard Form 91.* The vehicle and equipment manuals and Standard Form 91, "Operator's report of motor vehicle accident" should be present, legible, and properly stowed.
141	141	*Modifications (MWO's).* Check DA AGO Form 478 to determine whether all modification work orders have been completed. A list of current modification work orders is contained in SR 310–20–4. Enter any modifications or major unit assembly replacements made during this service on DA AGO Form 478.

Table III. Organizational Mechanic or Maintenance Crew Preventive Maintenance Services—Continued

Intervals		Procedure
6-month or 6,000-mile	60-day or 1,000-mile	
		FINAL ROAD TEST
142	142	Perform final test as outlined under ROAD TEST at the beginning of this table. Pay special attention to any items which have been repaired or adjusted.
		Note. Correct or report all deficiencies found during final road test.
		UNUSUAL CONDITIONS
		Maintenance operations and road tests as prescribed under usual conditions will apply equally well under unusual conditions for operations for all occasions except in extreme-cold weather. Intervals are necessarily shortened in extreme-cold weather servicing and maintenance. Vehicles subject to saltwater immersion or complete submersion are evacuated to ordnance maintenance unit as soon as possible after exposure.

both scheduled maintenances. In order to determine which procedure to follow, look down the column corresponding to the maintenance procedure, and wherever an item number appears, perform the operations indicated opposite the number.

Section IV. TROUBLE SHOOTING

45. General

a. This section contains trouble-shooting information and tests for locating and correcting some of the troubles which may develop in the vehicle. Trouble shooting is a systematic isolation of defective components by means of an analysis of vehicle trouble symptoms; testing to determine the defective component, and applying the remedies. Each symptom of trouble given for an individual unit or system is followed by a list of probable causes of the trouble and suggested procedures to be followed.

b. This manual cannot cover all possible troubles and deficiencies that may occur under the many conditions of operation. If a specific trouble, test, and remedy therefor, is not covered herein, proceed to isolate the system in which the trouble occurs and then locate the defective component. Use all the senses to observe and to locate troubles. Do not neglect use of any test instruments, such as voltmeter, ammeter, test lamp, hydrometer, and pressure and vacuum gages, that are available. Standard automotive theories and principles of operation apply. Question vehicle crew to obtain maximum number of observed symptoms. The greater the number of symptoms of troubles that can be evaluated, the easier will be the isolation of the defective system and components thereof.

46. Brakes

a. GENERAL. In analyzing trouble with the braking system of the unit, it is especially important to localize the cause because of the complexity of the system. It must be remembered that the symptom may be the end result of a defect existing on the towing vehicle instead of the trailer. By the elimination of one possible general source of trouble after another, and then eliminating specific possibilities in the affected portion of the system, the actual cause of the trouble may be isolated and corrected.

b. BRAKES WILL NOT RELEASE.

(1) *Relay-emergency valve in applied position.* Build up pressure in trailer brake system, if trailer is coupled open drain cock on trailer air reservoir, if trailer is uncoupled.

(2) *Brake air hoses improperly connected to towing vehicle* Connect lines properly (par. 31*b* (3)).

(3) *Brake valve on towing vehicle in applied position.* Move brake valve to released position.

(4) *Restriction in tubing or hose.* Check all tubing and hose.

(5) *Shut-off valves closed on towing vehicle.* Open valves.

(6) *Weak or broken brake shoe return spring.* Replace brake shoe return spring (par. 56).

c. No Brakes or Weak Brakes.

(1) *Shut-off valves closed on towing vehicle.* Open valves.

(2) *Brake hoses improperly connected to towing vehicle.* Connect hoses properly (31*b* (3)).

(3) *Trailer air reservoir drain cock open.* Close drain cock.

(4) *Low air pressure.* Check air pressure gage on towing vehicle. Make leakage test (par. 62). Check for restriction in air lines.

(5) *Defective relay-emergency valve.* Make serviceability tests (par. 59).

(6) *Clogged air filter.* Clean or replace element (par. 58*b*).

(7) *Air in hydraulic system.* Bleed hydraulic system (par. 55).

(8) *Leaks in hydraulic system.* Locate leak. Tighten connection or replace broken air line (par. 62).

(9) *Grease on brake lining.* Replace or reline brake shoe (par. 56 or 79) and check and replace grease seal, if necessary (par. 53).

(10) *Worn brake lining.* Adjust brakes (par. 54*b*).

(11) *Worn-out brake lining.* Replace or reline brake shoes (par. 56 or 79).

(12) *Excessive travel of brake chamber push rod.* Check operation (par. 61*a*). If more than seven-eighths inch, adjust brakes (par. 54).

d. Slow Application or Slow Release.

(1) *Low air pressure.* Check air supply. Make leakage test (par. 62).

(2) *Restriction in air lines.* Look for bent or dented tubing.

(3) *Clogged air filter.* Clean or replace element (par. 58*b*).

(4) *Defective relay-emergency valve.* Make serviceability tests par. 59).

(5) *Air in hydraulic system.* Bleed hydraulic system (par. 55).

(6) *Weak or broken brake shoe return spring.* Replace (par. 56).

e. Grabbing Brakes.

(1) *Moisture in filters, reservoir, or relay-emergency valve.* Drain.

(2) *Brakes out of adjustment.* Adjust (par. 54*b*).

(3) *Grease on brake lining.* Replace or reline brake shoe (par. 56 or 79) and check and replace grease seal, if necessary (par. 53).
(4) *Loose or worn wheel bearings.* Adjust bearings (par. 53*d*). If they cannot be adjusted properly, replace (par. 56).
(5) *Cracked, scored, or deformed brake drum.* Replace or repair (par. 53 or 78).
(6) *Worn or loose brake lining.* Replace or reline shoes (par. 56 or 79).

f. Brake Drag (One or Both Brakes Running Hot).

(1) *Brakes adjusted too tightly.* Adjust brake (par. 54*b*).
(2) *Weak or broken brake shoe return spring.* Replace (par 56).
(3) *Drum out of round.* Replace or reline drum (par. 53 or 78).
(4) *Parking brakes not fully released.* Check levers, cable, and conduit (par. 57), and mechanism inside brake drums (par. 56*a*).

g. Ineffective Parking Brake.

(1) *Loose cable.* Adjust (par. 54*d*).
(2) *Cable stuck or not moving freely in conduit.* Free (par. 54*d*).
(3) *Defective sector or pawl.* Replace or repair lever assembly (par. 57 or 80*c*).
(4) *Weak or broken brake shoe return spring.* Replace (par. 56).
(5) *Service brakes out of adjustment.* Adjust (par. 54*b*).

47. Suspension

a. General. The suspension of the vehicle includes a number of units the functions of which are closely related. These units are the springs, axles, hubs, wheels, and tires. Any improper adjustment or operation of one of these may affect the functioning of others. In correcting a specific malfunction, it may be necessary to search for and correct the basic fault rather than to balance out or allow for the more apparent cause of the trouble.

b. Hard Pulling.

(1) *Dragging brakes.* Adjust brakes (par. 54*b*).
(2) *Improper wheel bearing adjustment.* Adjust bearings (par. 53*d*).
(3) *Bent axle.* Replace or repair axle (par. 63 or 85).
(4) *Springs loose or out of alinement on axle.* Straighten springs on spring seats on axle and tighten "U"-bolt nuts.

c. Improper Spring Action.

(1) *Loose "U" bolts.* Tighten "U"-bolt nuts.

(2) *Uneven load distribution.* Distribute load to front and rear of axle.

(3) *Broken spring leaves, center bolts, or clips.* Replace or repair spring (par. 64 or 86).

(4) *Insufficient lubrication of shackle pins.* Lubricate (par. 38).

(5) *Excessive flexibility.* Broken spring leaves. Replace or repair spring (par. 64 or 86).

d. Excessively Worn, Scuffed, or Cupped Tires.

(1) *Improper tire pressure.* Inflate to proper pressure (par. 52*a*).

(2) *Loose wheels.* Tighten wheel-bolt nuts.

(3) *Loose wheel bearings.* Adjust wheel bearings (par. 53*d*).

(4) *Bent rim or wheel.* Replace wheel (par. 52).

(5) *Bent axle.* Replace or repair axle (par. 63 or 85).

48. Front Caster and Rear Support Leg

a. General. Because of the relatively simplicity and localized action of these units, the determination of causes of trouble and the correction of faults should present no great difficulty.

b. Improper Operation of Front Caster.

(1) *Fork swivel does not swivel freely.* Determine if binding is due to lack of lubrication or parts being deformed. Lubricate (par. 38) or replace or repair defective component of caster assembly (par. 67 or 87).

(2) *Wheel does not rotate freely.* Determine cause. Lubricate axle (par. 38). Replace or repair deformed parts or complete assembly (par. 67 or 87).

c. Improper Operation of Rear Support Leg.

(1) *Inner tube is difficult to turn in outer tube.* Determine if binding is due to lack of lubrication (par. 38). If lubrication will not correct difficulty, replace or repair support leg assembly (par. 68 or 88).

(2) *Bent or broken foot.* If bent, straighten; if broken, replace (par. 68).

49. Tail Lights

a. General. In locating the causes of the majority of lighting troubles on the trailer, the first steps are to determine whether the inoperative lamp is burnt out and whether an adequate supply of current is reaching the lamp from the source on the towing vehicle. A tester or test lamp should be used to isolate the seat of the trouble so that appropriate measures can be taken to eliminate it.

b. Lamps Do not Light.

(1) *Intervehicular cable not properly plugged into receptacles on trailer and towing vehicle.* Pull plugs out and reinsert them fully.

(2) *Light switch on towing vehicle not adjusted properly.* Check setting of light switch.

(3) *No current from towing vehicle.* Check circuit breaker and wiring on towing vehicle.

(4) *Short circuit in wiring.* Check wiring for bare spots in insulation.

(5) *Dirty or corroded contacts in receptacle or on plug.* Clean.

c. One or More Lamps Will Not Light.

(1) *Burned out lamp.* Replace lamp (par. 70*a*).

(2) *Broken wire or loose connection.* Check circuit for broken wire or loose connection. Tighten, repair, or replace. Clean connections.

(3) *Damaged light assembly.* Replace or repair light assembly (par. 70 or 90).

(4) *Dirty or corroded lamp socket.* Remove lamp and clean contacts.

(5) *Dirty or corroded contact in receptacle or on plug.* Clean.

d. Dim or Flickering Lights.

(1) *Loose, dirty, or corroded terminals.* Clean and tighten.

(2) *Poor or loose ground.* Clean and tighten terminals of short (ground) wire in back of the receptacle on the trailer.

(3) *Defective lamp. Replace lamp* (par. 70*a*).

(4) *Dirty or corroded lamp socket or contact in receptacle or on plug.* Clean or replace.

50. Body, Tank, and Equipment

a. General. Damage to the body and equipment of the cargo trailer M104, such as tears in the paulin, dents in the panels, and broken slats in the racks, is largely self-evident and means of correction are obvious to the personnel of the responsible echelon. Difficulties with items of equipment of the water tank trailer M106 offer possibilities for prompt correction.

b. Leaking Tanks. Emergency repairs of punctures and tears can be made by cutting pieces of soft wood to fit and forcing them into the holes that are causing the leaks. These matters should be brought to the prompt attention of qualified maintenance personnel who will make permanent repairs by welding and patching.

c. PUMP WILL NOT RAISE WATER TO FILL TANK.

(1) *Pump not primed.* Prime pump by removing priming plug, filling pump with water, and replacing plug.

(2) *Bell strainer not open.* Open strainer by unscrewing wing nut.

(3) *Air leak in suction hose or connection.* Check hose and connections for leaks. Repair or replace hose. Tighten connections.

(4) *Bell strainer, hose, or piping clogged.* Clean (par. 78).

(5) *Leaks at pump packing gland.* Tighten packing gland, repack packing gland, or replace pump (par. 73*d*).

(6) *Worn or otherwise unserviceable plunger crimp or lower valve leather.* Replace crimp, lower valve leather, or pump assembly (par. 73*d*).

d. NO WATER AT FAUCETS.

(1) *External valve closed.* Latch external valve handle in open position.

(2) *Manifold valve closed or not fully opened.* Swing the handle of the manifold valve to the limit of its 180 degree travel.

(3) *Sediment in tank and/or valves.* Drain, clean, and flush (par. 72).

e. DEFECTIVE FAUCET.

(1) *Leaking faucet.* Replace worn or otherwise unserviceable valve seat washer or replace faucet (par. 73*g*).

(2) *Self-closing feature not effective.* Replace broken spring or replace faucet (par. 73*g*).

Section V. WHEELS, TIRES, HUBS, AND BRAKE DRUMS

51. General

The wheel and hub may be removed and installed as a unit or separately. The wheel is separated from the hub in changing tires and in making any major brake adjustment, repair, or replacement.

52. Wheels and Tires

a. TIRE INFLATION. Standard inflation pressure for highway driving is 50 psi; for cross-country driving, 35 psi; for driving in sand, 15 psi. Pressure in both tires must be equal. When checking tire pressure, do not reduce pressure if tires are hot, unless pressure must be reduced to increase traction for cross-country driving or driving in sand.

b. REMOVAL OF WHEEL FROM HUB. Loosen wheel-stud nuts (fig. 29) with wheel stud nut wrench—41–W–3843–15.

Note. Nuts on right side (marked R) have right hand threads and those on left side (marked L) have left threads. Nuts must be turned in opposite direction to normal forward revolution of wheel to be loosened or removed.

Jack up wheel to be removed until tire clears ground. Remove six wheel-stud nuts and remove wheel.

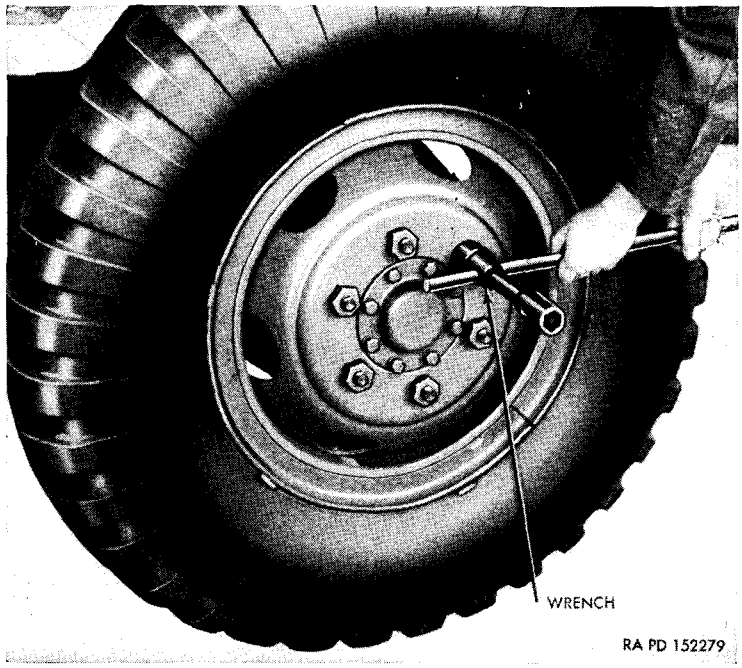


Figure 29. Removing wheel from hub using wrench.

c. Removal of Tire From Wheel.

(1) *Remove split lock ring.* Deflate tire by unscrewing tire valve with valve cap and removing valve. With tire tool, force bead clips free from split lock ring. Place small end of tire tool in slot between split lock ring and wheel rim and pry end of lock ring from its groove in wheel rim (*fig.* 30). It will prove helpful to place a tire iron or chisel under the pried-up end of lock ring to hold it until next successive portion is pried from place.

(2) *Remove tire.* Turn wheel over, placing it on blocks or other objects to raise tire about 6 inches from ground. Force bead clips free of wheel rim. Force tire valve stem into tire through slot in wheel rim. Press and pry one tire bead and then other from wheel rim. Weight of tire, as it hangs from blocked up wheel, will aid in its removal. Standing on casing will help force it off rim. Remove tire flap and tube from tire.

Figure 30. Prying lock ring from wheel.

d. Installation of Tire on Wheels.

(1) *Mount tire.* Put tube into tire. Insert flap. Fit bead clips on tire bead opposite to one toward which tube stem is pointing. With beaded edge of rim downward, place wheel on blocks or other objects sufficiently high to raise rim an inch or more off the ground. Lower tire onto wheel with bead containing bead clips downward and with valve stem lined up with stem slot in wheel rim. Stand on tire on side opposite stem to force tire on rim. Fit bead clips to other tire bead.

(2) *Install split lock rim.* Place split ring on wheel. Start an end of split ring under bead of rim by standing on ring and stamping it into groove in rim with heel (fig. 31). As a portion of ring goes into place, stand on that portion and stamp it progressively into place. Inflate tire slightly and pound casing all around to make tube fit smothly inside casing. Inflate to proper pressure (*a* above). Bead clips should be forced into clinched position over wheel rim and split ring by tire as it becomes fully inflated.

e. Installation of Wheel on Hub. Place wheel on 6 wheel studs in hub. Install wheel-stud nuts, using wheel stud nut wrench 41-W-3843-15 (fig. 29). Tighten them alternately, to insure that they will

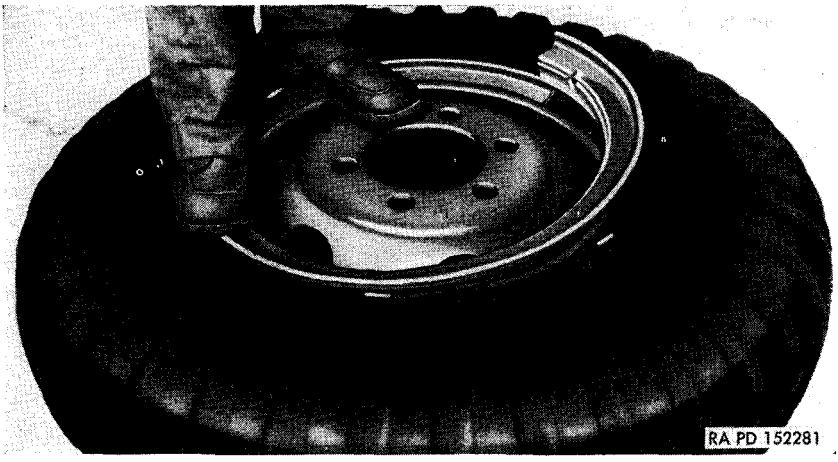


Figure 31. Forcing split lock ring into groove in wheel rim.

be tightened evenly. Lower jack. Check tightness of wheel-stud nuts.

53. Hub and Brake Drum

a. Remove Wheel From Hub. Refer to paragraph 52*b*.

b. Removal of Hub and Brake Drum From Axle.

(1) *Remove wheel nuts.* Remove six cap screws which hold hub cap. With screwdriver or chisel, lift bent-over portion of wheel nut lock to release outer wheel nut. With wheel bearing nut wrench 41–W–3748–75, remove outer wheel nut (fig. 32). Slide off keyed wheel nut lock (fig. 33). Remove inner wheel nut also using wrench 41–W–3748–75.

(2) *Remove bearings.* Move hub and brake drum assembly slightly on axle spindle to loosen outer bearing. Remove cone and roller assembly of outer bearing (fig. 33). Carefully lift hub and brake drum assembly from axle spindle, taking care that cone and roller assembly of inner bearing does not fall out if it is removed with hub. Remove cone and roller assembly of inner bearing from spindle or hub. Do not remove bearing cups from hub unless they require replacement. Carefully remove inner grease seal from axle spindle.

c. Clean and Lubricate Hub and Bearings. Wash bearing cone and roller assemblies in dry-cleaning solvent or volatile-mineral-spirits paint thinner. Clean with brush to remove old lubricant. Dry and inspect for defects and wear. Using lubricants specified in lubrication chart (par. 38), completely fill spaces around rollers and above and

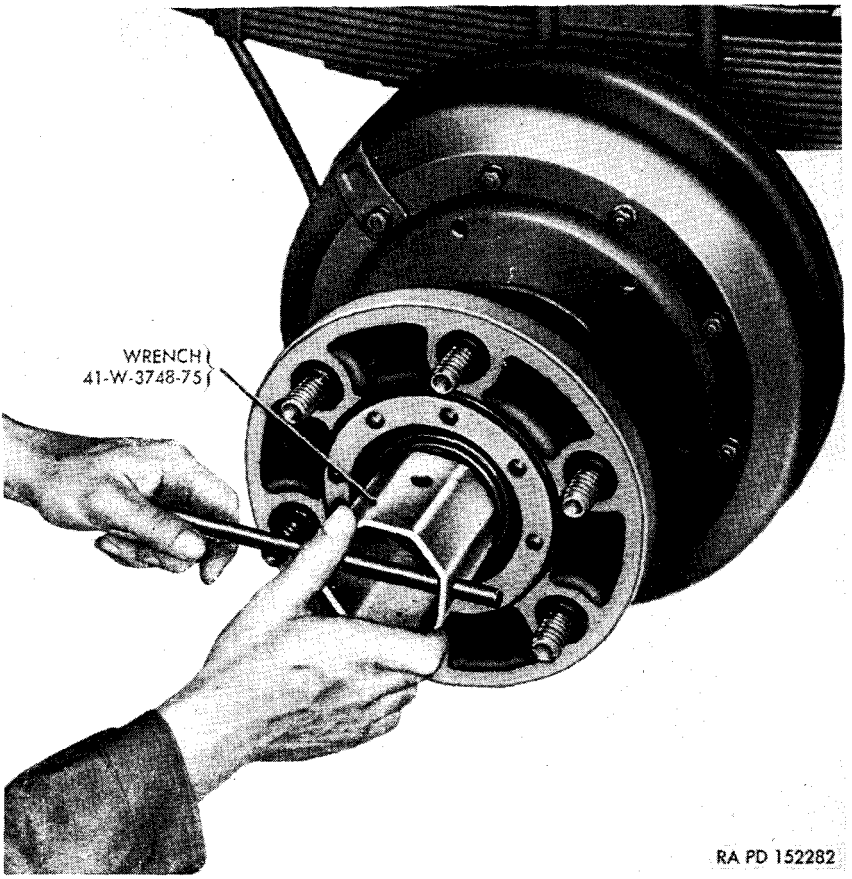


Figure 32. Removing outer wheel nut with wrench.

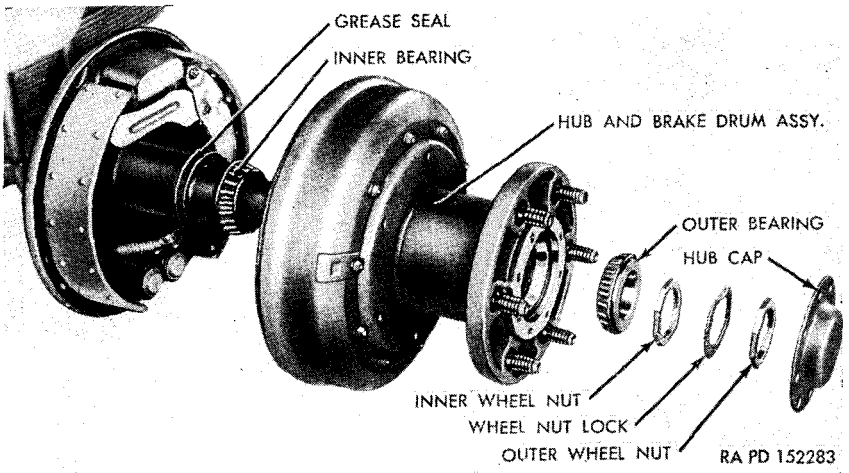


Figure 33. Hub and bearing retaining and adjusting parts.

beneath cone, kneading lubricant into all openings. Thoroughly wash hub to remove old lubricant. Inspect condition of bearing cups and replace (*h* and *i* below) if worn, distorted, or scored. Apply thin coating (not over 1/16-inch thick) of bearing lubricant to inside surface of hub and outside of spindle.

Caution: Do not pack or fill hub with lubricant as this may result in leakage on brake linings.

d. INSTALLATION OF HUB AND DRUM.

(1) *Install bearings.* Install grease seal (fig. 33) and inner (larger) bearing cone and roller assembly on axle spindle. Bearing may have to be tapped gently but kept absolutely true with axle, to be forced into place. Position hub and drum assembly over inner bearing. Insert outer bearing cone and roller assembly in hub. Screw on inner wheel nut.

(2) *Adjust bearings.* While turning hub, tighten inner wheel nut using wrench 41–W–3748–75 until drum binds on spindle. Back off nut about one-eighth turn. Check adjustment by grasping drum and attempting to rock it on the spindle. If bearings are properly adjusted, movement of brake drum in relation to top edge of backing plate will scarcely be visible with drum turning freely. If movement is excessive, further adjustment is required.

Note. Bearings may be adjusted without removing wheel from hub.

(3) *Lock wheel nuts.* Slide wheel nut lock (fig. 33) on axle spindle. Install outer wheel nut using wrench 41–W–3748–75 (fig. 32), drawing it up tightly against wheel nut lock and inner wheel nut but using care not to disturb the bearing adjustment. Bend edge of wheel nut lock over inner wheel nut. Test bearing adjustment. Bend edge of wheel nut lock over outer wheel nut to lock outer nut. Install hub cap.

e. INSTALL WHEEL ON HUB. Refer to paragraph 52*e*.

Note. The following hub and drum operations are to be performed, if required, after wheel has been removed from hub (par. 52*b*) and hub and brake drum have been removed from axle (*b* above).

f. REMOVAL OF DRUM FROM HUB. Turn the brake drum so that a wrench can reach beneath oil slinger and remove the eight cap screws which fasten brake drum adapter assembly to hub. Remove the ten lock nuts from bolts which fasten brake drum, oil slinger, and inspection hole cover to brake drum adapter assembly. Remove bolts and oil slinger as a unit. Bolts have knurled area on shank which causes them to be retained in oil slinger unless forced out.

g. INSTALLATION OF DRUM ON HUB. With ten bolts installed in oil slinger, put bolts through holes in brake drum adapter assembly

and then through holes in brake drum. Install lock nuts. Install adapter assembly to hub with eight cap screws and lock washers.

h. Removal of Bearing Cup From Hub. Assemble two parts of bearing cup remover and replacer 41–R–2374–630 and fit their outer edges to contour of bearing cup in hub (fig. 34). Turn hub over,

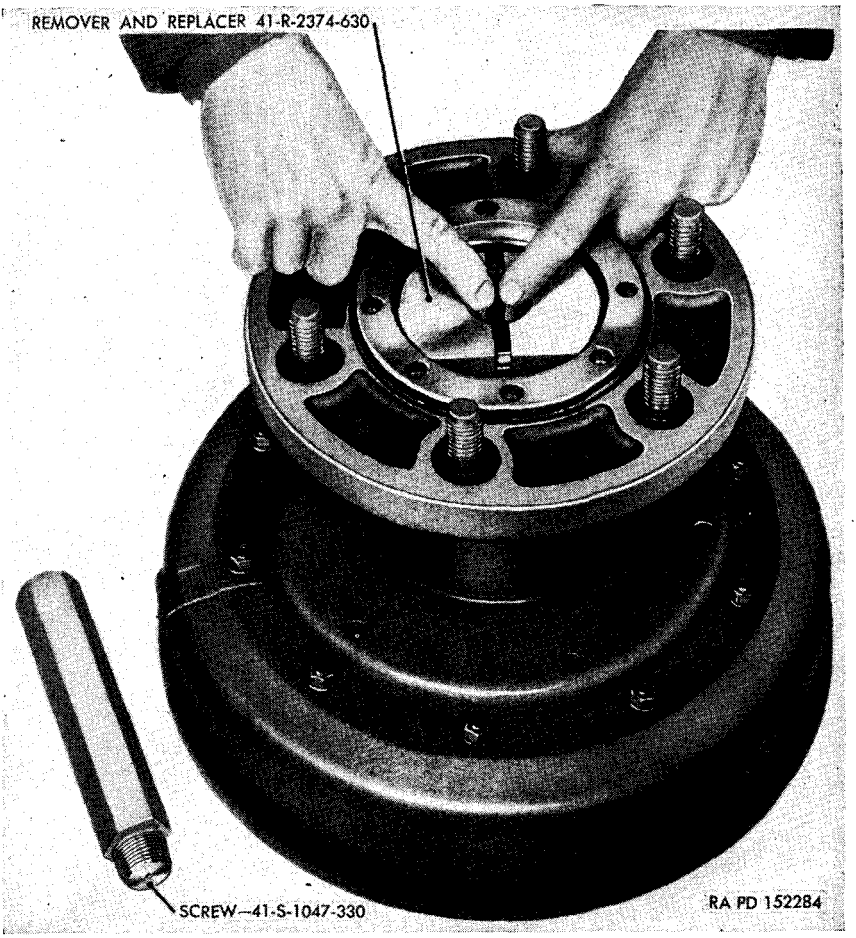


Figure 34. Fitting remover and replacer—41–R–2374–630 on bearing cup.

spread two parts of remover and replacer, and screw in screw 41–S–1047–330. Hammer on end of screw to drive out bearing cup. Remove other bearing cup from opposite side of hub in same manner.

i. Installation of Bearing Cup in Hub. Position bearing cup in hub. Fit remover and replacer 41–R–2374–630 in cup and screw in screw 41–S–1047–330. Drive bearing cup into its seat. Turn hub over and install other bearing cup in same manner.

Section VI. BRAKES

54. Brake Adjustments

a. General. Brake adjustment to compensate for normal lining wear is termed "minor adjustment." Following a rebuild or when new linings are installed, each brake shoe must be adjusted to center brake-shoe arc in relation to the drum and is termed "major adjustment." Parking brake linkage is adjusted to regulate amount of reserve travel of brake levers on ratchets.

Note. Always check wheel-bearing adjustment (par. 53*d*) before adjusting brakes. A satisfactory brake adjustment cannot be obtained unless wheel bearings are in proper adjustment. Check and adjust parking brakes whenever a minor or a major brake adjustment is made. Do not adjust brakes when drums are hot.

b. Minor Adjustment. The minor adjustment can be made without removing the wheel from the hub.

(1) Release parking brake. Release all pressure from braking system by opening drain cock on reservoir. Jack up wheel or drum so that it may be rotated.

(2) Turn one of the shoe-adjusting-cam nuts (fig. 35) on upper rear face of backing plate to bring brake lining in contact with drum until brake drags slightly when wheel or drum is turned by hand. Back off adjusting-cam nut just enough to allow wheel or drum to rotate freely.

(3) Repeat this procedure with other shoe-adjusting-cam nut, which is rotated in opposite direction to loosen and tighten. Make both adjustments at each wheel as uniform as possible. Shape of cam permits nut to be turned only so far. Cams have friction springs which lock them in set positions.

c. Major Adjustment. The wheel must be removed from hub before making major adjustment to give access to inspection hole in drum.

(1) Remove wheel from hub (par. 52*b*). Remove nut which holds cover on inspection hole in brake drum.

(2) Rotate drum until opening is 1½ inches from bottom end of rear brake shoe. Insert 0.010-inch feeler gage between drum and bottom end of shoe (fig. 36). Loosen lock nut on brake anchor pin. Hold lock nut with one wrench and turn anchor pin with a second wrench (fig. 37) until 0.010-inch clearance is obtained.

(3) Rotate drum until opening is 1½ inches from top end of rear brake shoe. Insert 0.020-inch feeler gage and turn anchor pin until 0.020-inch clearance is obtained. Check lower clearance again.

971845°—51——6

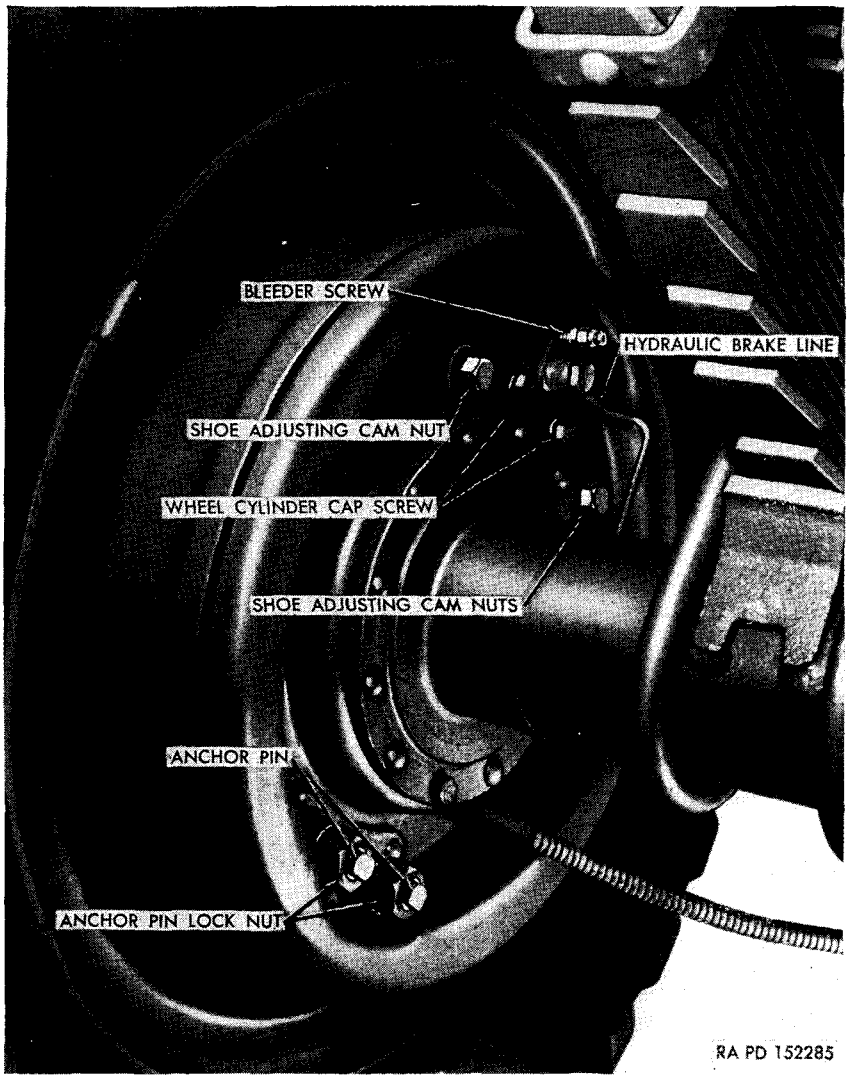


Figure 35. Brake shoe adjusting cam nuts used in making minor adjustment.

(4) Repeat this procedure on front brake shoe. Tighten anchor pin lock nuts and check clearances again.

(5) Check brake lining clearance by "minor adjustment" (*b* above). Install inspection hole cover. Install wheel.

d. Parking Brake Adjustment. Parking brake linkage must be adjusted when parking-brake-lever reserve travel is less than one-half of ratchet range.

(1) Block wheels to keep trailer from moving. Release parking brakes. Remove cotter pin from clevis pin to release clevis (fig. 38).

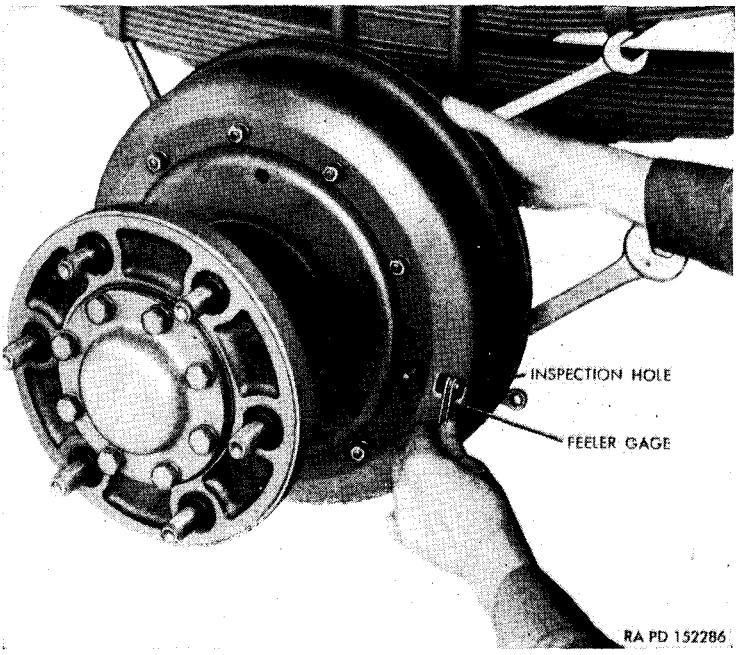


Figure 36. Checking brake lining clearance with feeler gage.

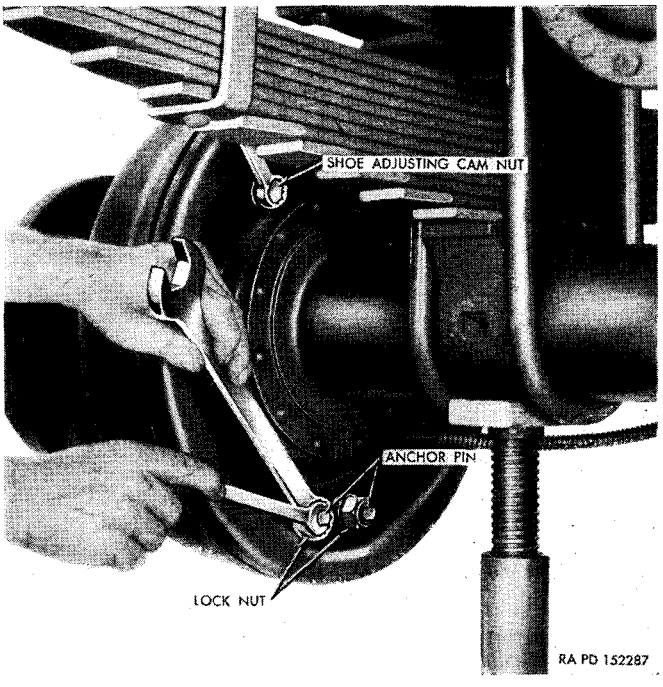


Figure 37. Making brake "major adjustment" at anchor pins.

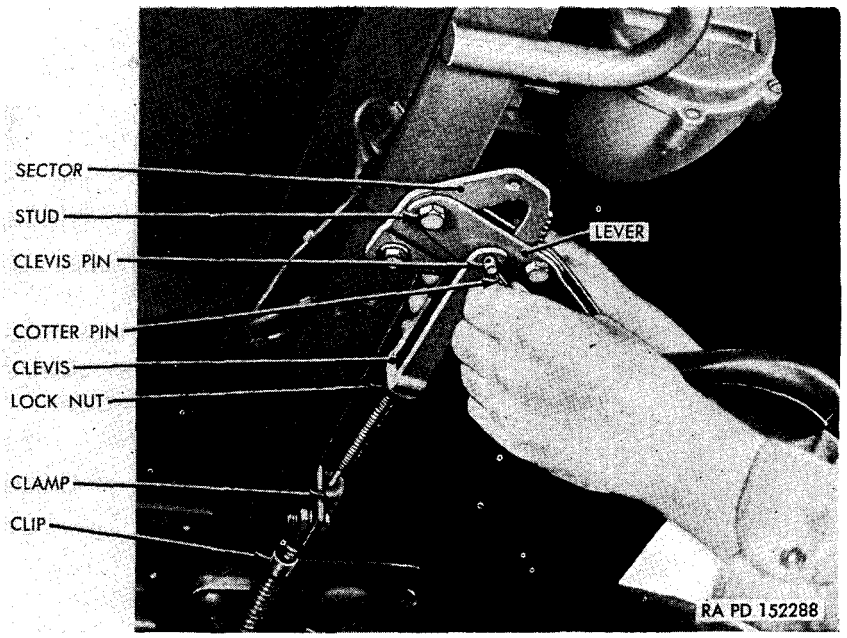


Figure 38. Removing clevis pin from parking brake lever.

(2) Make certain that brake cable operates freely in conduit. Work it back and forth by hand to be sure broken strands do not cause binding. Use special preservative lubricating oil as a penetrating oil to free it up and lubricate, if necessary.

(3) Place brake lever in forward position on sector. Screw lock nut forward on threaded end of cable. Pull cable to take up slack. Screw clevis forward on thread until clevis pin can just be inserted through lever to hold clevis. Test operation of brake lever for proper reserve travel. Insert cotter pin in clevis pin. Screw lock nut against clevis firmly. Remove blocks.

55. Bleeding Hydraulic Brake System

a. Purpose. Proper operation of hydraulic portion of brake system requires a "solid column" of fluid (without air bubbles). It is necessary to bleed system to expel any air which may be entered for any reason. Need for bleeding is generally indicated by poor braking action. Bleeding can be done manually or with pressure feed filler.

b. Manual Bleeding of Hydraulic Brake System. Trailer braking system must be connected to braking system of towing vehicle for manual bleeding operations as pedal must be pressed and released to actuate system. Master cylinder reservoir must be kept full during

bleeding operations or air will enter and make "rebleeding" necessary.

(1) Clean bleeder screw (fig. 35) at top of brake backing plate. Attach bleeder tube (fig. 39) and place other end of tube in jar or bottle so that end is submerged in hydraulic brake fluid. Remove filler plug from top of reservoir of master cylinder. Fill reservoir with brake fluid.

(2) While brake pedal on towing vehicle is being pumped slowly up and down, open bleeder screw by turning three-quarter-turn clockwise. Liquid will be forced through line to expell

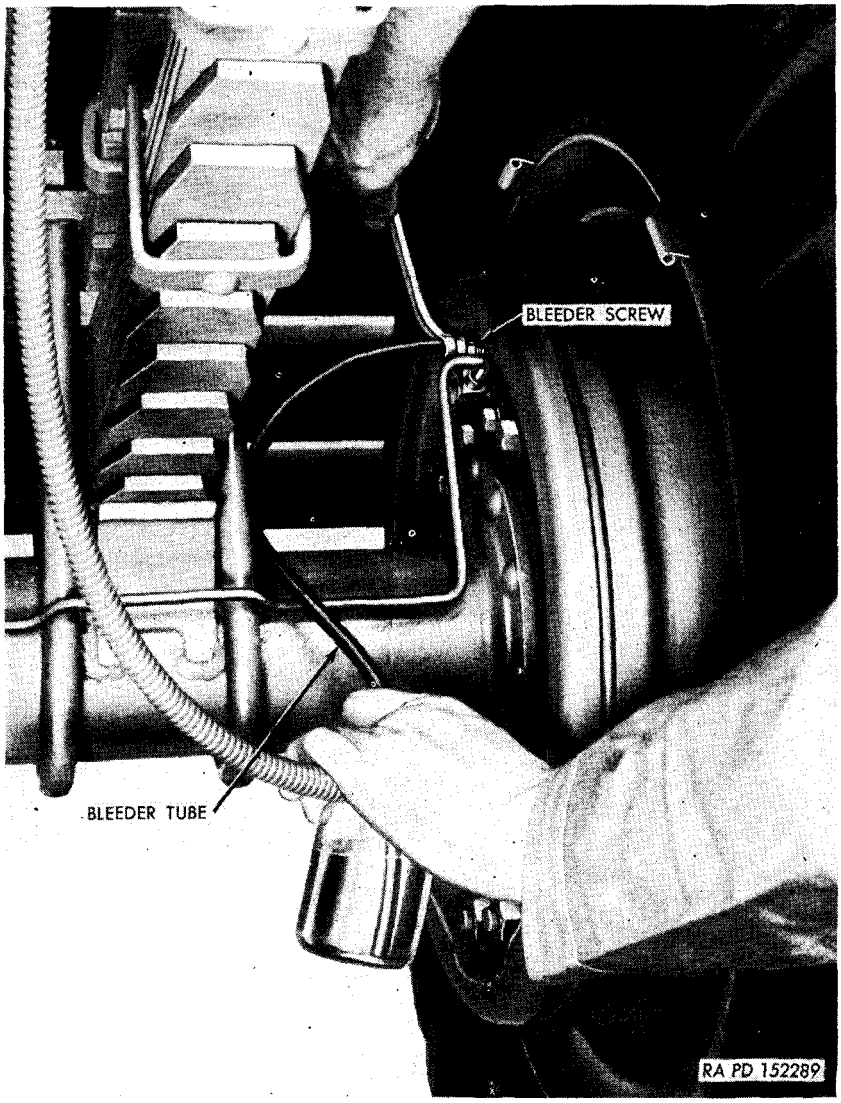


Figure 39. Bleeding hydraulic brake wheel cylinder.

air which will show as bubbles in fluid coming out of tube. Repeat operation approximately ten times.

(3) Watch flow, keeping tube submerged in fluid. When air bubbles cease and stream is a clean, solid mass, close bleeder screw firmly. Remove tube.

(4) Repeat operations on other wheel cylinder. Replenish fluid in master cylinder before other wheel is bled. Install filler plug in top of reservior of master cylinder.

c. Bleeding Hydraulic Brake System with Pressure Feed Filler. Connect hose of pressure feed filler with proper size adapter to opening for master cylinder filler plug. Filler should contain from 10 to 20 psi air pressure and sufficient fluid to maintain constant fluid level in master cylinder. Bleed system as in manual bleeding method (*b* above) except that manual operation of brake pedal is not required nor is replenishing of brake fluid.

56. Internal Brake Mechanisms

a. Removal of Parking Brake Internal Lever and Strut.

(1) Remove wheel from hub (par. 52 *b*).

(2) Remove hub and drum assembly from axle (par. 53 *b*).

(3) Release parking brake cable clevis from hook at lower end of internal lever (fig. 14). Remove cotter pins and unscrew slotted nuts from two bolts which attach strut and lever to upper ends of brake shoes. Remove strut and lever as an assembly; then separate.

Note. Internal brake mechanism parts may be attached by slotted nuts and cotter pins, "C" washers, "hair-pin" retainers, or "horse-shoe" retainers.

b. Removal of Brake Shoes.

Caution: Make sure all pressure has been relieved from braking system by opening drain cock on air reservoir (fig. 23).

(1) Install clamp over ends of wheel cylinder to retain pistons. Remove return spring (fig. 40) with brake spring pliers.

(2) Remove retainers and guide pin washers which hold brake shoes in position on guide pins. Remove retainers and washers from anchor pins. Remove brake shoes. Remove washers from short guide pins. Remove washers and springs from long guide pins. Remove retainers and felts from anchor pins.

c. Removal of Brake Wheel Cylinder.

Caution: Prevent brake fluid from coming in contact with brake linings either by dripping or from soiled hands.

(1) Disconnect hydraulic brake line from wheel cylinder at rear of backing plate (fig. 35).

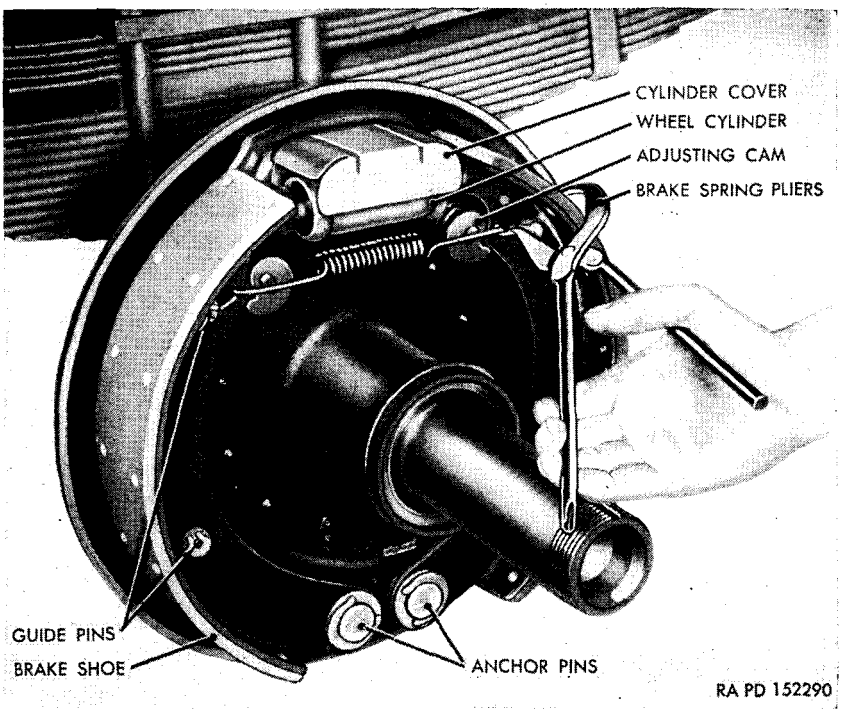


Figure 40. Removing brake shoe return spring.

(2) Remove two wheel cylinder cap screws and lock washers (fig. 35) holding cylinder to backing plate. Remove cylinder cover and wheel cylinder (fig. 14).

d. Installation of Brake Wheel Cylinder.

(1) Position cover and wheel cylinder on backing plate. Install two lock washers and cap screws through rear of backing plate (fig. 35). Tighten.

(2) Connect hydraulic brake line to wheel cylinder (fig. 35).

(3) Bleed brake system (par. 55).

e. Installation of Brake Shoes.

(1) Install washer over each short guide pin. Install spring and washer over each long guide pin. Install felt and retainer over each anchor pin. Position brake shoes over anchor pins and guide pins.

(2) Make certain that upper ends of brake shoes are properly engaged by connecting links in ends of wheel cylinder. Install return spring with brake shoe pliers (fig. 40) in upper guide pin holes in brake shoes.

(3) Install washers and retainers on guide pins. Install flat washers and retainers on anchor pins.

f. Installation of Parking Brake Internal Lever and Strut.

(1) Insert end of cable through hole in backing plate, fitting rubber sleeve into hole to make it as watertight as possible. Connect clevis on end of cable over hooked end of internal lever. Assemble forked end of strut over pin on back of lever and slide holes in strut and lever over bolts in upper ends of brake shoes (fig. 41). Secure with castle nuts and cotter pins. Attach cable to backing plate with clamp.

(2) Install hub and drum assembly on axle. Refer to paragraph 53*d*.

(3) Adjust brakes with "major adjustment." Refer to paragraph 54*c*.

(4) Install wheel on hub. Refer to paragraph 52*e*.

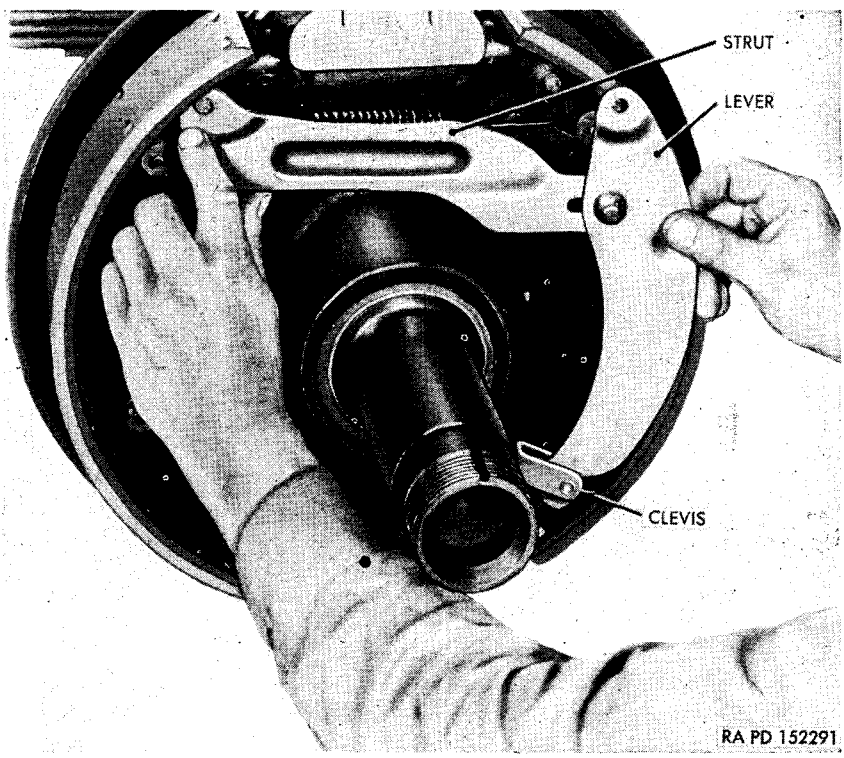


Figure 41. Installing parking brake internal lever and strut.

57. Parking Brakes

a. Adjustment. Refer to paragraph 54*d*.

b. Removal of Parking Brake Lever. Remove cotter pin from clevis pin to release clevis (fig. 38). Remove nuts from stud and bolt which fasten lever assembly to frame side rail.

c. Removal of Cable and Conduit. Remove nuts from bolts holding cable clamp to bracket on side rail. Remove clip holding cable to side rail. Remove wheel, and hub and brake drum assembly (par. 53*b*). Remove parking brake cable clevis from hook at lower end of parking brake internal lever.

d. Removal of Internal Lever and Strut. Refer to paragraph 56*a*.

e. Installation of Internal Lever and Strut. Refer to paragraph 56*f*.

f. Attachment of Cable and Conduit to Side Rail. Bolt cable clamp (fig. 38) bracket on side rail. Attach cable clip to side rail with self-tapping screw.

g. Installation of Parking Brake Lever. Fasten lever assembly to side rail with stud (shoulder bolt) through lever and sector (fig. 38) and with bolt. Connect cable clevis to lever with clevis pin; secure with cotter pin.

58. Hose Couplings and Air Filters

a. Drainage of Moisture from Air Filters. To drain accumulations of moisture from air filters, remove drain plug (fig. 42).

Caution: Use care in removing plug not to twist air filter and break neck of connection on which air filter is mounted. Replace plug after drainage.

b. Cleaning and/or Replacing Element in Air Filter.

(1) *Disassembly.* With a wrench on housing of air filter to keep it from being twisted, remove nut which serves as base (fig. 42). Accumulation of paint may have to be scraped away to permit nut to be unscrewed. As nut is unscrewed, gasket, spring, seat washer, and element will come from housing.

(2) Cleaning. Clean all metal parts, including inside of housing, with dry-cleaning solvent or volatile-mineral-spirits paint thinner. Clean element by dusting and rinsing with dry-cleaning solvent or volatile-mineral-spirits paint thinner. If element is damaged or impregnated with oil or gummy deposit, it must be replaced.

(3) Assembly. Check gasket before installing it on nut; replace if unserviceable. Place spring, seat washer, and element on nut (fig. 42), press parts into housing, and screw nut on housing.

c. Removal of Hose Couplings and Air Filters. Remove hose coupling from coupling-to-filter connection (fig. 42) by unscrewing. Remove jam nut and lock washer. Unscrew tube elbow from air filter housing. Draw connection from hole in cross member of A frame. Unscrew connection from air filter housing.

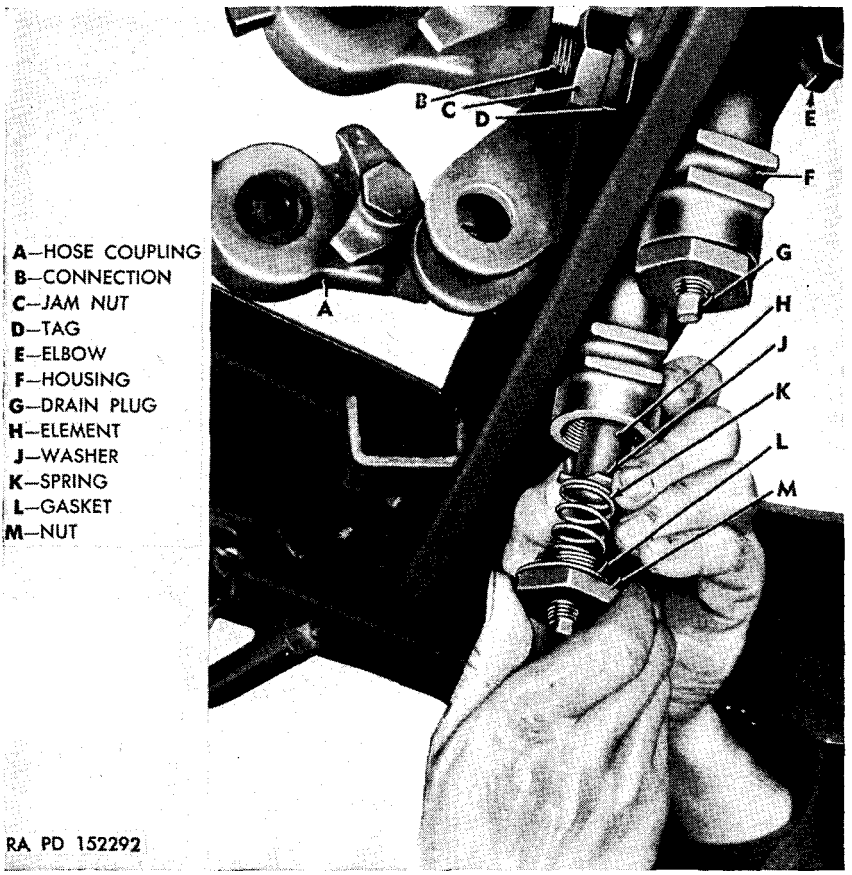


Figure 42. Removing element from air filter.

d. Installation of Hose Couplings and Air Filters. Install coupling-to-filter connection and tube elbow tightly in their respective openings in air filter housing. Put connection through hole in **A** frame cross member. Place proper tag (SERVICE on right side; EMERGENCY on left side) on connection and secure connection with lock washer and jam nut. Connect tube elbow to air line. Screw hose coupling on connection.

59. Relay-emergency Valve

a. Drainage of Moisture from Relay-emergency Valve. To drain accumulated moisture, remove drain plug (fig. 43). Replace plug after drainage.

b. Operating Tests.

(1) With air brake system of trailer connected and charged, apply brakes and check to be sure that brakes on both trailer wheels apply properly.

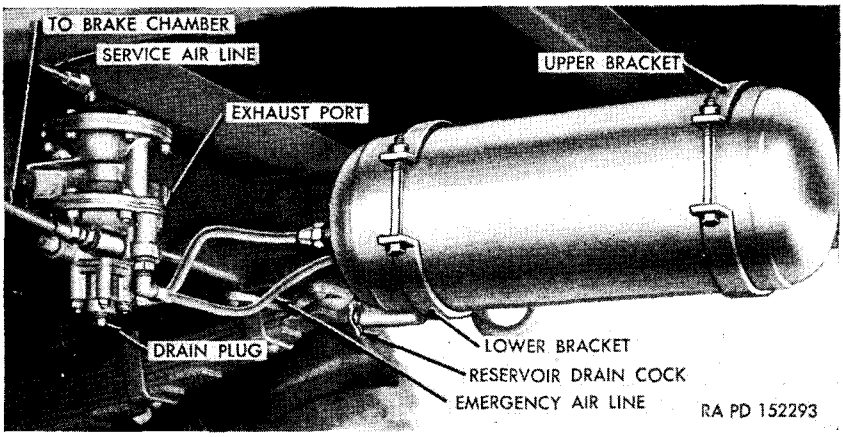


Figure 43. Relay-emergency valve and air reservoir on trailer.

(2) Release brakes and check to be sure air pressure is exhausted promptly through exhaust port (fig. 43).

(3) With trailer brake system fully charged, close shut-off cock in emergency line on towing vehicle and disconnect emergency air hose. Check to be sure trailer brakes apply automatically.

(4) Connect emergency air hose, open shut-off cock on towing vehicle, and check to be sure brakes release automatically.

c. Leakage Tests.

(1) With air brake system of trailer connected and charged, apply soapy water to flanges which hold diaphragms and to service line coupling. No leakage should be present. Tighten nuts on flanges and tighten coupling as required.

(2) Coat exhaust port (fig. 43) with soap suds. Apply brakes.

(3) Release brakes and apply coating of soap suds to exhaust port.

(4) With relay-emergency valve in emergency position (operating test (3) above), coat exhaust port with soap suds.

(5) Leakage in tests (2), (3), and (4) above must not exceed a 1-inch bubble in three seconds. If excess leakage is found, replace relay-emergency valve.

d. Removal of Relay-emergency Valve.

Caution: Release air pressure from system by opening drain cock on reservoir (fig. 43). Disconnect air line tube elbow from service port and emergency port and tube couplings to brake chamber and reservoir. Remove nuts and lock washers from two bolts which attach valve to cross member.

e. Installation of Relay-emergency Valve. Position valve on cross member and secure with two bolts, lock washers, and nuts. Con-

nect air lines to reservoir, brake chamber, service port, and emergency port. Make operating tests and leakage tests (*b* and *c* above).

60. Reservoir

a. Test and Check for Serviceability. With brake system charged, coat drain cock, connector, and outside of reservoir with soap suds. No leakage is permissible. Tighten any leaking connection. Inspect for damage or corrosion. Replace reservoir, if it leaks or if any damage or corrosion is found that would weaken reservoir.

b. Removal of Reservoir.

Caution: Release air pressure from system by opening drain cock. Disconnect tube connector on air line from relay-emergency valve. Remove two nuts, lock washers, and bolts which join reservoir upper and lower brackets (fig. 43). Remove reservoir from brackets.

c. Installation of Reservoir. Position reservoir in brackets so drain cock will be at lowest point. Join brackets with two bolts, lock washers, and nuts. Connect air line to relay-emergency valve.

61. Brake Chamber and Hydraulic Master Cylinder

a. Test for Proper Brake Chamber Piston Travel.

(1) *Purpose.* Insufficient brake chamber piston travel will result in damage to rubber cup in master cylinder. Excessive travel will result in ineffective brakes on high speed stops.

(2) *Test.* With brakes released, insert a small rod through one of two inspection holes in brake chamber (fig. 44). Mark rod at surface of bracket when rod contacts piston in brake chamber. Apply brakes and again mark rod at surface of bracket with rod in contact with piston. Withdraw rod and measure distance between marks which will designate amount of piston travel. Brakes should be adjusted to permit a minimum of ½-inch travel and a maximum of ⅞-inch travel. Adjust brakes (par. 54), if necessary.

b. Removal of Brake Chamber and Master Cylinder.

Caution: Release air pressure from system by opening reservoir drain cock. Disconnect tube elbow from brake chamber and hydraulic hose connection from master cylinder. Remove nuts and lock washers from three bolts which attach bracket (fig. 44) to frame side rail. Remove complete assembly.

c. Installation of Brake Chamber and Master Cylinder. Install bracket on frame side rail with three bolts, lock washers and nuts (fig. 44). Connect tube elbow to brake chamber and hydraulic hose connection to master cylinder.

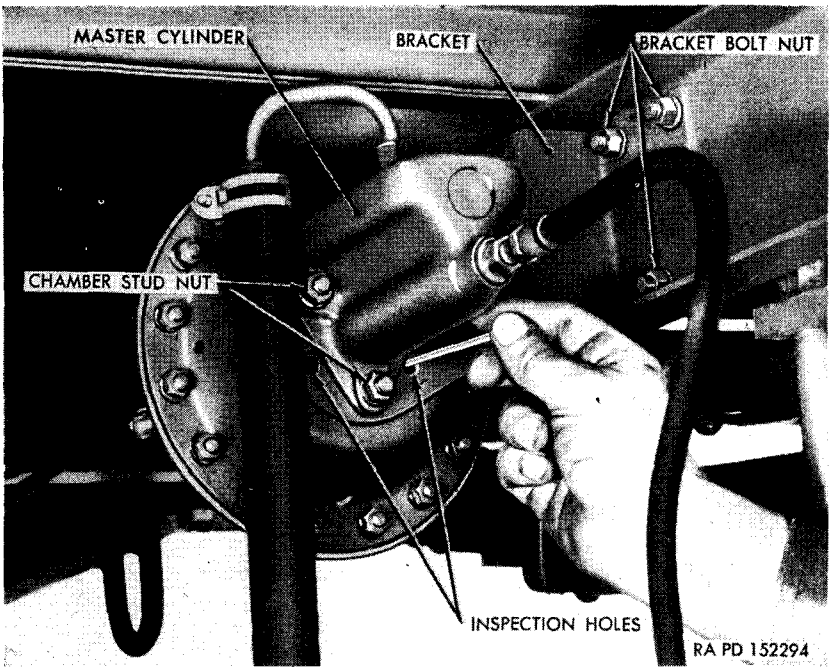


Figure 44. Testing brake chamber piston travel.

62. Air Hose, Tubing, and Fittings

a. Test and Check for Serviceability. With hose couplings connected and brakes applied, coat hose couplings and connections of hoses and air line tubing with soap suds. Examine hydraulic lines and connections. No leakage is permissable.

(1) Leakage of couplings is usually caused by worn, damaged, or improperly installed packing ring. Install new ring to stop leaks (*c* below).

(2) Tighten hose connectors to check leakage. Replace sleeve or entire connector, if necessary (*d* below).

(3) Tighten fittings on tubing. Tighten self-tapping screws which clip tubing to frame. Inspect tubing for partial restrictions caused by dents and kinks. Replace new piece of tubing or fitting (*f* below) if damaged or leak cannot be stopped.

b. Removal of Packing Ring From Hose Coupling. Remove old ring (fig. 45) by prying it out of hose coupling with screwdriver.

c. Installation of Packing Ring in Hose Coupling. Clean groove in coupling from which ring has been removed. Partially collapse ring with fingers, and enter one side of ring flange into groove. Use blunt nose of screwdriver to push ring into place. Face of ring must lie flat with no twist or bulge.

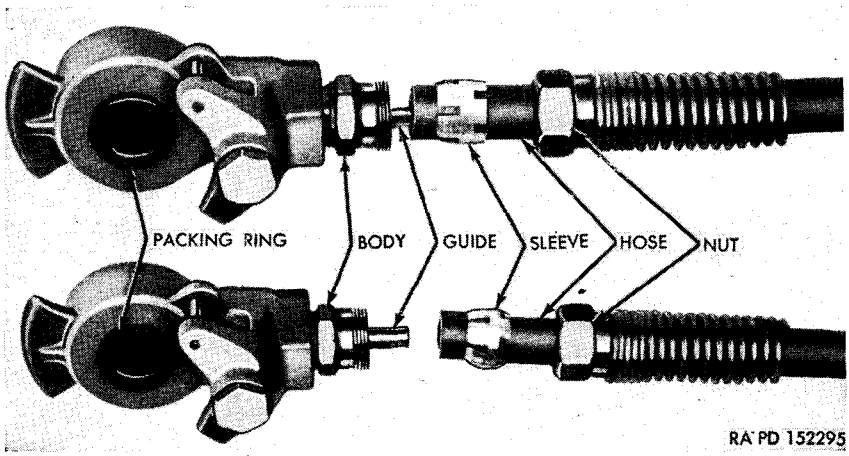


Figure 45. Air hose connector sleeve before and after installation.

d. Removal of Hose Connector. Unscrew nut (fig. 45) from body of connector and slip hose off of guide. Cut hose squarely to remove piece with defective sleeve.

e. Installation of Hose Connector. Smooth off end of hose. Blow out hose to remove dirt or cuttings. Put nut and sleeve on hose (fig. 45) making sure beveled ends of sleeve point toward end of hose. Force end of hose over guide and as far into body as possible Move sleeve until it is against edge of connector body. Tighten nut sufficiently to insure airtight joint.

f. Removal of Tube Fittings. Unscrew fitting from tube. Serviceable fittings may be reused but do not use old sleeves.

g. Installation of Tube Fittings. Cut tubing with hack saw or tube cutter, making sure end is smooth and cut squarely with tubing wall. Do not crimp or partially close ends. Ream or file, if necessary. Blow out to remove cuttings or filings. Place nut and new sleeve on tube and put end of tube into recess in fitting body. Hold tube at bottom of recess and tighten nut until sufficient pressure is placed on sleeve to prevent leakage.

Section VII. AXLE AND SPRINGS

63. Axle

a. Removal of Axle.

(1) Jack up and block rear of trailer to relieve tension from springs.

(2) Remove wheels (par. 52 *b*). Remove hub and drum assemblies (par. 53 *b*).

(3) Release air pressure in braking system by opening drain cock on reservoir. In both wheel brake mechanisms, remove parking brake cable clevis from hook at lower end of parking brake internal lever, detach clamp which holds cable to backing plate, and pull cable and rubber sleeve from hole in backing plate.

(4) If internal brake mechanisms are to be removed, remove parking brake internal levers and struts, remove brake shoes, and remove wheel cylinders (par. 56). Remove brake anchor pins by removing lock washers and lock nuts (fig. 35) and drawing anchor pins from backing plate.

(5) Unscrew hydraulic hose connection from hydraulic line tee fastened to rear of axle. Entire hydraulic line may be detached by breaking weld of clip and removing nut and lock washer from bolt which holds tee to rear of axle. Bolt is welded to axle.

(6) Place jack under axle to support its weight when it is no longer supported by **U** bolts. Unscrew double nuts from **U** bolts (fig. 46) and remove **U** bolts. Remove axle by lowering jack under axle.

b. Installation of Axle.

(1) Raise axle with jack to proper position against main springs. Install **U** bolts around axle and up each side of each main spring, through holes in **U**-bolt plates on tops of auxiliary springs (fig. 46), securing them with double nuts. Aline springs and draw up nuts tightly.

(2) If internal brake mechanisms have been removed from axle, make necessary installations. Insert anchor pins in holes in bottom of backing plate and install lock washers and lock nuts (fig. 35). Install brake wheel cylinders (par. 56*d*). Install brake shoes (par. 56*e*). Install internal lever and strut (par. 56*f*).

(3) Connect hydraulic hose connection to hydraulic tee fastened to rear of axle. If no hydraulic tee and line are mounted on axle, mount line by fastening tee to welded bolt on rear of axle with lock washer and nut.

(4) Install hub and drum (par. 53*d*), adjusting the bearings during this series of operations.

(5) Bleed hydraulic system (par. 55).

(6) Adjust brakes with major adjustment (par. 54*c*).

(7) Install wheels (par. 52*e*). Remove jacks.

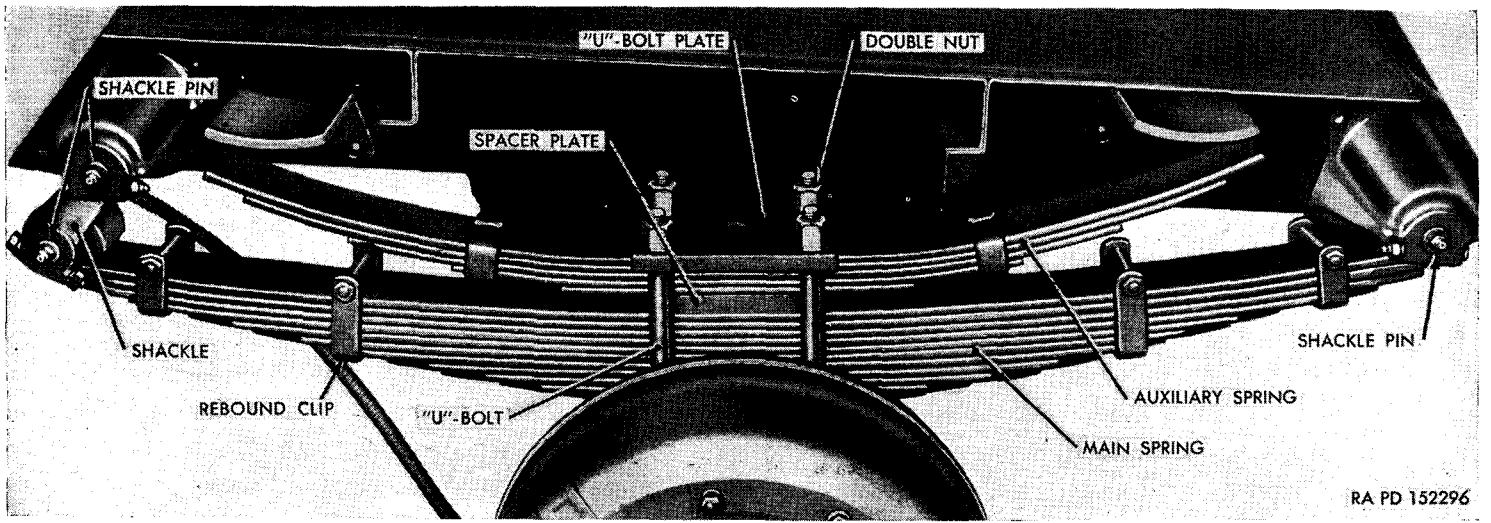


Figure 46. Main spring, auxiliary spring, and mounting parts.

64. Springs

a. Removal of Springs.

(1) Jack up and block rear of trailer to relieve tension from springs.

(2) Remove wheel (par. 52*b*) for convenience in working on springs.

(3) Unscrew double nuts (fig. 46) from U bolts. Remove U bolts, U-bolt plate, auxiliary spring, and spacer plate.

(4) Remove lubricating fittings from shackle pins. Remove nuts and lock washers from cap screws holding shackle pins in front and rear spring hangers and lower bore of rear shackle; remove cap screws. Using a brass drift, drive out shackle pins from hangers and shackle. Holes are provided in frame side rails for driving pins from hangers. Use jack under axle to take as much weight as possible off shackle pins as they are being driven out.

(5) Force rolled leaf-ends from front hanger and rear shackle and remove shackle from rear hanger.

b. Installation of Springs.

(1) Position spring on seat on axle with nuts on spring rebound clips facing outwardly (fig. 46).

(2) Force rolled leaf-ends at front end of spring into front hanger.

Line up bore of spring bearing with bore in hanger. Drive shackle pin into bores of hanger and spring bearing, using a brass drift so as not to damage pin. Use slot in outer end of shackle pin to line up cap screw groove in bottom of outer end of pin with cap screw passage in hanger. Install cap screw, lock washer, and nut.

(3) Put rear shackle in rear hanger and line up bores. Insert shackle pin. Line up cap screw groove. Install cap screw, lock washer, and nut.

(4) Use jack to raise or lower axle to line up lower bore in shackle with bore in spring rear bearing. Insert shackle pin. Line up cap screw grooves. Install cap screws in inner and outer passages in shackle. Install lubricating fittings in all three shackle pins.

(5) Position spacer plate on center bolt of main spring. Position auxiliary spring on spacer plate. Position U-bolt plate on center bolt of auxiliary spring.

(6) Install U bolt around axle, up one side of springs and through holes in U-bolt plate. Hand-screw on double nuts. Install

971845°—51——7

other U bolt. Tighten four nuts alternately until all are as tight as possible.

(7) Install wheels (par. 52*e*). Remove jack and blocking.

Section VIII. LUNETTE, SAFETY CHAINS, FRONT CASTER, AND REAR SUPPORT LEG

65. Lunette

a. Adjustment for Height. Shank of lunette is offset which provides a 4-inch adjustment in height. Adjustment is made by mounting lunette with offset directed upward or offset directed downward.

b. Removal of Lunette. Remove cotter pin, lunette nut, and washer (fig. 47) from shank of lunette. Tap end of lunette shank to loosen and remove.

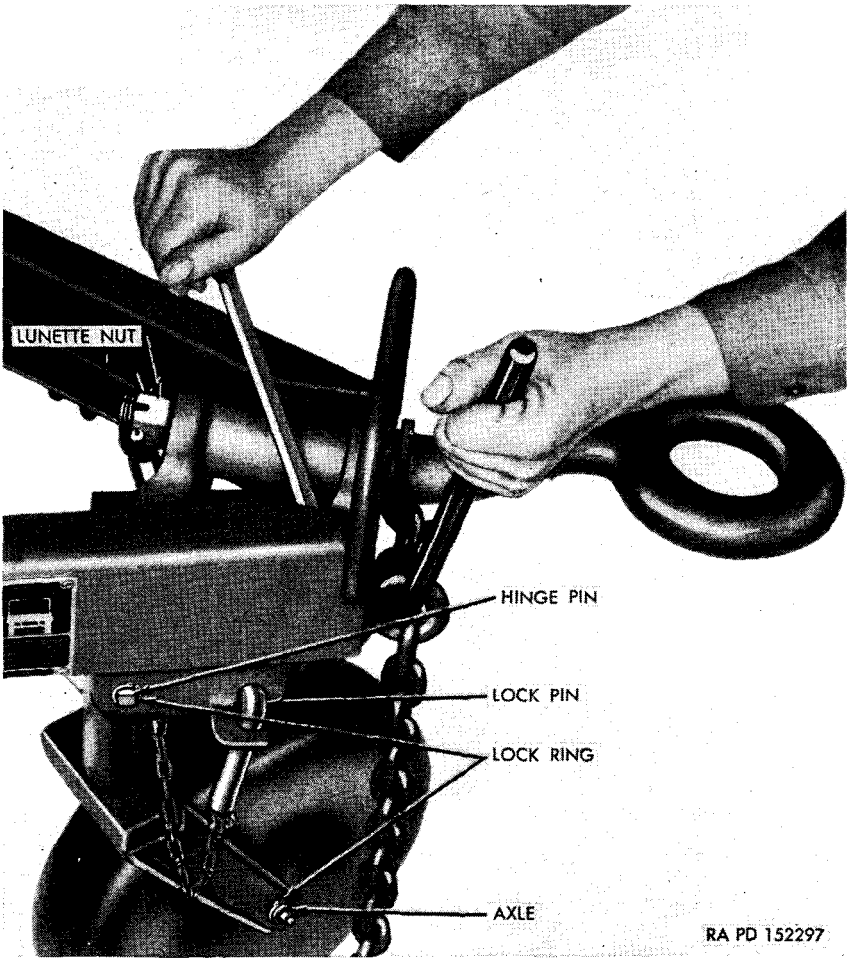


Figure 47. Removing safety chains.

c. Installation of Lunette. Install shaft of lunette in bore in A frame with offset in position to give desired towing height. Install washer, lunette nut, and cotter pin.

66. Safety Chains

a. Removal of Safety Chains (fig. 47). Insert wrench between lunette boss and side rail and hold nut from turning. Insert bar in ring of safety chain ring bolt and unscrew bolt from nut.

b. Installation of Safety Chains (fig. 47). Hold nut in position between lunette boss and side rail and hand-start safety chain ring bolt in nut. Hold nut with wrench and twist ring bolt with bar to tighten.

67. Front Caster

a. Removal of Front Caster. Support front end of trailer. Remove lock pin. Remove lock ring (fig. 47) from squared end of hinge pin with lock ring pliers or by inserting screwdriver between squared side of hinge pin and lock ring and prying lock ring out of groove. Remove hinge pin.

b. Removal of Front Caster Wheel. Remove lock ring from squared end of axle (fig. 47) with lock ring pliers or by prying out. Remove axle.

c. Installation of Front Caster Wheel. Insert axle so that squared end fits mating hole in fork. Fit lock ring into groove around squared end of axle.

d. Installation of Front Caster. Position front caster mounting bracket in bracket on underside of A frame and insert lock pin (fig. 47). Install hinge pin so that squared end fits in mating hole in bracket on frame. Fit lock ring in groove around squared end of hinge pin.

68. Rear Support Leg

a. Removal of Rear Support Leg. Release leg from raised position by removing lock pin. Remove lock ring from squared end of hinge pin. Remove hinge pin.

b. Installation of Rear Support Leg. Position cross tube in support leg bracket on frame and insert hinge pin, fitting squared end in mating hole in bracket. Fit lock ring in groove around squared end of hinge pin. Raise support leg to traveling position and secure with lock pin.

Section IX. ELECTRICAL SYSTEM

69. Electrical Receptacle and Wiring Harness

a. GENERAL. All electric wiring from receptacle (fig. 19) to wires of individual lamps (fig. 48) is wrapped at intervals to form a single wiring harness. Cables of each circuit are identified by metal tags (fig. 48) stamped with numbers of circuits shown in figure 19. Contact pins, soldered to ends of harness cables, are forced through lettered holes in a rubber grommet or insert, housed in the receptable. Mating contact sockets in plug of intervehicular cable (jumper cable) fit over contact pins when plug is inserted in receptacle.

b. CONTACT ADJUSTMENTS. Good contacts are essential to satisfactory operation of lamps. If a single lamp does not function properly, determine if contact pin in receptacle and contact socket in intervehicular cable plug are in proper positions. If not, carefully grasp pin or socket with pliers and pull it to proper position. Do not deform pin or socket. Check contacts in connector shells of harness cable and tail light cables. Check ground cable contacts; there must be clean and tight contact with frame.

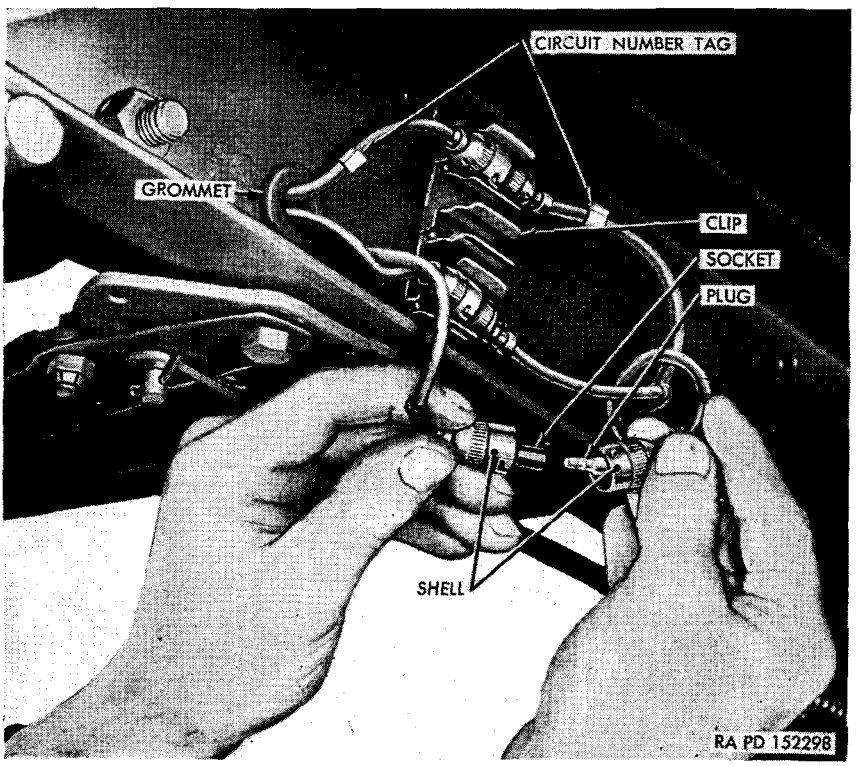


Figure 48. Joining harness cable and light cable with connector.

c. REMOVAL. Receptacle and wiring harness are removed as a unit. Remove connectors from clips inside frame side rails (fig. 48), twist two parts of shell to disconnect bayonette-type joint and pull inside plug from its socket. Remove screws which secure harness clips to frame. Unscrew grommet-retaining nut from rear of receptacle. Remove nuts and lock washers from four machine screws which secure receptacle cover and receptacle to cross member of **A** frame. Remove cover. Draw receptacle and wiring harness through hole in **A** frame.

d. INSTALLATION. Thread wiring harness through hole in **A** frame. Fit receptacle in hole. Thread harness through grommet-retaining nut and screw nut on rear of receptacle. Position cover on receptacle and fasten both to cross member with four machine screws, lock washers, and nuts, installing ground connector with right-hand top receptacle mounting screw. Join mating numbered harness and light cables with connectors and place connectors in clips on frame side rails. Secure harness to frame with harness clips and screws.

70. Tail Light Assemblies

a. LAMP REPLACEMENT. Remove six screws from door (fig. 24). Remove door and gasket. Push lamp in and turn counterclockwise to remove lamp from socket. Insert lamp in socket and turn clockwise to lock. With intervehicular cable connected, test lamp by turning on switch on towing vehicle. Position gasket and door and install six door screws tightly.

b. REMOVAL. Remove connectors from clips (fig. 48) and disconnect light cables from harness cables. Remove grommet in frame side rail. Pull light cables through hole. Remove two screws which attach tail light to bracket.

c. INSTALLATION. Attach tail light to bracket with two screws which screw into rear of tail light assembly. Thread tail light cables through grommet and through hole in frame side rail. Fit grommet in hole. Match numbered wires and join with connectors. Install connectors in clips on inside of frame side rail.

Section X. FRAME, BODY, AND EQUIPMENT M104

71. Frame and Body

a. GENERAL. Frame and body are joined by welding in addition to bolts, lock washers, and nuts. If body must be removed from frame, welds will have to be broken carefully. Individual parts of body may be removed and installed without complete disassembly.

b. ROOF BOWS, RACKS, AND RACK GATES (fig. 7). Remove roof bows by sliding bow stakes from tops of rack stakes. Roof bows may be

stowed by sliding ends of bow stakes into auxiliary stakes at front ends of top rack slats. To disassemble roof bows, remove nuts, lock washers and bolts, joining roof bows, corners, and bow stakes. Remove side racks by removing nuts, lock washers, and bolts securing rack stakes in body posts and drawing stakes from body posts. Rack gates are removed by lifting hinge pins from hinges. Rack gate hinges are welded and bolted to rack end stakes and hinges and latches are fastened to rack gates with bolts, lock washers, and nuts. Rack slats are riveted to rack stakes. Rack gate slats are riveted to rack gate posts.

c. Front and Rear Tail Gates. Before removing or installing either tail gate, engage hooks of tail gate chain assemblies to hold tail gate when hinge pins are not in position. To remove tail gate, withdraw cotter pins and hinge pins. To install, insert hinge pins and cotter pins.

Section XI. FRAME, TANK, AND EQUIPMENT M106

72. Tank Frame and Tank

a. Cleaning. Clean tank frame and outside of tank and equipment with steam or water and stiff brush to remove dirt, and dry-cleaning solvent or volatile-mineral-spirits paint thinner to remove grease. Interior of tank is accessible for cleaning through manhole. A drain plug in the bottom of tank at rear is removed when tank is flushed. Thoroughly wash inside of tank with clean water and flush tank, piping, valves, and faucets with clean water.

b. Removal of Fender Extension Rear Step Assemblies. Remove two nuts, lock washers, and bolts attaching step assembly to fender. Remove two nuts, lock washers, and bolts attaching step assembly to tank frame.

c. Removal of Fenders. At each end of fender, remove three nuts, lock washers, and bolts attaching fender to frame side rail. Remove three nuts, lock washers, and bolts attaching fender to tank frame. Lift fender, disengaging fender bracket from bracket welded to side of tank.

d. Removal of Tank. Unscrew hexagonal nut of union to separate piping assembly from external valve. Disconnect hose from bottom of pump. On each side of tank, remove four nuts, lock washers, and bolts attaching extrusion, welded to bottom of tank, from tank frame. Lift tank from tank frame.

e. Removal of Tank Frame. Remove two nuts, lock washers, and bolts fastening tank frame to cross member of A frame. On each side remove two nuts, lock washers, and bolts from bracket below faucet box and two nuts, lock washers, and bolts from bracket at rear of

tank frame. Lift tank frame from chassis frame. Remove screws securing slats to tank frame.

f. Installation of Tank Frame. Position tank frame on chassis frame. Attach tank frame to chassis frame by installing two bolts, lock washers, and nuts through brackets below each faucet box and beneath both rear corners. Fasten tank frame to cross member of **A** frame with two bolts, lock washers, and nuts.

g. Installation of Tank. Position tank on tank frame, lining up holes in extrusion, welded to bottom of tank, with bolt holes in tank frame. Install bolts, lock washers, and nuts. Connect hose of bell strainer and hose assembly to bottom of pump. Assemble union attaching piping assembly to external valve.

h. Installation of Fenders. Engage fender bracket with bracket on side of tank. Install bolts, lock washers, and nuts fastening fender at front and rear to frame side rail and along bottom to tank frame.

i. Installation of Fender Extension Rear Step Assemblies. Position step assembly. Install bolts, lock washers, and nuts to fasten step assembly to fender and to tank frame.

73. Tank Equipment

a. General. Individual pieces of tank equipment may be removed or installed without complete disassembly.

b. Manhole Cover (fig. 8). Unscrew wing nut on manhole cover eye bolt and press wing nut from latch to release cover. Remove cotter pin and bracket hinge pin to remove cover. Remove cotter pin and latch hinge pin to separate cover from latch. Remove cotter pin and eye bolt pin to remove eye bolt. Manhole cover may be mounted in bracket on front of tank with latch hinge pin when cover and latch are separated and latch is used to secure immersion heater in tank.

c. Filler Hatch Cover. Filler hatch cover is unlatched, latched, removed, and installed in same manner as manhole cover (*b above*).

d. Water Pump (fig. 8).

(1) *Removal.* Loosen hose clamps and detach inlet pipe hose from inlet pipe which enters top of pump. Detach hose of bell strainer and hose assembly from pump. Remove four nuts, lock washers, and bolts attaching pump to tank.

(2) *Replacement of pump stuffing box packing.* Remove pump handle by removing cotter pins, nuts, and bolts at plunger rod end and at upper end of link. Remove rod end. Unscrew stuffing box gland. Pry out old packing. Insert new packing. Install stuffing box gland tightly enough to stop leaks. Install rod end. Install handle with bolts, nuts, and cotter pins in rod end and upper end of link.

(3) *Replacement of plunger crimp.* Remove two cap screws which secure bearer to top of pump cylinder. Lift bearer off cylinder, drawing plunger assembly from cylinder. Unscrew plunger follower from plunger cage. Remove leather crimp, crimp expander, and plunger valve. Install plunger valve, expander, and new crimp in cage and install plunger follower. Examine cylinder top gasket and replace if unserviceable. Insert plunger assembly in cylinder and position bearer. Secure bearer to cylinder with two cap screws.

(4) *Replacement of lower valve leather.* Detach hose of hose and bell strainer assembly. Remove two cap screws holding bottom attachment to bottom of cylinder. Remove bottom attachment and lower valve weight and leather assembly. Remove screw holding leather to weight. Replace leather, fastening new leather to weight with screw. Position lower valve weight and leather assembly in bottom attachment and install bottom attachment with cap screws.

(5) *Installation of pump.* Position pump on tank and install with four bolts, lock washers, and nuts. Attach hose of bell strainer and hose assembly to pump. Connect inlet pipe hose to inlet pipe and tighten hose clamps.

e. Bell Strainer.

(1) *Removal.* Loosen nut on hose clamp. Pull stem of bell strainer from hose.

(2) *Cleaning of bell strainer and replacement of strainer (screen).* Drive out lock pin holding wing nut to cover bolt. Remove wing nut and cover. Remove snap ring holding strainer.

Caution: Use care to avoid injury when compression spring behind strainer is released by removal of snap ring. Release strainer and spring. Scrub inside and outside thoroughly with water and stiff brush. Position spring and new strainer and install snap ring. Install cover and wing nut. Install lock pin through wing nut and cover bolt and peen both ends of pin.

(3) *Installation.* Force shank of bell strainer into end of hose. Tighten hose clamp.

f. External Valve. External valve is unscrewed from bottom of tank after tank has been removed from tank frame (par. 72) and is installed in tank before tank is mounted in tank frame (par. 72).

g. Faucet Covers, Faucets, Piping, and Manifold Valve.

(1) *Removal.* Remove faucet covers by driving out hinge pins from faucet cover hinges. Remove nuts, lock washers and bolts holding halves of guards around pipes in faucet boxes.

Unscrew faucets. Unscrew nipples and fittings from reducing tees. Unscrew reducing tees from cross-pipe nipples. Unscrew nipples from manifold valve. Unscrew hexagonal nut from union connecting external valve to piping. Unscrew manifold valve, nipples, and fittings. Faucet boxes are welded to tank frame.

(2) *Replacement of faucet seat washer, spring, and/or packing.* Unscrew hexagonal centerpiece beneath ears (handles) and remove assembly from body. Remove nut from screw holding ears to stem and unscrew screw. Disassemble ears, stem, spring, and packing gland. Examine packing and washer in centerpiece and replace, if necessary. Unscrew stem screw and pry out and replace defective seat washer. Assemble spring and gland on stem, insert stem in centerpiece, and position ears on centerpiece, lining up screw holes in ears and stems. Insert and screw in handle screw and install nut on screw. Install assembly in faucet body and screw centerpiece down sufficiently to stop leaks.

(3) *Installation.* Screw 1⅝-inch nipples into opposite ends of 1¼-inch tee. Screw manifold valve on one nipple and one half of union on other nipple. Join 4-inch nipple, 45-degree elbow, 10-inch nipple, 45-degree elbow and 7½-inch nipple. Screw 4-inch-nipple-end of this assembly into tee. Position assembly on extension in front of tank with 7½-inch nipple through rear hole in left faucet box. Screw 17-inch nipples into opposite ends of manifold valve through holes in backs of faucet boxes. Secure assembly by fastening guards with bolts, lock washers, and nuts. Screw 1¼ x ½ x ¼-inch reducing tea on end of left 17-inch nipple. Join 4½-inch nipple, 1¼ x 1 x ½-inch reducing tee, 1 x 4½-inch nipple, and 1-inch elbow, and screw this assembly into 1¼-inch opening in reducing tee. Screw 1¼ x ½ x 1-inch reducing tee on end of right 17-inch nipple. Join 1 x 4½-inch nipple and 1 x ½-inch reducing tee. Install faucets. Join union to connect piping assembly to internal valve.

CHAPTER 4

FIELD AND DEPOT MAINTENANCE INSTRUCTIONS

Section I. PARTS, SPECIAL TOOLS, AND EQUIPMENT FOR FIELD AND DEPOT MAINTENANCE

74. General

Tools and equipment and maintenance parts over and above those available to the using organization are supplied to ordnance field maintenance units and depot shops for maintaining, repairing, and/or rebuilding matériel.

75. Parts

Maintenance parts are listed in ORD 7–8 SNL G–754, which is the authority for requisitioning replacements. Parts not listed in this catalog, but required by depot shops in rebuild operations, may be requisitioned and will be supplied if available.

76. Tools and Equipment

Standard and commonly used tools and equipment having general applications to this matériel are authorized for issue by T/A and T/O&E. They are not specifically identified in this manual. No special tools and/or equipment are issued for field and depot maintenance on the material. However, the special tools and equipment for the 2½-ton, 6 x 6, cargo truck M34, and chassis trucks M44, M45, and M46, tabulated in table I, may be used with the matériel and are listed in ORD 6 SNL G–27, Section 1.

Section II. REBUILD OF WHEELS, HUBS, AND BRAKE DRUMS

77. Wheels

a. DISASSEMBLY. Remove wheel from hub (par. 52*b*). Remove tire from wheel (par. 52*c*).

b. Cleaning. Wash wheel thoroughly with water under pressure, or water and sponge. Dry with compressed air.

c. Inspection and Repair. Inspect wheel carefully for distortion and replace if damaged. Check condition of paint and repaint if chipped, cracked, or bare metal is found. Inspect mounting stud holes for excessive wear due to loose mounting and replace wheel if wear is excessive. Check split ring for wear or distortion and replace if wear or distortion are such as to prevent ring from holding tire effectively.

d. Assembly. Install tire on wheel (par. 52*d*). Install wheel on hub (par. 52*e*).

78. Hubs and Brake Drums

(fig. 49)

a. Disassembly. Remove hub and brake drum from axle (par. 53*b*). Remove drum from hub (par. 53*f*).

b. Cleaning. Wash hub and drum assembly and bearings thoroughly with dry-cleaning solvent or volatile-mineral-spirits paint thinner and allow bearings to dry (par. 39*c* (3)).

c. Inspection and Repair.

(1) *Hubs.* Inspect hubs carefully for cracks or other indications of damage. Replace hub if damaged. Inspect bearing cups for cracks, chipped spots, or wear caused by contact with bearing rollers. Make sure cups fit tightly in hub. If cups are damaged or worn, remove (par. 53*h*) and install new ones (par. 53*i*). Oil the bearing cones and rollers lightly and rotate by hand to test for tightness. Replace, if there is evidence of scoring, pitting, or excessive wear. Inspect grease seals to make sure contact material is intact and pliable. Inspect threads on wheel studs in hub and in bearing adjusting nuts and wheel-stud nuts; replace if threads are stripped.

(2) *Brake drums.* Inspect brake drums for warpage, cracks, or scored braking surface. Place drum in lathe and check run-out of braking surface. Refinish surface in lathe if scored or if run-out exceeds specific limit (par. 96). If refinishing requires removal of more than one-sixteenth inch of metal (1/8 inch on diameter), replace drum.

d. Assembly. Install drum on hub (par. 53*g*). After performing all necessary operations on internal brake mechanisms (par. 79), parking brake (par. 80), and axle (par. 85), lubricate spindle, hub, and bearings (par. 53*c*.). Install hub and brake drum on axle (par. 53*d*), adjusting the wheel bearings. Adjust brakes with major adjustment (par. 54*c*). Install wheel on hub (par. 52*e*).

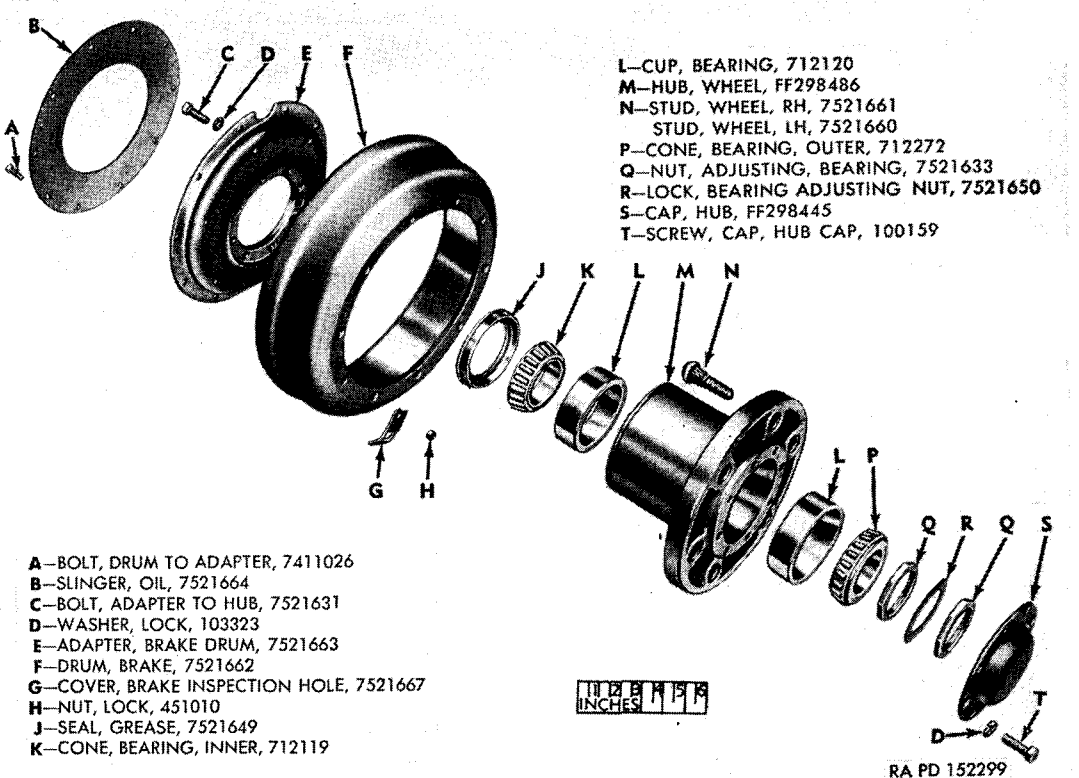


Figure 49. Exploded view of hub, brake drum, and mounting parts.

Section III. REBUILD OF BRAKES

79. Internal Brake Mechanisms
(fig. 50)

a. DISASSEMBLY. Remove parking brake internal lever and strut (par. 56*a*), brake shoes (par. 56*b*), and brake wheel cylinder (par. 56*c*).

b. CLEANING. Clean all parts removed from brake mechanism with dry-cleaning solvent or volatile-mineral-spirits paint thinner. Dry thoroughly before inspecting or installing on trailer.

c. INSPECTION AND REPAIR.

(1) *Internal lever and strut.* Inspect for warpage or wear. Straighten, if required. Correct condition causing wear. These parts are seldom worn sufficiently to require replacement.

(2) *Brake shoes and lining.* Inspect pivot surfaces of shoes for wear. Check for broken return spring. Replace broken or ineffective spring. Inspect lining for wear. The minimum thickness of lining before relining cannot be specified exactly and is a matter of judgment, depending upon usage and amount of time before next regular inspection. In any case, if braking surface is near heads of rivets, linings should be replaced.

(*a*) Before relining brake shoes, remove rivets and strip lining from shoe. Clean face of shoe thoroughly. Install new lining on both shoes of same brake mechanism at same time. If brake drums have been machined, shims of thickness of metal removed should be installed between shoes and lining.

(*b*) In relining brake shoes, aline end rivet holes with holes in shoe and clamp lining in place with suitable applier. Install end rivets, remove applier, and install remaining rivets.

(*c*) After relining brake shoes, check contact of lining with shoe after riveting. A 0.010-inch feeler gage should not enter between shoe and lining at any point. Brake linings should be ground concentric with drum center with suitable grinder after installation on axle.

(3) *Brake wheel cylinders.* Refer to TM 9–1827C for inspection and repair of brake wheel cylinders.

(4) *Backing plates.* Inspect for bent backing plate, guide pins; and adjusting cam pins, broken adjusting cam springs, and worn adjusting cams and anchor pins. Carefully straighten bent parts. Replace worn anchor pins. Adjusting cams and pins and guide pins are installed with special equipment by

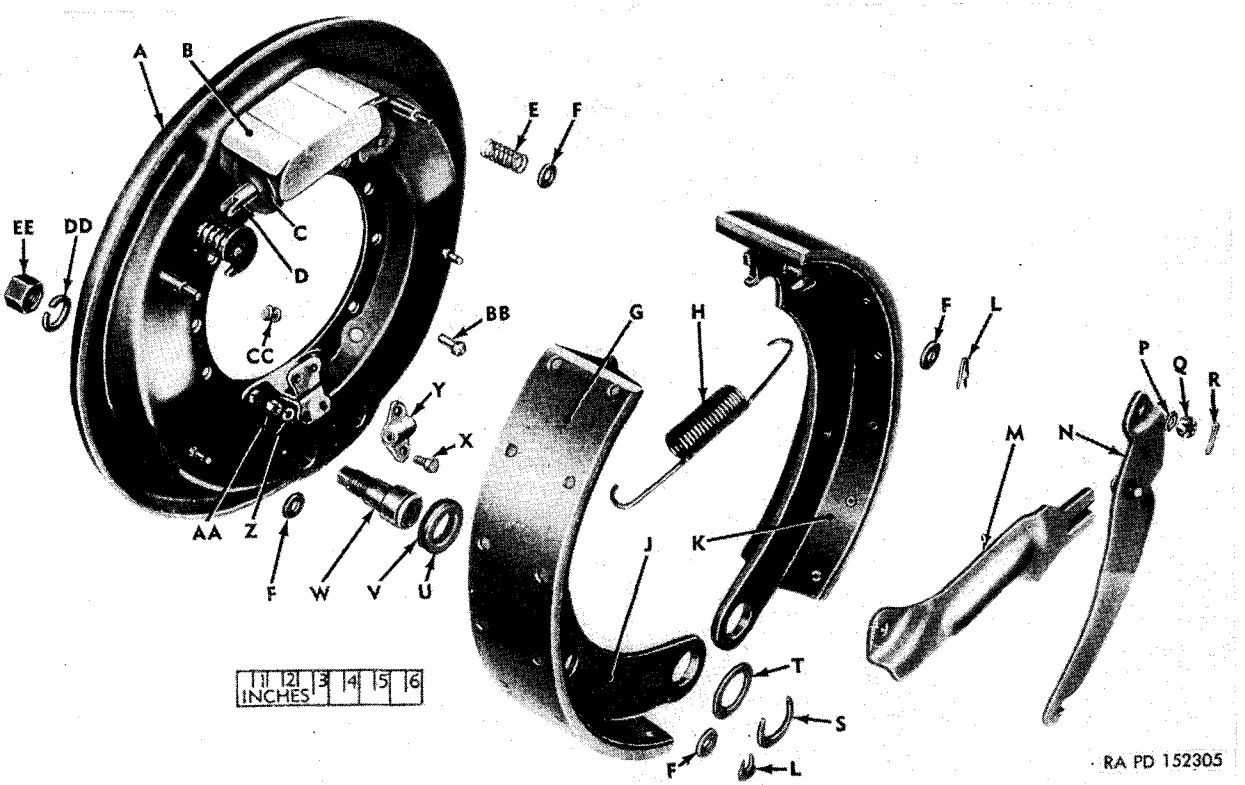


Figure 50. Exploded view of internal brake mechanism.

Figure 50.—Continued.

A—PLATE, BACKING, ASSY—7411014
B—COVER, WHEEL CYLINDER—FF298497
C—CYLINDER, WHEEL—7411010
D—LINK, CONNECTING WHEEL CYLINDER—FF298496
E—SPRING, GUIDE PIN, SHOE—FF298510
F—WASHER, GUIDE PIN, SHOE—7411019
G—LINING, BRAKE SHOE—7411013
H—SPRING, RETURN, BRAKE SHOE—7411017
J—SHOE, BRAKE, W/LINING, LH—7411015
K—SHOE, BRAKE, W/LINING, RH—7411016
L—RETAINER, HAIRPIN—FF298508
M—STRUT, PARKING BRAKE, RH—FF298516
—STRUT, PARKING BRAKE, LH—FF208517
N—LEVER, INTERNAL, RH—FF298498
—LEVER, INTERNAL, LH—FF298499
P—WASHER, PLAIN—FF301722
Q—NUT, SLOTTED—102645
R—PIN, COTTER—103373
S—RETAINER, "C"—FF298502
T—WASHER, ANCHOR PIN—7411018
U—RETAINER, ANCHOR PIN, FELT—FF298505
V—FELT, ANCHOR PIN—FF298504
W—PIN, ANCHOR, FF298501
X—SCREW, CABLE CLAMP—100013
Y—CLAMP, CABLE—A303461
Z—WASHER, LOCK—103320
AA—NUT—103025
BB—RIVET—104114
OPTIONAL, SCREW—100027
WASHER, LOCK—103321
NUT—103026
CC—PLUG—FF298507
DD—WASHER, LOCK, ANCHOR PIN—103326
EE—NUT, LOCK, ANCHOR PIN—103321

manufacturer and are difficult to install properly without this equipment. If backing plate, pins, or springs are not serviceable, install new backing plate. On some axles, backing plates is attached by bolts, lock washers, and nuts. Rivets are used to attach backing plates to other axles; these rivets must be cut off or drilled out to remove backing plates.

d. ASSEMBLY. Install brake wheel cylinder (par. 56*d*), brake shoes (par. 56*e*), and parking brake internal lever and strut (par. 56*f*). Install hub and drum (par. 53*d*), adjusting wheel bearings. Bleed hydraulic brake wheel cylinders (par. 55). Adjust brakes with major adjustment (par. 54*c*).

80. Parking Brake

a. DISASSEMBLY. Remove parking brake lever (par. 57*b*) and cable and conduit (par. 57*c*).

b. CLEANING. Clean mud and dirt from all parts with water and a stiff brush. Remove grease with dry-cleaning solvent or volatile-mineral-spirits paint thinner.

c. INSPECTION AND REPAIR.

(1) *Hand lever, pawl, and sector.* Squeeze latch into lever and test effectiveness of operation. If spring is too weak for satisfactory operation, drill out rivet and replace spring. Inspect pawl for excessive wear and sector for worn teeth. Replace pawl or sector, if excessively worn.

(2) *Cable assembly.* Make sure cable end does not have crossed or damaged threads and that cable operates freely in conduit. Work it back and forth by hand to be sure broken strands do not cause binding. Use special preservative lubricating oil as a penetrating oil to free it up and lubricate, if necessary. Replace cable and conduit assembly, if defective.

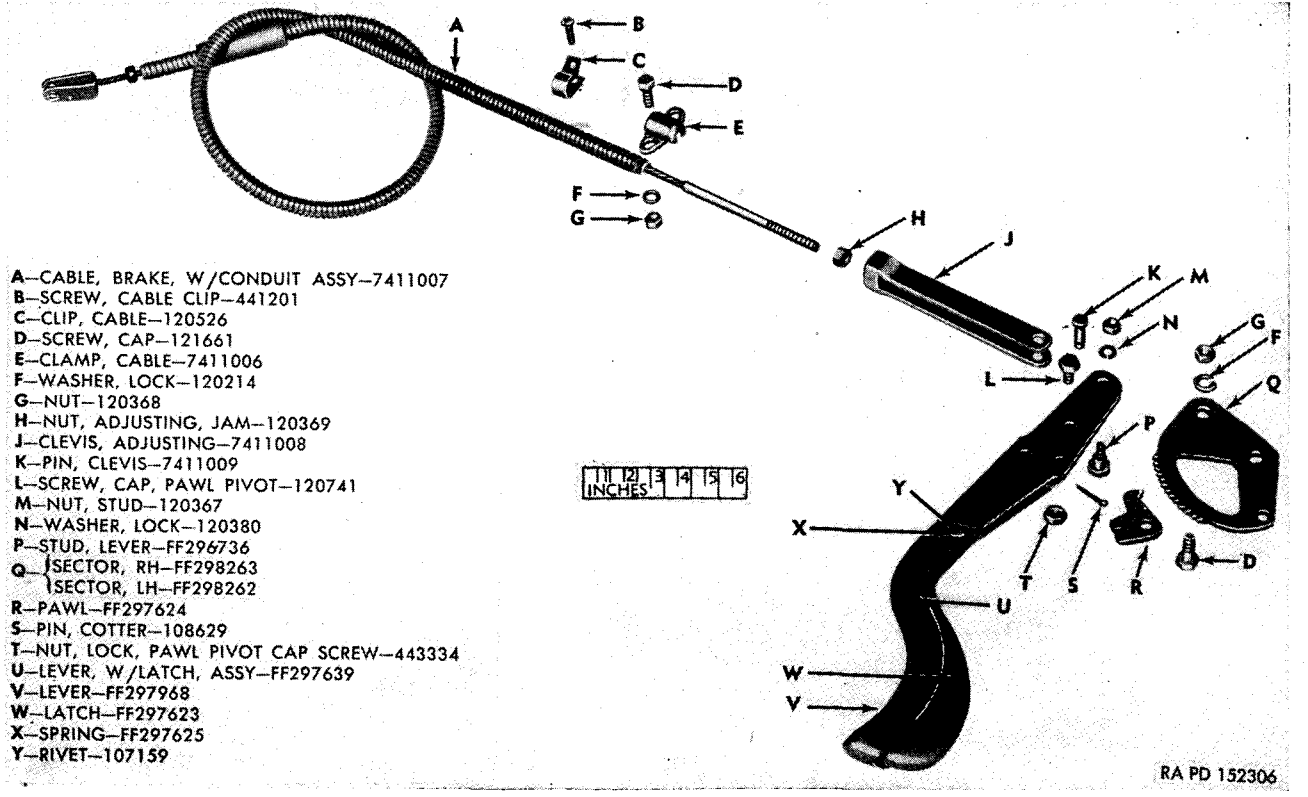
d. ASSEMBLY. Attach cable and conduit to side rail (par. 57*f*) and install parking brake hand lever (par. 57*g*). Adjust parking brake (par. 54*d*).

81. Relay-Emergency Valve

(fig. 54)

a. GENERAL. Annually, disassemble and clean all parts with dry-cleaning solvent or volatile-mineral-spirits paint thinner. Replace emergency check valve seal, inlet valve, exhaust valve, and relay valve and emergency valve diaphragms. Replace upper and/or lower seals if worn or causing leak. Replacement of defective parts does not necessarily require complete disassembly.

b. REMOVAL. Remove relay-emergency valve (par. 59*c*).



A—CABLE, BRAKE, W/CONDUIT ASSY—7411007
B—SCREW, CABLE CLIP—441201
C—CLIP, CABLE—120526
D—SCREW, CAP—121661
E—CLAMP, CABLE—7411006
F—WASHER, LOCK—120214
G—NUT—120368
H—NUT, ADJUSTING, JAM—120369
J—CLEVIS, ADJUSTING—7411008
K—PIN, CLEVIS—7411009
L—SCREW, CAP, PAWL PIVOT—120741
M—NUT, STUD—120367
N—WASHER, LOCK—120380
P—STUD, LEVER—FF296736
Q—SECTOR, RH—FF298263
SECTOR, LH—FF298262
R—PAWL—FF297624
S—PIN, COTTER—108629
T—NUT, LOCK, PAWL PIVOT CAP SCREW—443334
U—LEVER, W/LATCH, ASSY—FF297639
V—LEVER—FF297968
W—LATCH—FF297623
X—SPRING—FF297625
Y—RIVET—107159

Figure 51. Exploded view of parking brake.

c. DISASSEMBLY INTO SUBASSEMBLIES.

(1) *Remove emergency check valve and diaphragm assembly.* With valve held firmly in vise, remove six nuts, lock washers, and cap screws holding emergency check valve cover to body. Remove cover and emergency check valve and diaphragm assembly (fig. 52).

Caution: In prying stuck parts loose, use care not to damage parts.

(2) *Remove cage w/valves assembly.* Remove nuts and lock washers from four relay valve body studs holding inlet valve cover to relay valve body (fig. 52). Carefully pry off cover and gasket. Carefully pry off inlet valve cage and gasket.

(3) *Remove relay valve body and relay valve plunger assembly.* Remove six nuts, lock washers, and cap screws holding relay valve body to relay-emergency valve body. Separate relay valve body, relay valve plunger assembly, and relay-emergency valve body (fig. 53).

d. Emergency check valve and diaphragm.

(1) *Disassembly.* Pry out snap ring holding check valve assembly in check valve seat retainer (fig. 55).

Caution: Use care to avoid injury in removing snap ring

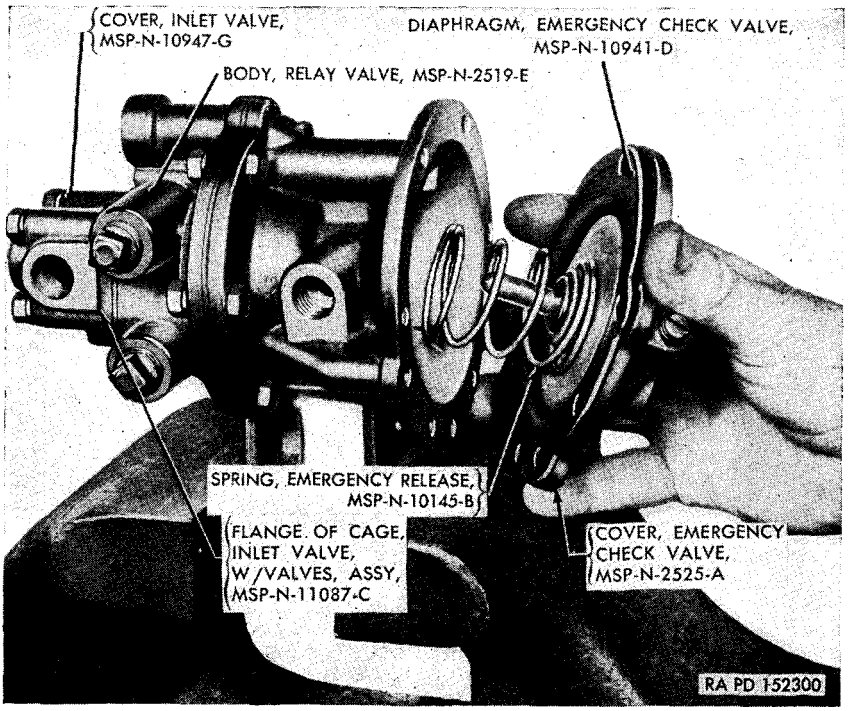


Figure 52. Removing emergency check valve and diaphragm assembly.

as check valve is spring-loaded. Remove check valve assembly and spring. With two wrenches, remove emergency check valve diaphragm nut from check valve seat retainer. Separate upper and lower plates and diaphragm.

(2) *Cleaning.* Steam-clean all metal parts, or wash in dry-cleaning solvent or volatile-mineral-spirits paint thinner, and dry thoroughly. Wash diaphragm in hydraulic brake fluid and dry with cloth entirely free from grease or oil.

(3) *Inspection and repair.* Inspect check valve seal, which is small rubber ring seated in bottom of cavity of check valve seat retainer. Remove and replace if damaged or worn. Make sure air passages in retainer are open. Check spring; replace if corroded. Inspect diaphragm; replace if rubber appears cracked or shows signs of wear.

(4) *Assembly.* Assemble diaphragm between upper and lower plates with beveled outer edges of plates toward diaphragm and upper plate (with beveled center) on side of diaphragm marked "TOP". Fit nose of check valve seat retainer through holes in plates and diaphragm until shoulder of retainer bears on bevel of hole in upper plate. Install emergency check valve diaphragm nut on retainer with flat surface of nut bearing against lower plate. Tighten with two wrenches. Insert spring and check valve assembly in cavity in top of retainer and install snap ring.

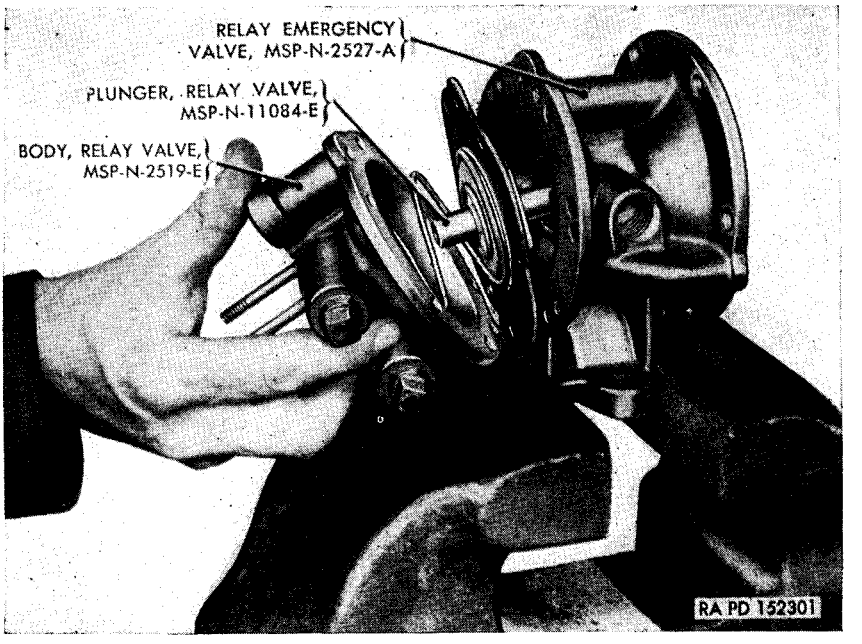


Figure 53. Removing valve plunger assembly.

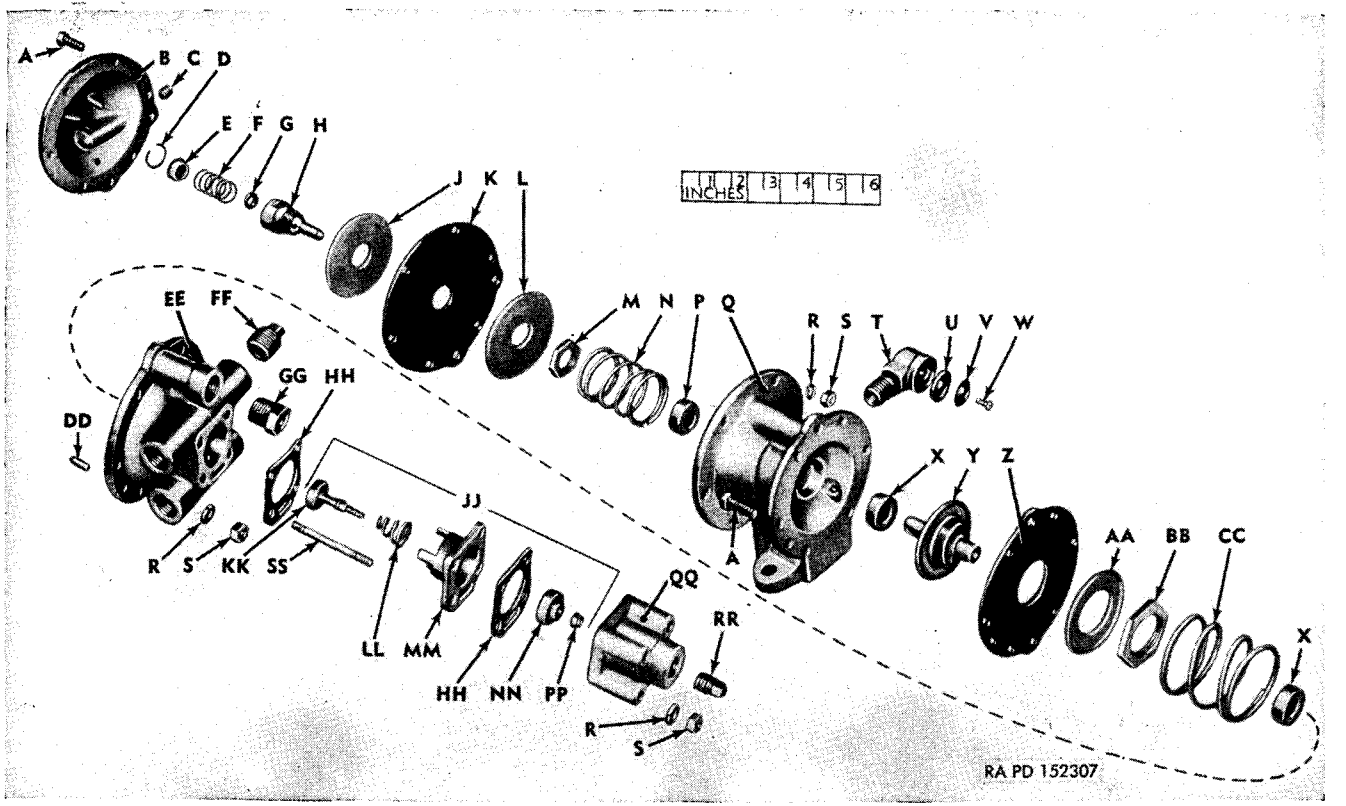


Figure 54. Exploded view of relay-emergency valve.

Figure 54.—Continued.

A—SCREW, RELAY—EMERGENCY VALVE—MSP-3X176
B—COVER, EMERGENCY CHECK VALVE—MSP-N2525A
C—PLUG, AIR PASSAGE—MSP-7X12
D—RING, SNAP—MSP-C10072
E—VALVE, CHECK, EMERGENCY, ASSY—MSP-N13023
F—SPRING, EMERGENCY CHECK VALVE—MSP-N10148
G—SEAL, EMERGENCY CHECK VALVE—MSP—N12844
H—RETAINER, EMERGENCY CHECK VALVE SEAT—MSP-N10674H
J—PLATE, EMERGENCY CHECK VALVE DIAPHRAGM, UPPER—MSP-N1865E
K—DIAPHRAGM, EMERGENCY CHECK VALVE—MSP-N10941D
L—PLATE, EMERGENCY CHECK VALVE DIAPHRAGM, LOWER—MSP-1865B
M—NUT, EMERGENCY CHECK VALVE DIAPHRAGM—MSP-2X39
N—SPRING, EMERGENCY RELEASE—MSP-N10145B
P—SEAL, UPPER—MSP-N170919A
Q—BODY, RELAY-EMERGENCY VALVE—MSP-N2527A
R—WASHER, LOCK—MSP-4X11
S—NUT, HEX—MSP-2X303
T—BODY, EXHAUST CHECK VALVE—MSP-N11073
U—DIAPHRAGM, EXHAUST CHECK VALVE—MSP-N11075
V—RETAINER, EXHAUST CHECK VALVE DIAPHRAGM—MSP-N11074
W—SCREW, EXHAUST CHECK VALVE DIAPHRAGM RETAINER—MSP-30X101
X—SEAL, LOWER—MSP-N10919B
Y—PLUNGER, RELAY VALVE—MSP-N11084E
Z—DIAPHRAGM, RELAY VALVE—MSP-N10941E
AA—PLATE, RELAY VALVE DIAPHRAGM—MSP-C11787A
BB—NUT, RELAY VALVE PLUNGER—MSP-2X346
CC—SPRING, RETURN, RELAY VALVE DIAPHRAGM—MSP-N11464
DD—PIN, DOWEL—MSP-10X24
EE—BODY, RELAY VALVE—MSP-N2519E
FF—PLUG, RELAY VALVE BODY PORT—MSP-7X14
GG—BUSHING, REDUCING—MSP-19X11
HH—GASKET, INLET VALVE CAGE—MSP-N10952A
JJ—CAGE, INLET VALVE, W/VALVES, ASSY—MSP-N11087C
KK—VALVE, EXHAUST—MSP-N1941D
LL—SPRING, RETURN, EXHAUST VALVE—MSP-N1162A
MM—CAGE, INLET VALVE—MSP-N-10946D
NN—VALVE, INLET—MSP-N10949A
PP—NUT, STOP—MSP-2X5501
QQ—COVER, INLET VALVE—MSP-N10947G
RR—PLUG, DRAIN—MSP-7X102
SS—STUD, RELAY VALVE BODY—MSP-14X1086

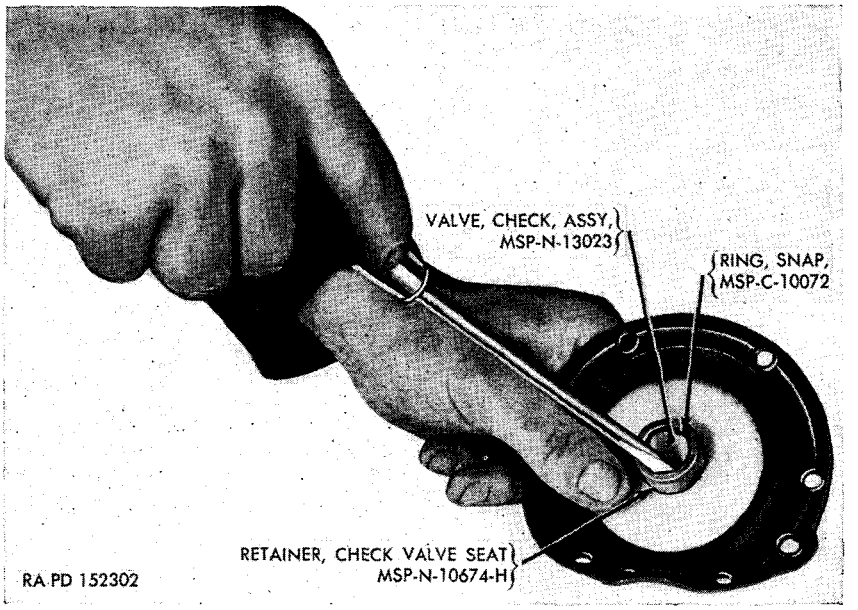


Figure 55. Removing snap ring holding emergency check valve assembly.

e. Inlet Valve Cage Assembly.

(1) *Disassembly.* With wrench and pliers remove self-locking stop nut from stem of exhaust valve (fig. 56). Release inlet valve, exhaust valve, and spring from cage.

(2) *Cleaning.* Wash all metal parts in dry-cleaning solvent or volatile-mineral-spirits paint thinner. Wash rubber parts in hydraulic brake fluid and dry immediately.

(3) *Inspection and repair.* Inspect rubber parts and replace if deeply grooved or distorted. Inspect spring and replace if corroded. Inspect valve seat and replace cage if seat is damaged or worn.

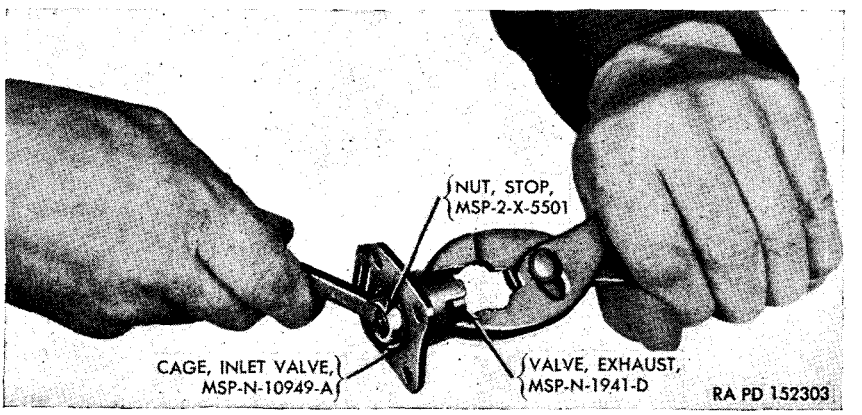


Figure 56. Disassembling inlet valve cage assembly

(4) *Assembly.* Place return spring on stem of exhaust valve, small end first (large end toward threads) and insert stem in pronged end of cage. Insert inlet valve in cage with rubber face toward inlet valve seat. Press stem of exhaust valve through inlet valve and install self-locking stop nut.

f. Relay Valve Plunger and Relay Valve Diaphragm.

(1) *Disassembly.* With two wrenches, remove valve plunger nut from threaded portion of valve plunger. Separate relay valve diaphragm plate and relay valve diaphragm from valve plunger.

(2) *Cleaning.* Wash all metal parts in dry-cleaning solvent or volatile-mineral-spirits paint thinner. Wash diaphragm in hydraulic brake fluid and dry immediately.

(3) *Inspection and repair.* Inspect diaphragm for cracks and signs of wear. Inspect valve plunger for cracks. Make certain air ports and air passage are open. Replace parts if not serviceable.

(4) *Assembly.* Assemble relay valve diaphragm on valve plunger, fitting ridge at center of diaphragm into groove in underside of collar of plunger. Fit diaphragm plate over threads of plunger with dished surface away from diaphragm. Install valve plunger nut and tighten with two wrenches.

g. Relay Emergency Valve Body and Upper and Lower Seals.

(1) *Cleaning and inspection.* Wash assembly in dry-cleaning solvent or volatile-mineral-spirits paint thinner. Blow out air passages with compressed air. Check body for cracks or other damage. Check lips of leather seals for excessive wear or breaks that might cause leakage. Replace damaged parts.

(2) *Disassembly.* Do not remove seals if they are not damaged or are not causing leakage. Seals are a pressed fit and will become damaged when removed. Drive out damaged seal or seals, using a small-diameter punch with a blunt end (fig. 57).

Caution: In driving out lower seal, exercise great caution not to damage wide stop flange on which seal is seated. Insert punch through hole in stop flange and into seal itself, tapping seal out with a series of light blows.

(3) *Assembly.* Press seal or seals into cavity of relay-emergency valve body. Install seal marked "N–10919–A" and having smaller inside diameter into top of relay-emergency valve body (cavity with smallest stop flange). Install seal marked "N–10919–B" in bottom of body. When pressing seals in, make certain free lip of seal is toward outside and face stamped with figures and letters is toward inside of body.

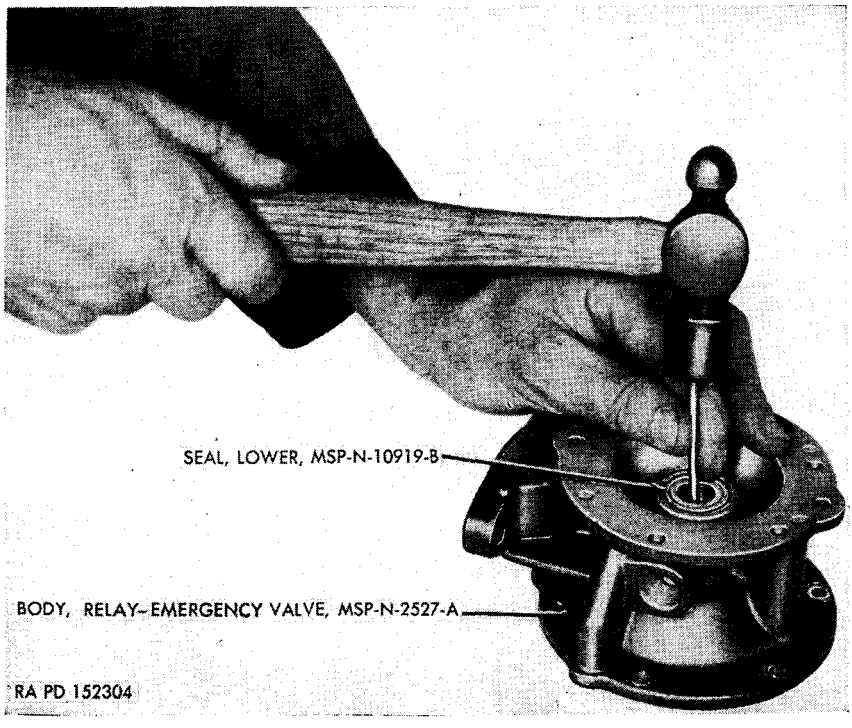


Figure 57. Driving upper seal from relay-emergency valve body.

h. Emergency Check Valve (Top) Cover, Relay Valve Body, Inlet Valve (Bottom) Cover. Wash in dry-cleaning solvent or volatile-mineral-spirits paint thinner. Blow out air passages with compressed air. Check for cracks or other damage. Make certain small equalizing vent in relay valve body is open. Seal pressed into bore of relay valve body serves only as a guide for valve plunger and should not require replacement despite wear of leather lip.

i. Assembly of Subassemblies.

(1) *Install relay-emergency valve body and relay valve plunger assembly.* Clamp mounting flange of relay-emergency valve body firmly in vise (fig. 53). Place relay valve diaphragm return spring in relay valve body, place valve plunger assembly on spring, position on relay-emergency valve body and install six valve cap screws, lock washers, and nuts, with nuts toward bottom of valve. Dowel pin assures proper positioning of parts.

(2) *Install inlet valve cage assembly and cover.* Carefully install inlet valve cage gasket and inlet valve cage assembly on four studs on bottom of relay valve body, with pronged end of cage entering cavity in relay valve body and elongated

holes in both, lining up. Install second gasket and inlet valve cover on studs. Install lock washers and nuts on studs.

(3) *Install emergency check valve and diaphragm assembly and emergency check valve cover.* Position emergency check valve and diaphragm assembly in emergency check valve cover with all holes lined up and head of retainer nesting in three cast lugs in cover. Place emergency release spring over nose of emergency check valve seat retainer and assemble all of these parts to relay-emergency valve body (fig. 52) with six cap screws, lock washers, and nuts. Install cap screws with nuts downward.

j. INSTALLATION. Install relay-emergency valve (par. 59*d*).

k. TEST. Make operation and leakage tests (par. 59).

82. Reservoir

For test and check for serviceability, removal, and installation, refer to paragraph 60. For cleaning, inspection and repairs, refer to TM 9–1827A.

83. Brake Chamber and Hydraulic Master Cylinder

a. REMOVAL. Refer to paragraph 61*b*. Remove chamber and cylinder from bracket.

b. CLEANING, DISASSEMBLY, INSPECTION, REPAIR, AND ASSEMBLY.

(1) *Brake chamber.* Refer to TM 9–1827A.

(2) *Master cylinder.* Refer to TM 9–1827C.

c. INSTALLATION. Fasten chamber and cylinder on bracket. Install bracket, chamber, and cylinder assembly on frame side rail (par. 61*c*). Make test for proper brake chamber piston travel (par. 61*a*).

84. Hose, Tubing, and Fittings

Air hose, hydraulic and air lines, and fittings are not ordinarily removed except for replacement. Bent, kinked, or damaged lines and fittings must be replaced. Lines must be kept tightly attached. Refer to TM 9–1827A.

Section IV. REBUILD OF AXLE AND SPRINGS

85. Axle

a. DISASSEMBLY. Generally, axle will not be removed unless inspection discloses need for repair or replacement. For inspection pur-

poses, remove wheels (par. 52*b*) and hubs and brake drums (par. 53). To remove axle, refer to paragraph 63.

b. Cleaning. Clean mud and dirt from all exposed parts with water and a stiff brush. Remove grease from spindles and wheel retaining parts with drycleaning solvent or volatile-mineral-spirits paint thinner.

c. Inspection and Repair. Check bearing and grease seal seats for roughness. File or grind smooth high spots, burs, or roughness. Check threads on spindle for wear, crossed threads, or damage. Using fine file, file off burs, or hand-chase, if necessary. Check axle beam and spindles for bend. Indications of bent spindle are binding bearings which cannot be adjusted properly and extremely uneven wear of brake linings. Spindles that are bent, but not cracked, can be straightened. Spindles are manufactured with a camber of 20-foot to 40-foot angle (downwardly) of flange.

d. Assembly. Install hubs and brake drums on axle (par. 53*d*), adjusting wheel bearings. Install wheels on hubs (par. 52*e*).

86. Springs

(fig. 58)

a. Removal. Remove springs (par. 64*a*).

b. Cleaning. Clean mud and dirt from all exposed parts with water and a stiff brush. Clean bearings and pins with dry-cleaning solvent or volatile-mineral-spirits paint thinner, reaming and flushing old grease from passages in pins.

c. Inspection and Repair.

(1) *Spring eye and shackle bearings and pins.* Inspect for wear. Replace if excessively worn (par. 97). To replace bearings, press out with suitable tool. Use same tool to press in new bearing. Ream or burnish new bearing to specified limits (par. 97).

(2) *Spring leaves.* Inspect all leaves for cracks and breaks. Replace defective leaves.

d. Disassembly and Assembly of Springs.

(1) *Purpose.* Generally, springs will be disassembled into separate leaves only for replacement of broken leaves.

(2) *Disassembly.* Clamp spring in arbor press or vise, or put a "C" clamp around spring near center bolt to hold leaves in tension after clips and center bolt have been removed. File or grind deformed ends of spring-clip bolts and center bolt. Remove nuts from bolts. Apply heat and straighten out clips on auxiliary springs. Gradually relieve tension of leaves by releasing clamp, press, or vise. Separate leaves.

(3) *Cleaning.* Clean each leaf with dry-cleaning solvent or volatile-mineral-spirits paint thinner. Brush or buff rust and corrosion from leaves.

(4) *Inspection and repair.* Inspect each leaf for cracks and breaks. Replace defective leaves. Make sure rivets hold clips tightly. Cut out rivet and replace any defective clip.

(5) *Assembly.* Assemble leaves in proper order, starting with top (larger) leaf and fitting rolled ends of second leaf over bearing ends of top leaf. Line up holes for center bolt and insert bolt through hole in shortest leaf first. Place assembly of leaves in arbor press or vise, or use heavy "C" clamp, and press leaves tightly together. Install nut on center bolt and tighten securely. Peen end of bolt over nut. Install spacers, bolts, and nuts in spring clips on main springs, peening ends of bolts over nuts. Heat and bend ends of spring clips over auxiliary springs. Clips must be tight enough to hold leaves in alinement without restricting free movement.

e. INSTALLATION. Install springs (par. 64*b*).

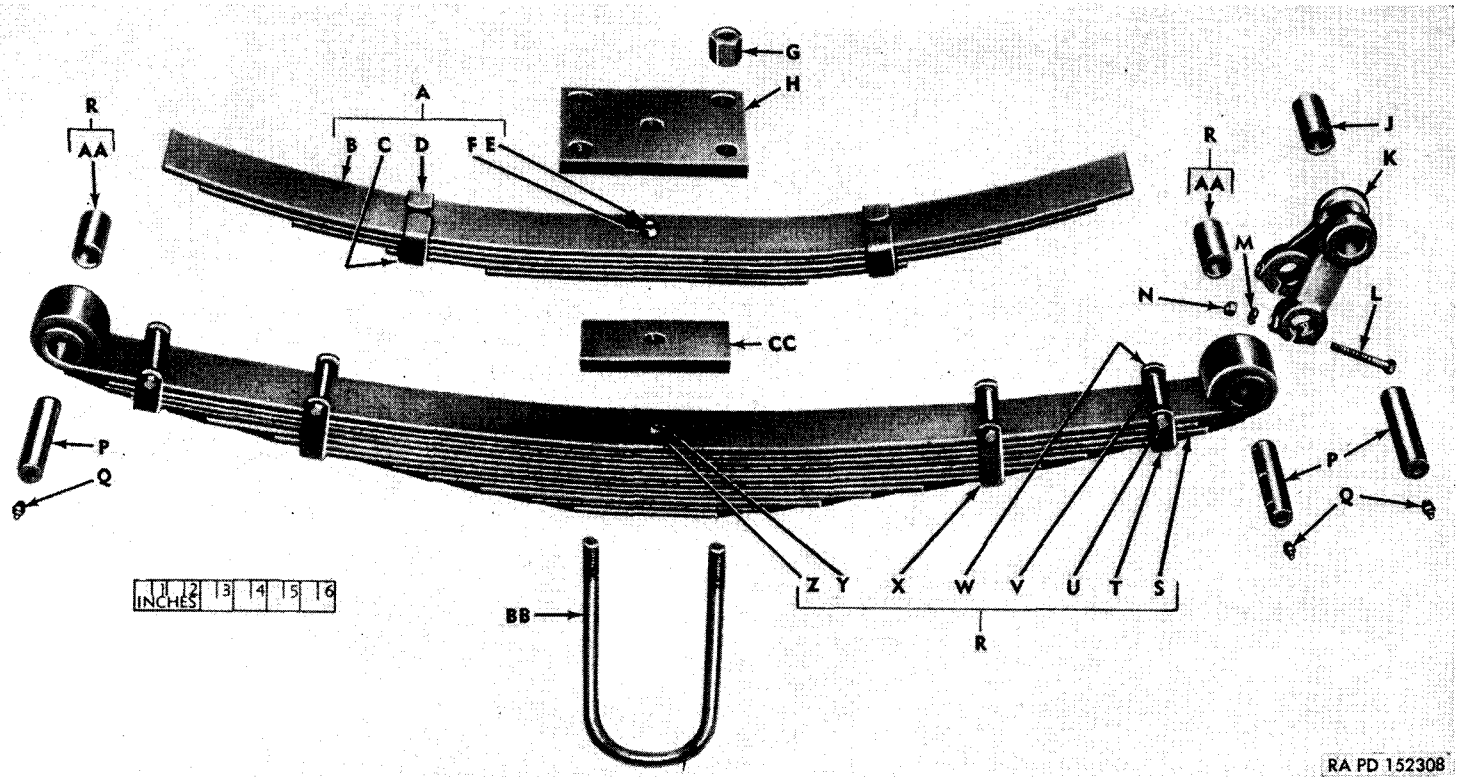


Figure 58. Exploded view of springs.

A—SPRING, AUXILIARY, ASSY—7411042
B—LEAF, NO 1, 37¼ IN—FF296253
LEAF, NO. 2, 34½ IN—FF296254
LEAF, NO 3, 27¼ IN—FF296255
LEAF, NO 4, 20 IN—FF296256
LEAF, NO 5, 12½ IN—FF296257
C—RIVET
D—CLIP, REBOUND, AUXILIARY SPRING—DST-S-346-4
E—BOLT, CENTER, AUXILIARY SPRING—DST-BN1604
F—NUT, AUXILIARY SPRING CENTER BOLT—174856
G—NUT, DOUBLE, "U" BOLT—7411041
H—PLATE, "U" BOLT—FF296245
J—BEARING, BUSHING TYPE, SHACKLE—7521827
K—SHACKLE—FF296241
L—SCREW, CAP—120640
M—WASHER, LOCK—120382
N—NUT, CAP SCREW—120369
P—PIN, SHACKLE—7521826
Q—FITTING, LUBRICATING—504208
R—SPRING, MAIN, ASSY—7521855
S—LEAF, NO 1, 58 IN—7521856
LEAF, NO 2, 59¾ IN—7521857
LEAF, NO 3, 48 IN—7529106
LEAF, NO 4, 44 IN—7529107
LEAF, NO 5, 39½ IN—7529108
LEAF, NO 6, 35 IN—7529109
LEAF, NO 7, 30½ IN—7529110
LEAF, NO 8, 26 IN—7529111
LEAF, NO 9, 21¾ IN—7529112
LEAF, NO 10, 17½ IN—7529113
LEAF, NO 11, 13¼ IN—7529114
LEAF, NO 12, 9 IN—7529115
T—CLIP, REBOUND, MAIN SPRING, SMALL—7521825
U—BOLT, MAIN SPRING SMALL REBOUND CLIP—7521739
V—SPACER, MAIN SPRING REBOUND CLIP BOLT—7521737
W—NUT, MAIN SPRING SMALL REBOUND CLIP BOLT—177585
X—CLIP, REBOUND, MAIN SPRING, LARGE—7521839
Y—BOLT, CENTER, MAIN SPRING—7521828
Z—NUT, MAIN SPRING CENTER BOLT—174856
AA—BEARING, MAIN SPRING—7521829
BB—BOLT, "U"—7521858
CC—PLATE, SPACER—FF296246

Figure 58—Continued.

Section V. REBUILD OF FRONT CASTER AND REAR SUPPORT LEG

87. Front Caster

(fig. 59)

a. DISASSEMBLY. Remove front caster from trailer (par. 67*a*). Remove wheel (par. 67*b*). Separate fork assembly from mounting bracket assembly by removing fork retaining lock ring and flat washer around top end of yoke spindle.

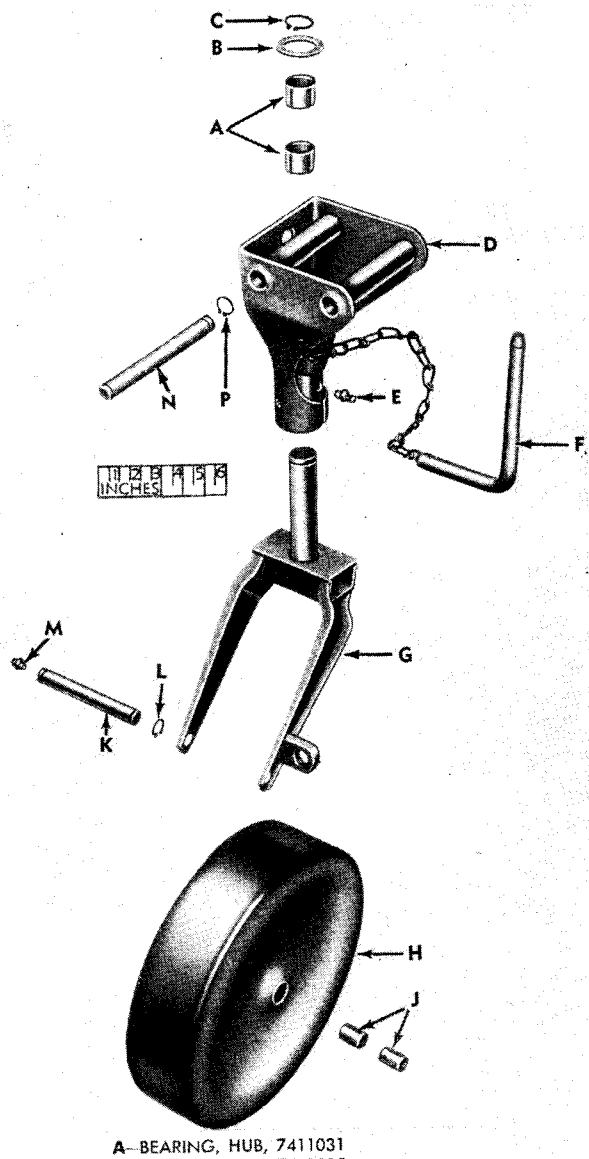


Figure 59. Exploded view of front caster.

A—BEARING, HUB, 7411031
B—WASHER, FLAT, 7411035
C—RING, LOCK, FORK RETAINING, 7411038
D—BRACKET, MOUNTING, CASTER, 7411034
E—FITTING, LUBR, 504208
F—PIN, LOCK, ASSY, 7411033
G—FORK, W/ SWIVEL, ASSY, 7411032
H—WHEEL, CASTER, ASSY, 7411036
J—BEARING, WHEEL, 7411030
K—AXLE, CASTER, 7411029
L—RING, LOCK, 583039
M—FITTING, LUBR, 504208
N—PIN, HINGE, 7411039
P—RING, LOCK, 297250

RA PD 152309

b. Cleaning. Clean mud and dirt from all exposed parts with water and a stiff brush. Clean bearings and pins with dry-cleaning solvent or volatile-mineral-spirits paint thinner, removing lubricating fitting from wheel axle, and reaming and flushing old grease from passages.

c. Inspection and Repair. Inspect bracket, yoke, and wheel for bent parts, broken welds, and wear. Inspect bearing surfaces of pins, spindle, and bearings for wear and evidence of improper lubrication. If caster is not abused, such as by being towed with caster in down position, no serious amount of wear is to be expected. However, unserviceable parts should be replaced after attempting to determine and eliminate cause. Press out worn or defective bearings with suitable tool and install new bearings. Check condition of paint and repaint if finish is badly chipped, cracked, or bare metal is found.

d. Assembly. Insert spindle of yoke in hub of mounting bracket and install flat washer and fork retaining lock ring in groove at top end of spindle. Install caster wheel (par. 67*c*). Install front caster on trailer (par. 67*d*).

88. Rear Support Leg

(fig. 60)

a. Removal. Remove support leg (par. 68*a*).

b. Cleaning. Clean mud and dirt from all exposed parts with water and a stiff brush. Unscrew inner tube to most extended position and clean exposed surface of inner tube with dry-cleaning solvent or volatile-mineral-spirts paint thinner. Screw tube to contracted position and to extended position again. Repeat cleaning operation, if necessary. Lubricate well.

c. Inspection and Repair. Inspect foot, handles, cross tube, lock pin, and chain for bent parts and broken welds. Straighten and repair. Check condition of paint and repaint if finish is badly chipped, cracked, or bare metal is found. Test and observe telescopic operation. Rear support was not designed to be disassembled. Parts deformed and welded during manufacture make repair or replacement of operating parts impractical. If one or both tubes are bent to extent screw will not operate satisfactorily, replace unit.

d. Installation. Install support leg (par. 68*b*).

Section VI. REBUILD OF ELECTRICAL SYSTEM

89. Receptacle and Wiring Harness, Terminals and Connectors

a. Removal. Remove receptacle and wiring harness (par. 69*c*).

b. Disassembly, Inspection, Repair, and Assembly. Receptacle pins, receptacle sockets, and terminals are always soldered to ends of

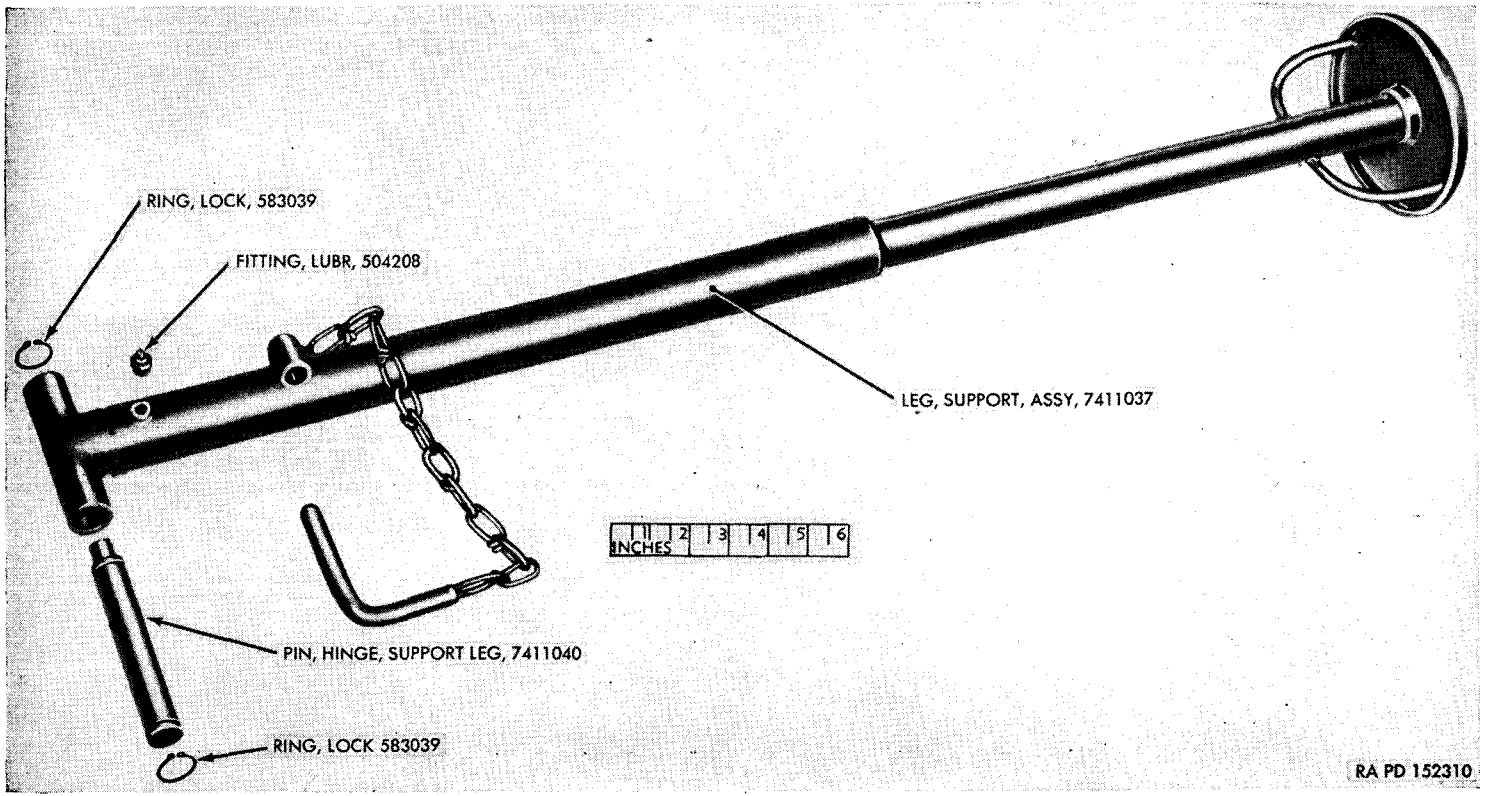


Figure 60. Exploded view of rear support leg.

wires or cables. All are replaced in essentially the same manner. Refer to TM 9–1825E for disassembly, inspection, repair, and assembly procedures for receptacle and plug-type connectors.

c. INSTALLATION. Install receptacle and wiring harness (par. 69*d*).

90. Tail and Stop Lights

(fig. 61)

a. DISASSEMBLY. Remove light (par. 70). Remove door by removing six screws. Remove two screws holding each socket plate to body. Remove eyelets. Remove three screws holding baffle plate to inside rear of body. Pull socket assembly, including baffle plate, from body.

b. CLEANING. Clean exterior of body and door with volatile-mineral-spirits paint thinner or dry-cleaning solvent. If necessary to clean interior of body and socket assembly, use clean water or soap solution. Dry thoroughly.

c. INSPECTION. Inspect door for cracks, warpage, cracked or broken lenses, or evidence of leakage around lens gaskets.

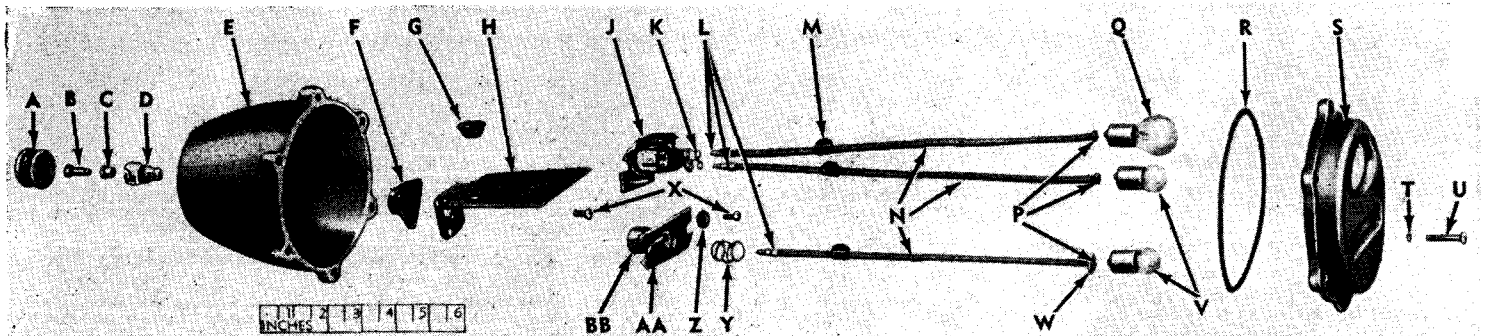
Note. It is not practical to attempt to replace lenses or lens gaskets in door since these are clinched in place to make a watertight seal.

Inspect body for cracks or evidence of leakage. Replace body if damaged. Check sockets to make sure grommets, eyelets, sockets, cables, and connectors are in good condition and will make good electrical and watertight connections when installed. Pay particular attention to body grommet at rear of baffle plate to make sure cables are cemented securely to grommet and grommet will make watertight seal in body when installed. Replace defective parts or assembly.

d. REPAIR. Individual parts of socket may be replaced without complete disassembly. To remove baffle-plate grommet, compress grommet and pull from hole. Remove grommet from cables. Cables through body grommet are cemented to grommet. Pry grommet from baffle plate and cut away from cables using care not to damage cables. Install baffle plate grommet on cable with large end up, compressing grommet, inserting it, making certain plate engages groove in grommet. To install body grommet, cement cables securely to grommet, press grommet to end of baffle plate, and aline screw holes. To remove cables, remove grommets, bushing, and shell, and pull cable through socket and baffle plate. To install cable, insert connector-terminal end of cable through socket and baffle plate and install new grommets, connector shell, and bushing.

e. ASSEMBLY. Position socket with baffle plate in body. For left-hand unit (service tail and stop, and blackout tail light), place double socket assembly (service tail light, cable No. 21, and service stop light, cable No. 22) at top. For right-hand unit (blackout tail and stop

971845°—51——9



A—GROMMET—FF674731
B—GROMMET, TERMINAL CONNECTOR—7762603
C—BUSHING, TERMINAL CONNECTOR—7762624
D—SHELL, FEMALE, CONNECTOR—7762628
E—BODY—7525997
F—GROMMET, BODY—7526022
G—GROMMET, BAFFLE PLATE—7526002
H—PLATE, BAFFLE—7526003
J—SOCKET, DOUBLE, ASSY—7526023
K—SPRING, DOUBLE SOCKET—7526027
L—TERMINAL—7762622
M—MARKER—7524649
N—CABLE—7720853
P—CONTACT—7526000
Q—LAMP, 24-28V, NO 1683, 32 CP—446914
R—GASKET, DOOR—7320658
S—DOOR—7526020
T—RING, RETAINING, DOOR SCREW—7320642
U—SCREW, DOOR—7320641
V—LAMP, 24-28V, NO 1251, 3 CP—190877
W—WASHER—7526289
X—SCREW—121832
Y—SPRING, SINGLE SOCKET—7526001
Z—EYELET, W/GROMMET, ASSY—7526007
AA—PLATE, SINGLE SOCKET—7525999
BB—SOCKET, SINGLE—7525998

RA PD 152311

Figure 61. Exploded view of service tail and stop, and blackout tail light.

light), place stop light socket (cable No. 23) at top. Press on front end of baffle plate to start body grommet into opening at rear of body. Aline holes and install three screws to secure baffle plate to inside rear of body. Install eyelets in ends of each socket assembly. Position socket plates in body, aline holes, and install two screws holding each socket plate to body. If lamps were removed, press each into its socket and turn clockwise. Position new gasket in groove in door and install door. Install light (par. 70*c*).

Section VII. REBUILD OF CHASSIS FRAME

91. Chassis Frame

a. CLEANING. Use steam or water under pressure and stiff brush to remove heavy accumulations of dirt. Use dry-cleaning solvent or volatile-mineral-spirits paint thinner to remove grease.

b. INSPECTION. Inspect frame side rails and cross members for cracks, bends, or damage. Inspect all welded seams and joints. Inspect all riveted and welded brackets, lift bars, tie-down loops, stops, and lugs. Repair or replace damaged parts.

c. REPAIR. No established rules can be made on the necessity, length, or kinds of reinforcements to install on frame members which have been bent, broken, or cracked. Reinforcements can be made with channel, angle, or flat stock. Use electric-arc welding when reinforcing damaged members. Do not weld on edges of frame members as this will weaken them and encourage development of new cracks. Refer to TM 9–2852 for welding theory and application. Brackets and other parts that are damaged or broken must be repaired or replaced. Cut off or drill and drive out all rivets from part to be replaced. Install new parts, using new rivets.

Section VIII. REBUILD OF BODY AND EQUIPMENT M104

92. Body and Equipment M104

a. CLEANING. Use steam or water and stiff brush to remove dirt. Use dry-cleaning solvent or volatile-mineral-spirits paint thinner to remove grease.

b. INSPECTION. Inspect body sides, front and rear tail gates, and floor for bent, dented, or torn sections. Inspect tail gate hinges, chain assemblies, and fastenings for damage. Inspect mounting brackets, lashing hooks, fenders, and reflectors for security of mounting and for damage. Inspect racks and rack gates for cracked or damaged boards, bent or damaged stakes, and loose rivets. Inspect for loose or deformed hinges or latches. Inspect bows for bent, loose, or dam-

aged parts. Check units for proper operation and care and preservation. Inspect paulin for tears or ripped seams and missing or damaged lashing ropes, webbing, grommets, and buckles. Repair or replace damaged parts.

c. REPAIR. Straighten bent and dented metal parts. Repair cracks or fractures by welding. Before welding, remove adjacent wood parts to prevent charring. Repair wood parts by splicing with wood or metal cleats. Make sure cleats do not effect function of repaired parts or affect strength of parts subject to strain; if so, replace. Reinforce torn or ripped seams in canvas. Replace damaged grommets, lashing ropes, or buckle assemblies.

Section IX. REBUILD OF TANK FRAME, TANK, AND EQUIPMENT M106

93. Tank Frame and Tank

a. REMOVAL. If tank, fenders, and/or tank frame require removal, refer to paragraph 72.

b. INSPECTION. Inspect tank mounting rails, front angle, and rear cross member for cracks or bends. Lift faucet box covers and test action of hinges and latches. Check fenders for looseness or damage. Inspect tank for leaks, punctures, and dents. Check front extension for loose or broken slats. Repair damaged parts and tighten loose ones. Check condition of finish and repaint if chipped, cracked, or bare metal is found.

c. REPAIR. Straighten bent and dented metal parts. Repair cracks or fractures by welding. Refer to TM 9–2852 for welding theory and application in welding of punctures and open seams of welded aluminum tank. Replace broken wood parts and metal parts which cannot be repaired.

d. INSTALLATION. Replace any components that have been removed (par. 72).

94. Tank Equipment

a. REMOVAL. If any components require removal, refer to paragraph 73.

b. WATER PUMP. Sufficient information for disassembly, repair, overhaul, rebuild, and assembly are given in paragraph 73*d*.

c. BELL STRAINER. Sufficient information for disassembly, repair, overhaul, rebuild, and assembly are given in paragraph 73*e*.

d. EXTERNAL VALVE. External valve is unscrewed from bottom of tank after tank has been removed from tank frame (par. 72). Stem packing is tightened to eliminate leaking by screwing down gland

nut. Plunger disk is reached for replacement by unscrewing cap nut, releasing spring, and withdrawing plunger assembly. External valve is installed in tank before tank is mounted in tank frame (par. 72).

e. MANIFOLD VALVE. This valve has ground seats and no provision for adjustment other than tightening nut at bottom of stem.

f. FAUCETS. Sufficient information for disassembly, repair, overhaul, rebuild, and assembly are given in paragraph 73*g*.

g. INSTALLATION. To install components, refer to paragraph 73.

Section X. REPAIR AND REBUILD STANDARDS

95. General

The serviceability standards included herein give the minimum and maximum size of new or rebuild parts. They also give wear limits which indicate that point to which a part or parts may be worn before replacement, in order to receive maximum service with minimum replacement. Normally, all parts which have not been worn beyond the dimensions shown in the "Wear limits" column or damaged from corrosion will be approved for service.

96 Brakes

Fig. No.	Ref. letter	Point of measurement	Sizes and fits of new parts	Wear limits
49	F	Inside diameter of brake drum.	14.995 to 15.005 in	Refinish surface if scored or if run-out exceeds 0.006 in. Replace if diameter cut to more than 15.230 in.

97. Springs

Fig. No.	Ref. letter	Point of measurement	Sizes and fits of new parts	Wear limits
58	P	Diameter of shackle pins	0.989 to 0.990 in	0.980 in.
58	J, AA	Diameter of spring bearings	0.991 to 0.994 in	1.004 in.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DESTRUCTION OF MATÉRIEL TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

98. Domestic Shipping Instructions

a. PREPARATION FOR SHIPMENT IN ZONE OF INTERIOR. When shipping the 1½-ton, 2-wheel cargo trailer M104 and water tank trailer M106 interstate or within the zone of interior, the officer in charge of preparing the shipment will be responsible for furnishing trailers to the carriers for transport in a serviceable condition, properly cleaned, preserved, painted and lubricated as prescribed in SB 9–4.

Note. For loading and blocking instructions for these trailers on freight cars, refer to paragraphs 100 and 101.

b. PREPARATION FOR SHIPMENT TO PORTS.

(1) *Inspection.* All used trailers destined for oversea use will be inspected prior to shipment in accordance with TB ORD 385.

(2) *Processing for shipment to ports.* All trailers destined to ports of embarkation for oversea shipment will be further processed in accordance with SB 9–4.

Note. Ports of embarkation will supplement any necessary or previously omitted processing upon receipt of trailers.

c. REMOVAL OF PRESERVATIVES FOR SHIPMENT. Personnel withdrawing trailers from a limited storage status for domestic shipment *must not remove preservatives*, other than to insure that the trailers are complete and serviceable. If it has been determined that preservatives have been removed, they must be restored prior to domestic shipment. The removal of preservatives is the responsibility of depots, ports, or field installations (posts, camps, and stations) receiving the shipments.

d. ARMY SHIPPING DOCUMENTS. Prepare all Army shipping documents accompanying freight in accordance with TM 38–705.

99. Limited Storage Instructions

a. GENERAL.

(1) Trailers received for storage already processed for domestic shipment, as indicated on the vehicle processing record tag (WD AGO Form 9–3), must not be reprocessed unless the inspection performed on receipt of trailers reveals corrosion, deterioration, etc.

(2) Completely process trailer upon receipt directly from manufacturing facilities or if the processing data recorded on the tag indicates that they have been rendered ineffective by operation or freight shipping damage.

(3) Trailers to be prepared for limited storage must be given a limited technical inspection and be processed as prescribed in SB 9–63. The results and classification of trailer will be entered on DA AGO Form 461–5.

b. Receiving Inspections.

(1) Report of trailers received for storage in a damaged condition or improperly prepared for shipment will be reported on DD Form 6 in accordance with SR 745–45–5. Report of trailers received in an unsatisfactory condition (chronic failure or malfunction of the trailer or equipment) will be reported on the Unsatisfactory Equipment Report, DA AGO Form 468, in accordance with SR 700–45–5.

(2) When trailers are inactivated, they are to be stored in a limited storage status for periods not to exceed 90 days. Stand-by storage for periods in excess of 90 days will normally be handled by ordnance maintenance personnel only.

(3) Immediately upon receipt of trailers for storage, they must be inspected and serviced as prescribed in chapter 2, section I. Perform a systematic inspection and replace or repair all missing or broken parts. If repairs are beyond the scope of the unit and the trailers will be inactivated for an appreciable length of time, store them in a limited storage status and attach tags to them specifying the repairs needed. The reports of these conditions will be submitted by the unit commander for action by an ordnance maintenance unit.

c. Inspections During Storage. Perform a visual inspection periodically to determine general condition. If corrosion is found on any part, remove the rust spots, clean, paint, and treat with the prescribed preservatives.

Note. Touch-up painting will be in accordance with TM 9–2851.

d. Removal from Limited Storage.

(1) If the trailers are not shipped or issued upon expiration of the limited storage period, they may either be processed for another limited storage period or be further treated for stand-by storage (trailers inactivated for period in excess of 90 days up to 3 years) by ordnance maintenance personnel.

(2) If trailers to be shipped will reach their destination within the scope of the limited storage period, they need not be reprocessed upon removal from storage unless inspection re-

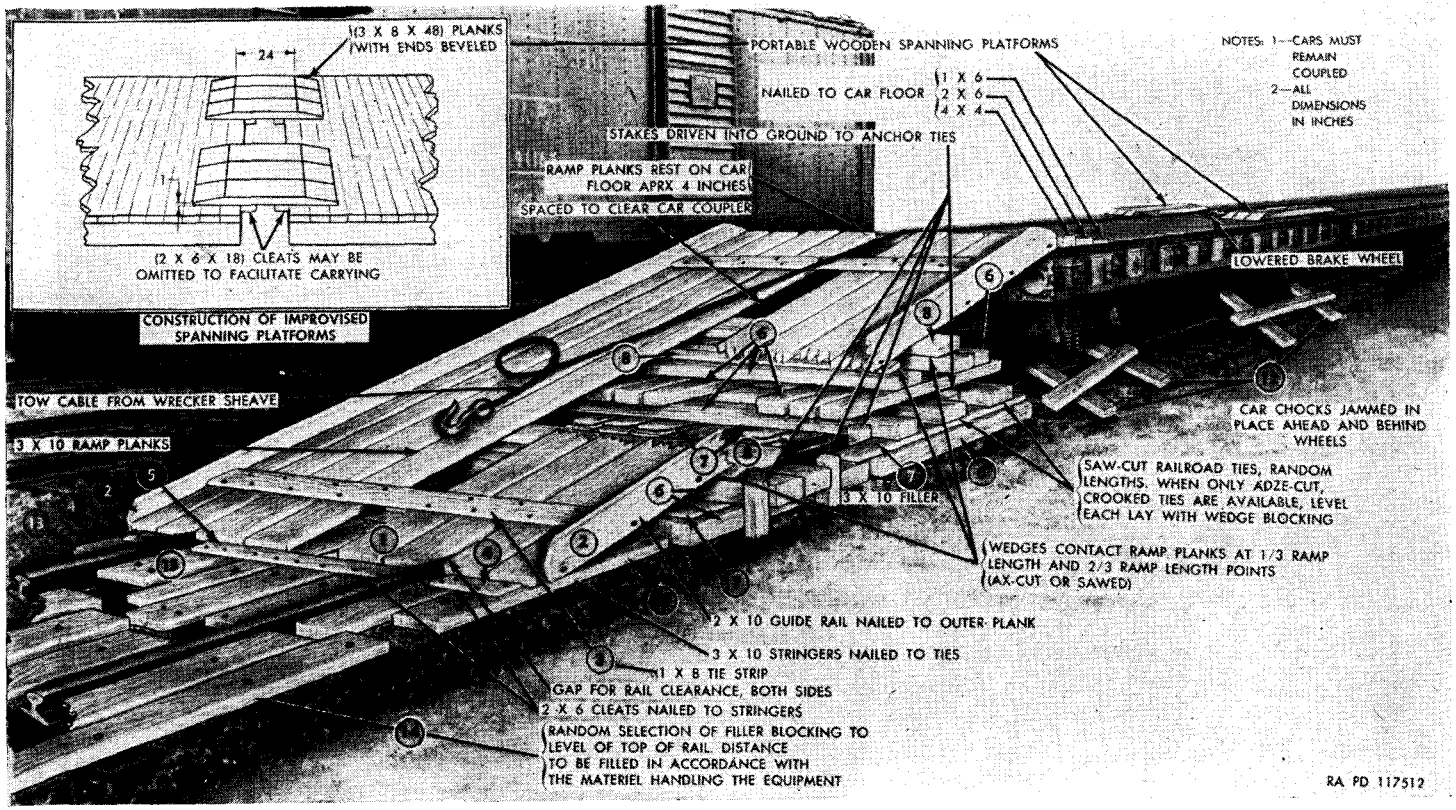


Figure 62. Construction of improvised loading ramp and spanning platforms.

BILL OF MATERIALS FOR RAMP AS ILLUSTRATED					
PART NO	QUANT REQ'D	PART NAME	LENGTH	WIDTH	THICKNESS
1	8	RAMP PLANKS	20 ft	10 in	3 in
2	2	GUIDE RAILS	20 ft	8 in	2 in
3	2	TIE STRIPS	8 ft	8 in	1 in
4	2	CLEATS	18 in	6 in	2 in
5	1	CLEAT	56 in	6 in	2 in
6	31	RAILROAD TIES	8 ft	8 in	8 in
7	AS REQD	FILLERS	AS REQD	10 in	3 in
8	AS REQD	WEDGES (CUT TO FIT)	8 ft	—	—
9	1	STEPDOWN PIECE	8 ft	4 in	4 in
10	1	STEPDOWN PIECE	8 ft	6 in	2 in
11	1	STEPDOWN PIECE	8 ft	6 in	1 in
12	4	CHOCK BLOCKS	AS REQD	4 in	4 in
13	AS REQD	STRINGERS	AS REQD	10 in	3 in
14	AS REQD	GROUND DUNNAGE	AS REQD		

NOTES:

1. RAMP SHOWN IS OF CAPACITY OF LARGEST END-LOADING FREIGHT CAR. FOR LESSER LOADS, REDUCE NUMBER OF RAMP PLANKS.
2. WIDTH DETERMINED BY TREAD OF MATERIEL BEING LOADED.
3. FOR LOADING TWO WHEELED ARTILLERY TRAILERS, OR SHORT WHEELBASE MATERIEL, RAMP PLANKS MAY BE SHORTER.

CAUTION: WHEN RAMP IS TOO SHORT, UNDERPINNING OF MATERIEL WILL STRIKE END OF RAMP (EX: 90 MM AA GUN).

4. OPENING AT CENTER MAY BE FILLED UP TO THE CAR COUPLER TO AVOID INJURY TO MANEUVERING PERSONNEL.
5. FOR LOADS OVER 40-TONS, APPROACH END OF FLATCAR MUST BE BLOCKED UP TO AVOID TIPPING OF FLATCAR.
6. THIS TYPE RAMP IS ADAPTABLE TO DROP-END GONDOLA AND AUTO END-DOOR BOX CAR LOADING.
7. WHEN LOADING AN AUTO END-DOOR BOX CAR, IT MAY BE NECESSARY TO LOAD A FLATCAR COUPLED TO THE BOX CAR, TO GAIN OVERHEAD LOADING CLEARANCE.
8. WHEN LOADING BY WRECKER CABLE, WITH PULL AT 90-DEGREES TO TRAIN, USING A SHEAVE, FLATCAR AT POINT OF PULL MUST BE LASHED TO ADJACENT RAILS, CARS, OR OTHER FIXED OBJECT.

RA PD 117513

Figure 63. Bill of materials for improvised loading ramp.

veals it to be necessary according to anticipated in-transit weather conditions.

Note. All trailers being reissued through the depot supply system to troops within the continental limits of the United States must meet the requirements of TB ORD 385. This is NOT required for so-called reissues, exchanges or redistribution among troop units, where the depot supply system is not involved.

(3) Deprocess trailers when it has been ascertained that they are to be placed into immediate service. Remove all rust preventive compounds and thoroughly lubricate as prescribed in chapter 3, section II. Inspect and service trailers as prescribed in chapter 3, section III.

(4) Repair and/or replace all items tagged in accordance with *b*(3) above.

e. Storage Site. The preferred type of storage for trailers is under cover in open sheds or warehouses whenever possible. Where it is found necessary to store trailers outdoors, the storage site must be selected in accordance with AR 700–105 and protected against the elements as prescribed in TB ORD 379.

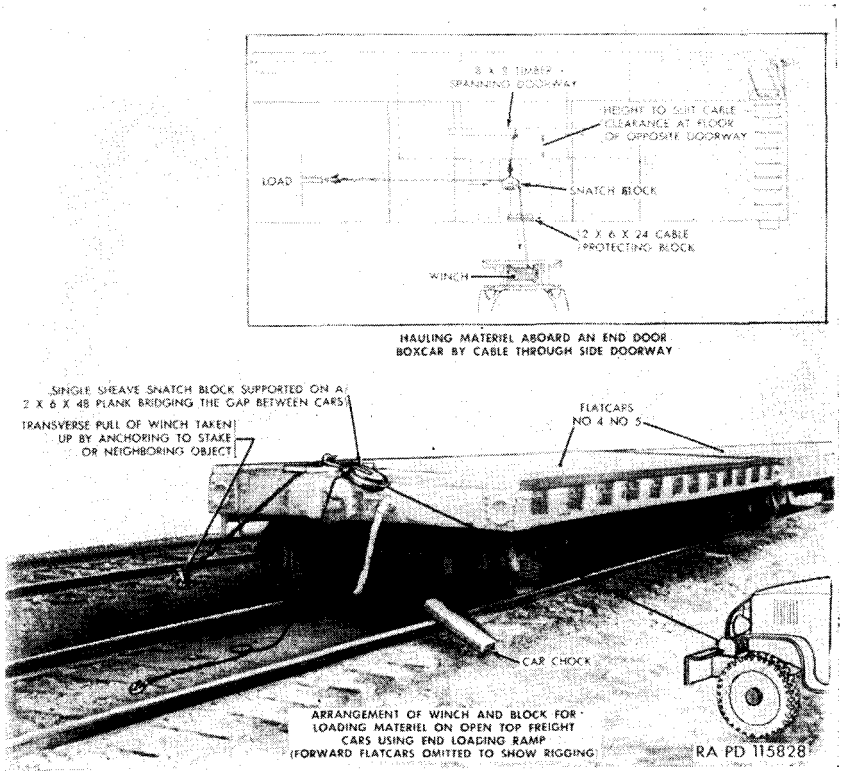


Figure 64. Method of powering the towing cable.

100. Loading the 1½-Ton, 2-Wheel Cargo Trailer M104 and Water Tank Trailer M106 for Rail Shipment

a. PREPARATION.

(1) When trailers are shipped by rail, every precaution must be taken to see that they are properly loaded and securely fastened and blocked to the floor of car. All on vehicle matériel (OVM) will be thoroughly cleaned, preserved, packed, (boxed or crated) and securely stowed in or on the trailer or freight car for transit.

(2) Prepare all trailers for rail shipment in accordance with paragraph 98*a*. In addition, take the following precautions:

(*a*) Remove canvas cover from the cargo trailer M104, dry, fold or roll together and wrap with aluminum foil type II (do not seal). The wrapped canvas will be boxed and securely strapped within the trailer for rail shipment.

(*b*) Remove bows from the cargo trailer M104. Apply rust-preventive compound (thin film) to unpainted metal components. Secure bows and legs together with metal strapping and secure in trailer for shipment.

(*c*) Increase tire pressure slightly higher than normal except where shipment is to be exposed to extremely hot-weather conditions.

b. TYPE OF CARS. Instructions contained herein pertain to the loading of trailers in flatcars (cars with wooden floors laid over sills and without sides and ends but equipped with stake pockets, *c*(1) below); gondola cars (an open top car having fixed sides fixed or drop ends, and solid bottom, *c*(2) below), and boxcars (cars equipped with side or side and end doors, *c*(3) below).

c. METHOD OF LOADING TRAILERS ON FREIGHT CARS.

(1) *Flatcar loading.*

(*a*) When suitable hoisting equipment is not available for loading trailers on or for subsequent unloading from a flatcar, an end ramp must be used in cases where the trailer is not on a level with the flatcar deck. Trailers on a warehouse platform or loading dock can be pivoted over spanning platforms aboard a flatcar adjacent to the platform, then again pivoted into lateral position on the flatcar.

(*b*) When unboxed trailers must be loaded from ground level, a ramp may be improvised ((4) below) by borrowing railroad ties normally found stacked in railroad yards and by procuring necessary planking. An end ramp is shown in

place in figure 62. The bill of materials for constructing this ramp is shown in figure 63.

Note. Railroad ties alone, stacked without deck planking and not securely anchored, provide a very unstable ramp and should not be used except under conditions of extreme emergency.

(*c*) To accomplish loading, the trailer is towed onto the improvised apron at base of ramp and unhitched. Using a cable laid along the center line of the flatcar, attached to the lunette of trailer, the trailer is pivoted to point toward the ramp. A chock behind one wheel of the trailer will prevent undesirable rearward travel and assist pivoting. If landing or caster wheel is not retracted before loading starts, it may drop into the space left in the loading ramp above car coupler (fig. 62). Either retract the wheel and have personnel guiding the drawbar end of trailer up ramp, or cover ramp opening with planks. When trailer is on platform of car, lower wheel so that trailer may be maneuvered into position on freight car for blocking.

Caution: Personnel used to assist in pivoting the trailer into position must be careful to avoid injury by the violent side-whipping action likely to occur when strain is applied to the cable. Follow up forward movement of the trailer by chocking behind one wheel on the ramp.

(*d*) For powering the towing cable, a vehicle with winch is spotted at *right angles* to the train (fig. 64). It is located at about the third or fourth flatcar to facilitate signaling because of cable length limits. A single-sheave snatch block located between cars on the train center line will provide the necessary *lateral* pull. A trailer passing this point can be towed by a vehicle on the ground with personnel guiding its passage. A long tow cable from the towing vehicle will lessen the tendency of the towed trailer to stray from the center line of the train.

Note. The snatch block fastening chain must be lashed to an adjacent solidly fixed object or stake to offset the cross pull of the powered winch (fig. 64).

(*e*) After the first trailer is loaded on the flatcar, additional trailers or other vehicles may be similarly hauled aboard by passing the towing cable beneath the loaded vehicle. When a train of flatcars is being loaded, steel or wooden spanning platforms or bridges are used to cover the gap between cars. Flatcar brake wheels must first be lowered to floor level to permit passage. A pair of improvised

spanning platforms are shown in the insert in figure 62. These spanning platforms are moved along the train by hand as the trailer advances.

(*f*) The above method of train loading requires careful advance planning as to the order of loading, so that trailers are arranged on each flatcar under prescribed methods and combinations.

(2) *Gondola car loading.*

(*a*) Fixed-end gondola cars may only be loaded when hoisting facilities are available for initial loading and for unloading at destination. Hopper- or drop-bottom gondola cars without false flooring and hoisting facilities are not to be used for shipments of unboxed vehicles.

(*b*) Drop-end gondola cars may be loaded exactly as described for flatcars ((1) above). Height of fixed sides is immaterial. Trailers may progress through a gondola car by passing over the two inwardly dropped ends and over spanning platforms. Trailers selected to remain in a gondola car are first moved to the *closed* end of the car, then spread out for blocking after the remaining end is closed and latched.

Note. Do not block trailer flush against ends of gondola car. When ordering gondola cars, specify inside width required as some may be received with gussets along the inner sides which affect clearance.

(3) *Boxcar loading.*

(*a*) End-door boxcars are spotted with the door end toward the ramp and loaded as described for flatcars ((1) above) except that loading must be accomplished by pushing the trailer or towing by cable and block through the side door (fig. 62).

Note. When ordering end-door boxcars, it must be remembered that some automobile boxcars may be received with an overhead built-in rack which affects inside height calculations. Specify inside height required. Keep open-end doors clear of traffic on adjacent tracks.

(*b*) Side-door boxcars are provided with either single or double rolling doors at each side and must be loaded from a platform of about the same level as the boxcar floor or from an adjacent flatcar. Automobile cars of this type have large side door openings and present less difficulty in loading. Steel plates or spanning platforms must be used to bridge the gap between platform and car (fig. 62).

(4) *Loading ramp.*

(*a*) A ramp for end-loading of trailers on freight cars may be improvised when no permanent ramps or hoisting facilities are available. A ramp suitable for loading of most ordnance items is shown in figure 62. For loading the 1½-ton, 2-wheel cargo trailers M104 and water tank trailer M106, the width of the ramp may be reduced to two double-plank runways, each cleated together. Length of planking must be determined with consideration to underchassis clearance, in order to clear the hump at upper end of ramp.

Caution: Personnel guiding the trailer up the ramp must exercise care when working close to the edges of the ramp planking.

(*b*) The car bearing the ramp must be securely blocked against rolling, particularly when the car brakes are not applied as in train loading. Successive cars must remain coupled and be additionally chocked at several points along the train when ground towing of trailers aboard the train is being effected.

(*c*) Whenever the freight cars are not on an isolated track or blocked siding, each end approach to the train must be posted with a blue flag or light to advise that men are at work and that the siding may not be entered beyond those points.

(*d*) Upon completion of the loading operation, the ramp planks and bridging devices should be loaded on the train for use in unloading operations. Random sizes of timbers used in building the approach apron up to rail level should be included. All materials should be securely fastened to the car floors and entered in the bill of lading (B/L), after trailers are blocked in place. Railroad ties borrowed for the operation should not be forwarded to the unloading point unless specifically required and only with the consent of the owner.

d. Loading Rules. For general loading rules pertaining to rail shipment of ordnance vehicles, refer to TB 9–OSSC–G.

Warning: The height and width of trailers when prepared for rail transportation must not exceed the limitations indicated by the loading table as prescribed in AR 700–105, section II. Whenever possible, local transportation officers must be consulted about the limitations of the particular railroad lines to be used for the movement to avoid delays, danger, or damage to equipment.

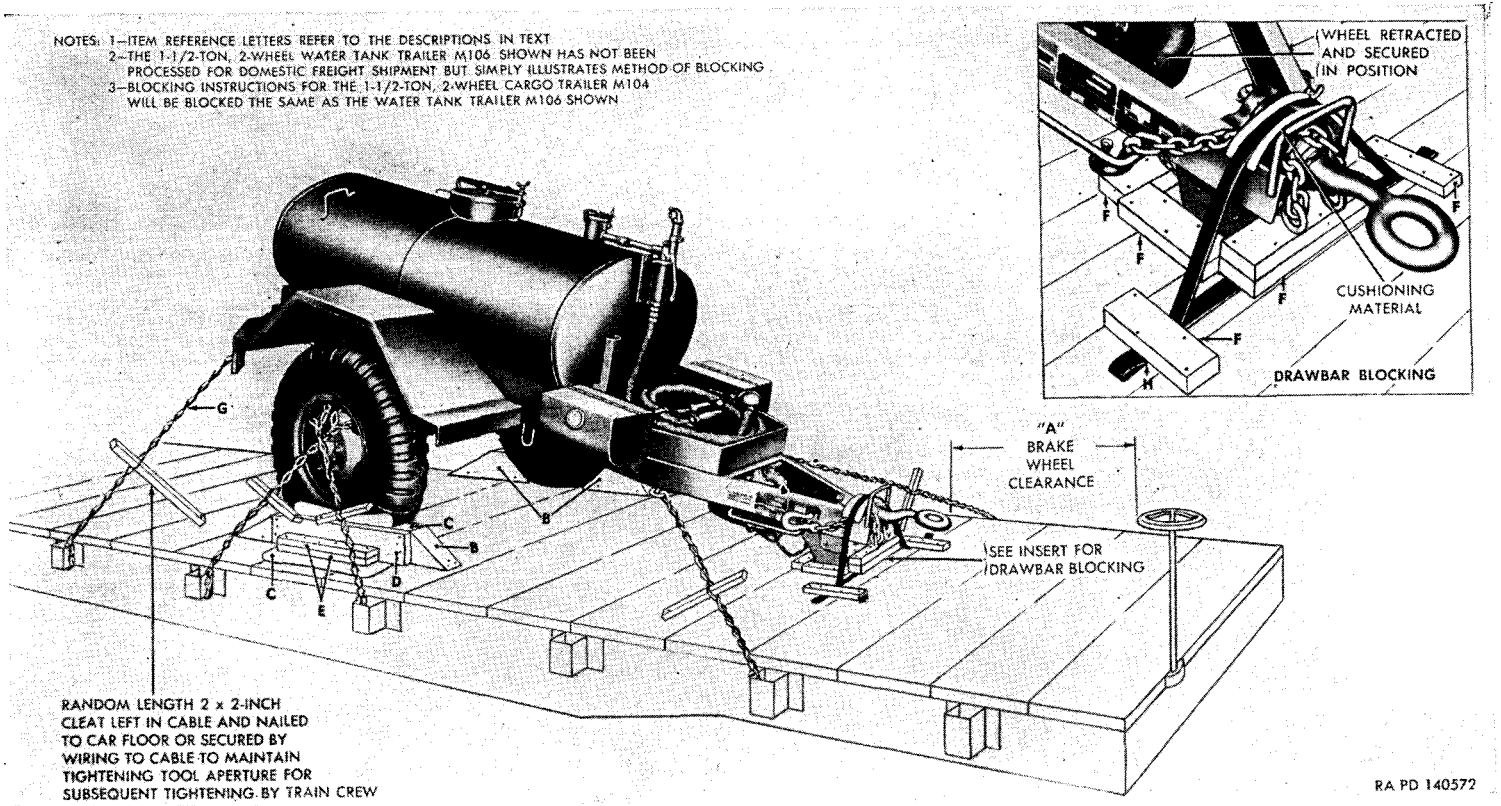


Figure 65. Method of blocking the 1½-ton, 2-wheel water tank trailer M106 for rail shipment.

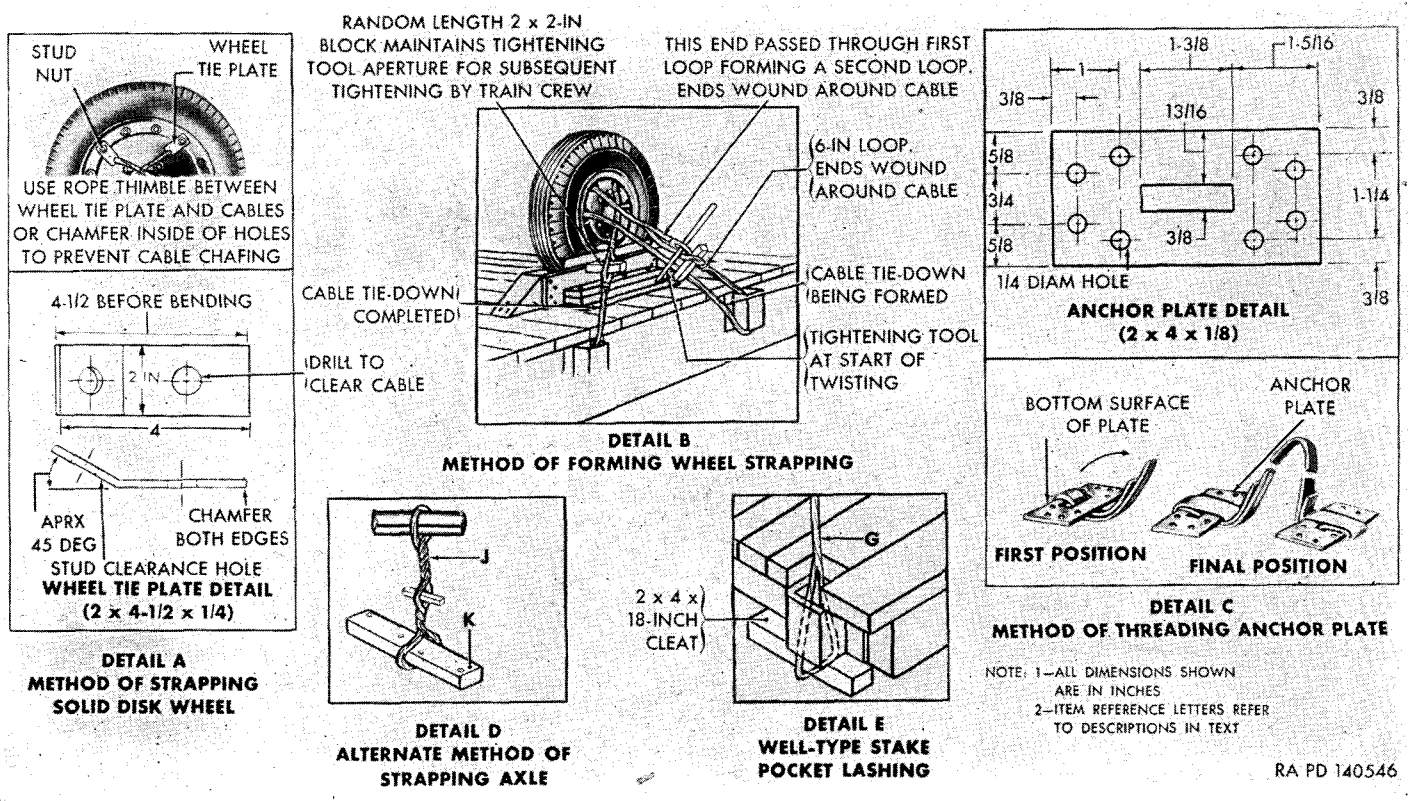


Figure 66. Method of blocking the 1½-ton, 2-wheel water tank trailer M106 for rail shipment—blocking detail.

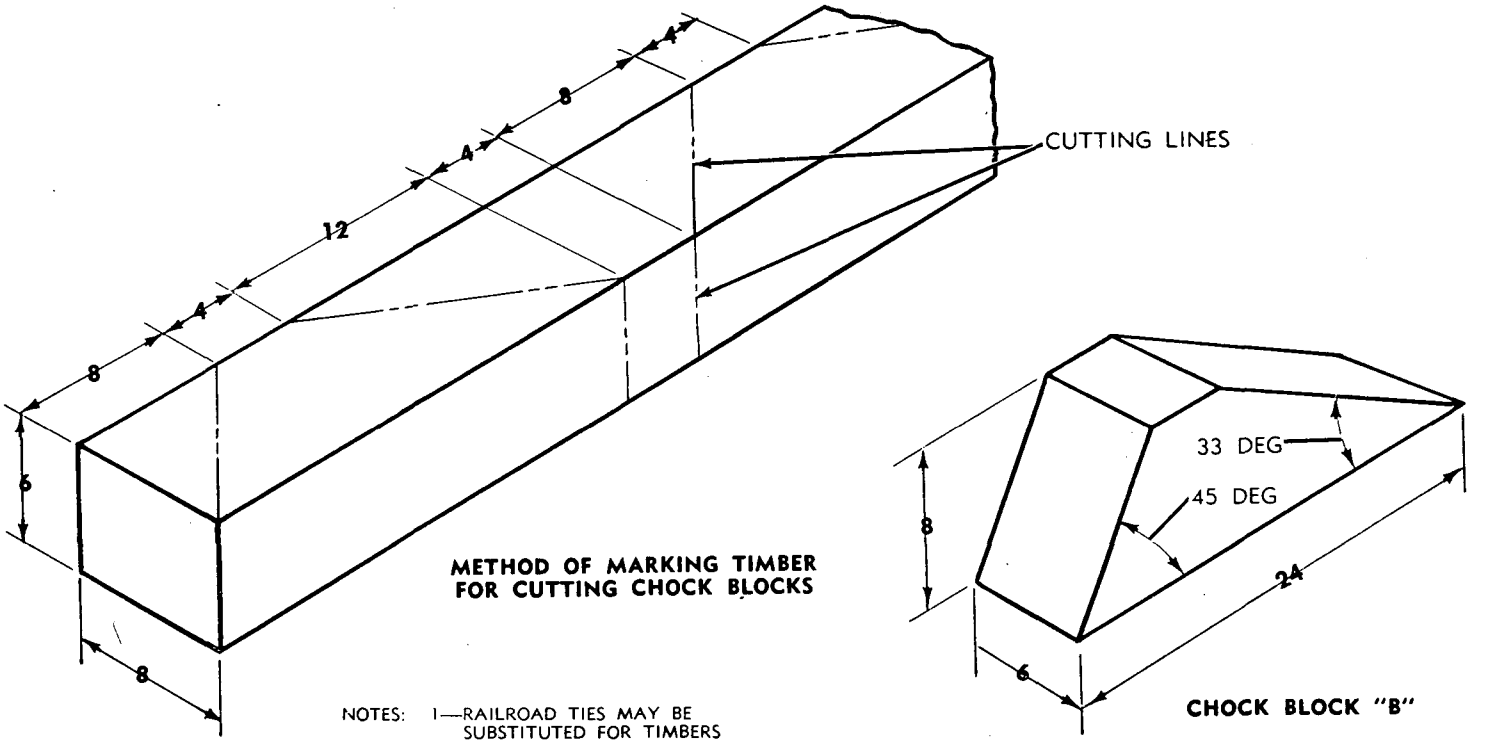


Figure 67. Cutting chock blocks from timbers.

101. Blocking the 1½-Ton, 2-Wheel Water Tank Trailer M106 for Rail Shipment

a. General.

(1) Blocking instructions for the 1½-ton, 2-wheel cargo trailer M104 will be the same as those specified for the 1½-ton, 2-wheel water tank trailer M106 illustrated in figure 65.

(2) All blocking instructions specified herein are minimum and are in accordance with the Association of American Railroads "Rules Governing the Loading of Commodities on Open Top Cars." Additional blocking may be added as required at the discretion of the officer in charge. Double-headed nails may be used if available, except in the lower piece of two-piece cleats. All item reference letters given below refer to the details and locations as shown in figure 65.

Note. Any loading methods or instructions developed by any source which appear in conflict with this publication or existing loading rules of the carriers, must be submitted to the Chief of Ordnance, Washington 25, D. C., for approval.

b. Brake Wheel Clearance "A." Load trailers on flatcars with a minimum clearance of at least 4 inches below and 6 inches above, behind, and to each side of the brake wheel (fig. 65). Increase clearance as much as is consistent with proper location of load.

Note. Trailers should be laterally spotted on flatcar so that wheels are centrally positioned between stake pockets in order that wheel strapping "G" (*h* (1) (*a*) below) provides uniform cross-wiring. Landing or caster wheel must be retracted and secured in position after trailer has been positioned on flatcar as shown in figure 65.

c. Chock Blocks "B" (6 x 8 x 24-in., 4 Required per Trailer). Locate the 45-degree face of blocks against the front and rear of each wheel. Blocks are to be positioned in such a manner as to allow flush application of wheel side cleats "D" (*e* below) when nailed to chock blocks. Nail heel of blocks to car floor with three fortypenny nails and toenail both sides of blocks to car floor with two fortypenny nails each.

Note. Filler cleats may be used between chock blocks and side cleats to centrally locate the chock block against tires. These cleats are not shown in figure 65. Chock blocks may be cut from timbers (or railroad ties, when available) as shown in figure 67.

d. Cushioning Material "C." Locate suitable cushioning material, such as waterproof paper or burlap between tires and cleats "D." The cushioning material should protrude beyond cleats "E" at floor and above cleats "D."

e. Wheel Side Cleats "D" (2 x 8-in., Length to Suit 2 Required per Trailer). Locate and nail cleats to chock blocks "B" with tenpenny nails at each end. (See note in *c* above.)

f. Floor Side Cleats "D" (2 x 4-in., Length to Suit, 4 Required per Trailer). Locate two side cleats against wheel side cleats "D" with cushioning material protruding underneath. Nail lower cleats to car floor with thirtypenny nails, staggered, and upper cleats to lower cleats and car floor with fortypenny nails, staggered.

g. Drawbar Tie-down.

(1) *Strapping "H" (1¼ x 0.035 in., length to suit, hot-rolled steel strapping.* Locate suitable cushioning material such as waterproof paper or burlap between strapping and end of drawbar frame and lunette. Locate strapping "H" over cushioning material end of drawbar frame and lunette as shown in figure 65. Nail ends of strapping to car floor with large headed nails.

(2) *Cleats "F" (2 x 4 in., length to suit, 7 required per trailer).* Locate two cleats "F" in front of skid plate on top of strapping "H" under end of drawbar frame. Nail lower cleat to car floor with thirtypenny nails and upper cleat to the lower cleat and car floor with fortypenny nails. Locate one cleat "F" against each side of skid plate and one cleat against the rear of skid plate under frame of drawbar. Locate one cleat "F" over each end of strapping (fig. 65). Nail all cleats to car floor with thirtypenny nails, staggered.

h. Trailer Tie-down.

(1) *Flatcars only.*

(*a*) *Wheel strapping "G" (no 8-gage black annealed wire or equivalent).*

1. Cut four strands of wire to length required according to the location of stake pockets. Twist-tie wires together to form a single cable.

Note. If perforated disk wheels (ventilating type) are used (fig. 65), insert cable through an upper ventilating hole then out an adjoining hole. If solid disk wheels are used, remove two upper stud nuts slightly forward and rearward of wheel center. Insert a wheel tie plate on each stud for cable (see fig. 66, detail A). Install stud nuts and tighten securely.

2. Insert the cable through a ventilating hold (or wheel tie plate), then out an adjacent hole at upper part of wheel slightly *forward* of center, for a length beyond half the distance to a stake pocket.

3. Pass the other end of cable through a stake pocket *rearward* of wheel and form a 6-inch loop in end, winding *each* of the four wires *tightly* around the cable a few turns. Make certain the loop is positioned well above the span of the cable.

4. Pass the free end of the cable through this loop, hand tight, and again wind end of each wire around cable *tightly* (detail B, fig. 66).
5. Position a random length 2 x 2-inch cleat between cables.
6. Insert end of a tightening tool at approximate center of cables and twist-tie cables just taut enough to remove all slack, retaining cleat in its position between cables. Nail this cleat to car floor or secure by wiring to prevent dislodgment during transit.
7. Form another cable and pass end through a ventilating hole (or wheel tie plate) then out an adjacent hole at upper part of wheel slightly *rearward* of center crossing initial cable (*3* above).
8. Pass other end of cable through a stake pocket *forward* of wheel and complete and twist-tie as described above.
9. Repeat above operations for the other wheel on opposite side of trailer.

Note. During transit, cables will be checked for looseness and retightened if necessary by train personnel.

10. Cables are passed through stake pockets so that the cable loop butts against the car frame. A short stake driven into each stake pocket will protect the cable loop from chafing and loosening. (These stakes are omitted in figure 65.) If flatcars are received where flooring is flush against the top of the well-type stake pockets, a loop of cable is passed through the stake pocket, and a short cleat about 2 x 4 x 18 inches is inserted in the loop below the stake pocket. Subsequent tightening of cable will cause it to draw the wooden cleat securely against the bottom of stake pocket (detail E, fig. 66).

(*b*) *Drawbar strapping "G."* Insert cable "G" through brackets on each side of drawbar and attach to stake pockets in the same fashion as prescribed for wheel strapping (*a*) above.

(*c*) *Rear trailer strapping "G."* Insert cable "G" through the two brackets at rear end of trailer and attach to stake pockets in the same fashion as prescribed for wheel strapping (*a*) above.

(2) *Gondola or boxcar only.*

(*a*) *Wheel strapping.* Strapping of wheels is not required for gondola or boxcar blocking.

(*b*) *Axle strapping.* Locate two pieces of 1¼ x 0.035-inch hot-rolled strapping over axle close to wheels. Coil strapping around steel anchor plates as shown in detail C, figure 66.

Secure by nailing anchor plates to car floor with not less than six twentypenny nails (double-headed nails preferred). As an alternate method of securing axle, form and substitute a cable "J" (consisting of four strands of No. 8 gage black annealed wire or wires of equivalent strength) at each location for steel strapping. Pass cables over axle and around wooden cleats "K" (2 x 4 x 18 in.). Locate cleats lengthwise of car and nail to car floor with thirtypenny nails in each cleat. Join both ends of cable together as prescribed in (1) (*a*) above, and twist taut with tightening tool just taut enough to take up slack (detail D, fig. 66).

(*c*) *Drawbar and rear trailer strapping.* Apply strapping in a similar fashion as prescribed in (1) (*b*) and (*c*) above, except secure to the floor of car by use of 2 x 4 x 18-inch cleats. If flat metal strapping is used secure to car floor by using anchor plates as prescribed in (2) (*b*) above.

Section II. DESTRUCTION OF MATÉRIEL TO PREVENT ENEMY USE

102. General

a. Destruction of the 1½-ton cargo trailer or water tank trailer when subject to capture or abandonment in the combat zone, will be undertaken by the using arm only when, in the judgment of the unit commander concerned, such action is necessary in accordance with orders of, or policy established by, the army commander. When in the possession of ordnance maintenance personnel, destruction will be in accordance with FM 9–5 and the information below as is applicable.

b. The information which follows is for guidance only. Certain of the procedures outlined require the use of explosives and incendiary grenades which normally may not be authorized items for the vehicle. The issue of these and related materials, and the conditions under which destruction will be effected, are command decisions in each case, according to the tactical situation. Of the several means of destruction, those most generally applicable are—

Mechanical	Requires axe, pick mattock, sledge, crowbar, or similar implement.
Burning	Requires gasoline, oil, incendiary grenades, or other inflammables.
Demolition	Requires suitable explosives or ammunition.
Gunfire	Includes artillery, machine guns, rifles using rifle grenades, and launchers using antitank rockets.

Under some circumstances hand grenades may be used.

In general, destruction of essential parts, followed by burning will usually be sufficient to render the matériel useless. However, selection of the particular method of destruction requires imagination and resourcefulness in the utilization of the facilities at hand under the existing conditions. Time is usually critical.

c. If destruction to prevent enemy use is resorted to, the matériel must be so badly damaged that it cannot be restored to a usable condition in the combat zone either by repair or cannibalization. Adequate destruction requires that all parts essential to the operation of the matériel, including essential spare parts, be destroyed or damaged beyond repair. However, when lack of time and personnel prevent destruction of all parts, priority is given to the destruction of those parts most difficult to replace. Equally important, the same essential parts must be destroyed on all like matériel so that the enemy cannot construct one complete unit from several damaged ones.

d. If destruction is directed, due consideration should be given to—

(1) Selection of a point of destruction that will cause greatest obstruction to enemy movement and also prevent hazard to friendly troops from fragments or ricocheting projectiles which may occur incidental to the destruction.

(2) Observance of appropriate safety precautions.

103. Destruction of the Cargo Trailer or Water Tank Trailer

The two trailer models covered in this technical manual have essentially the same chassis but differ in the equipment mounted thereon. The methods of destruction described in paragraphs 104, 105, and 106 below are applicable to both models of this vehicle. Additional instructions are furnished, as required, to provide for complete destruction of the particular model of vehicle.

104. Method No. 1—Destruction by Burning

a. Using an axe, pick mattock, sledge or other heavy implement, smash all vital elements such as the parking wheel assembly, operating brake lever assembly, lights, reflectors, switches, and plug and cable assembly. On the water tank trailer, also smash the water pump, valves, and heater.

b. Slash tires. If tires are inflated, exercise care to prevent injury should the tires blow out while being slashed. Whenever practicable, it is usually preferable to deflate tires before slashing.

c. Explosive ammunition, if present or available nearby, should be removed from packing or other protective material. Place ammuni-

tion in and about the cargo or water tank trailer so that it will be fully exposed to the fire and in such locations that the greatest damage will result from its detonation. Remove any safety devices from ammunition.

d. Pour gasoline and oil over the entire trailer. Ignite and take cover. If gasoline and oil are not available, use incendiary grenades.

Caution: Cover must be taken without delay since an early explosion of the explosive ammunition may be caused by the fire. Due consideration should be given to the highly inflammable nature of gasoline and its vapor. Carelessness in its use may result in painful burns. Elapsed time :– about 6 minutes.

105. Method No. 2—Destruction by Demolition

a. Prepare and place the number of 1-pound charges of EXPLOSIVE, TNT (1-lb. block or equivalent per charge together with the necessary detonating cord) for destruction of the particular model of trailer as indicated below:

Model of trailer	*No. of charges*	*Location of charges*
1½-Ton Cargo Trailer, M104.	3	Set *two* charges on the rear axle, *one* close to the left wheel, and the *other* close to the right wheel; set the *third* charge on the parking wheel touching the fork.
1½-Ton Water Tank Trailer, M106.	4	Set *two* charges on the rear axle, *one* close to *left* wheel, and the *other* close to the *right* wheel; set the *third* charge on the parking wheel, touching the fork, set the *fourth* charge between the water pump and the water tank.

Connect the charges for simultaneous detonation with detonating cord.

b. Provide for dual priming to minimize the possibility of a misfire. For priming, either a nonelectric blasting cap crimped to at least 5 feet of safety fuse (safety fuse burns at the rate of 1 foot in 30 to 45 seconds; test before using) or an electric blasting cap and firing wire may be used. Safety fuse, which contains black powder, and blasting caps must be protected from moisture at all times. The safety fuse may be ignited by a fuse lighter or a match; the electric blasting cap requires a blasting machine or equivalent source of electricity.

Caution: Cover must be taken without delay since an early explo- separated from the charges until required for use.

Note. For the successful execution of methods of destruction involving the use of demolition materials, all personnel concerned will be thoroughly familiar with the pertinent provisions of FM 5–25. Training and careful planning are essential.

c. Destroy the tires by placing an incendiary grenade under each tire. The detonation of the explosive charges should be delayed until the incendiary fires are well started. This will prevent the fires from being extinguished by the blast when the charges are detonated.

d. Detonate the charges. If primed with nonelectric blasting cap and safety fuse, ignite and take cover. If primed with electric blasting cap, take cover before firing the charges.

Caution: Cover must be taken without delay since an early explosion of the charges may be caused by the incendiary fires. Elapsed time: about 5 minutes.

106. Method No. 3—Destruction by Gunfire

a. Destroy the tires as in paragraph 104*b* or 105*c* above.

b. Destroy the trailer by gunfire using artillery, machine guns, rifles using rifle grenades, or launchers using antitank rockets. Fire on the trailer aiming at the wheels, axles, and parking wheel assembly. When destroying the water tank trailer, also fire on the water tank. Although one well placed direct hit may destroy the vehicle, several hits are usually required for complete destruction of the cargo trailer or water tank trailer unless an intense fire is started, in which case the vehicle may be considered destroyed.

Caution: Firing at ranges of 500 yards or less should be from cover. Elapsed time: about 5 minutes.

APPENDIX

REFERENCES

1. Publication Indexes

The following publication indexes and lists of current issue should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to matériel covered in this manual:

Index of Administrative Publications (Army Regulations, Special Regulations, Joint Army-Air Force Adjustment Regulations, General Orders, Bulletins, Commercial Traffic Bulletins, Joint Procurement Circulars, Department of the Army Pamphlets, and ASF Manuals)	SR 310–20–5
Index of Motion Pictures and Film Strips	SR 110–1–1
Index of Army Training Publications (Field Manuals, Training Circulars, Firing Tables and Charts, Army Training Programs, Mobilization Training Programs, Graphic Training Aids, Joint Army-Navy Air Force Publications, and Combined Communications Board Publications	SR 310–20–3
Index of Blank Forms and Army Personnel Classification Tests	SR 310–20–6
Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, and Tables of Equipment	SR 310–20–4
Introduction and Index (supply catalogs)	ORD 1
Military Training Aids	FM 21–8
Ordnance Major Items and Major Combinations and Pertinent Publications	SB 9–1

2. Supply Catalogs

The following catalogs of the Department of the Army Supply Catalog pertain to this matériel:

a. Destruction to Prevent Enemy Use.

Land Mines and Fuzes, Demolition Material, and Ammunition for Simulated Artillery and Grenade Fire ORD 11 SNL R–7

b. Repair and Rebuild.

Antifriction Bearings and Related Items ORD 5 SNL H–12

Cleaners, Preservatives, Lubricants, Recoil Fluids, Special Oils, and Related Maintenance Materials ORD 3 SNL K–1

Electrical Fittings ORD 5 SNL H–4

Items of Soldering, Metallizing, Brazing, and Welding Materials: Gases and Related Items ORD 3 SNL K–2

Lubricating Equipment, Accessories, and Related Dispensers ORD (*) SNK K–3

Major Items and Major Combinations of Group G ORD 3 SNL G–1

Miscellaneous Hardware ORD 5 SNL H–2

Oil Seals ORD 5 SNL H–13

Ordnance Maintenance Sets ORD 6 SNL N–21

Pipe and Hose Fittings ORD 5 SNL H–6

Standard Hardware ORD 5 SNL H–1

Tool Sets (special), Motor Vehicles ORD 6 SNL G–27, Sec 1

c. Vehicle.

Trailer, Cargo, 1½-Ton, 2-Wheel, M104 and Trailer, Water Tank, 1½-Ton, 2-Wheel, M106. ORD (*) SNL G–754

3. Forms

The following forms pertain to this matériel:

Standard Form 91, Operator's Report of Motor Vehicle Accident

Standard Form 91A, Transcript of Operator's Report of Motor Vehicle Accident

Standard Form 93, Report of Investigating Officer

Standard Form 94, Statement of Witness

DA Form 30b, Report of Claims Officer

DA AGO Form 9–68, Spot Check Inspection Report for Wheeled and Half-Track Vehicles.

WD AGO Form 9–71, Locator and Inventory Control Card

WD AGO Form 9–72, Ordnance Stock Record Card

DA AGO Form 9–74, Motor Vehicle Operator's Permit

DA AGO Form 9–75, Daily Dispatching Record of Motor Vehicles

DA AGO Form 9–76, Request for Work Order

WD AGO Form 9–77, Job Order Register

*See ORD 1 for published catalogs of the ordnance section of the Department of the Army Supply Catalog.

WD AGO Form 9–78, Job Order
DA AGO Form 9–79, Parts Requisition
WD AGO Form 9–80, Job Order File
WD AGO Form 9–81, Exchange Part or Unit Identification Tag
DA AGO Form 348, Driver's Qualification Record
WD AGO Form 460, Preventive Maintenance Roster
DA AGO Form 461, Preventive Maintenance Service and Inspection for Wheel and Half-Track Vehicles.
DA AGO Form 461–3, Work Sheet for Wheeled and Half-Track Vehicles
(For production line maintenance).
DA AGO Form 461–5, Limited Technical Inspection
DA AGO Form 468, Unsatisfactory Equipment Report
WD AGO Form 478, MWO and Major Unit Assembly Replacement Records and Organizational Equipment File
WD AGO Form 811, Work Request and Job Order
WD AGO Form 811–1, Work Request and Hand Receipt
WD AGO Form 865, Work Order
WD AGO Form 866, Consolidation of Parts
WD AGO Form 867, Status of Modification Work Order
DD Form 6, Report of Damaged or Improper Shipment
DD Form 317, Preventive Maintenance Service Due (Sticker)

4. Other Publications

The following explanatory publications contain information pertinent to this matériel and associated equipment:

a. Camouflage.

Camouflage	TM 5–267
Camouflage, Basic Principles	FM 5–20
Camouflage of Vehicles	FM 5–20B

b. Decontamination.

Decontamination	TM 3–220
Decontamination of Armored Force Vehicles	FM 17–59
Defense Against Chemical Attack	FM 21–40

c. Destruction To Prevent Enemy Use.

Explosives and Demolitions	FM 5–25
Ordnance Service in the Field	FM 9–5

d. General.

Inspection of Ordnance Matériel in Hands of Troops	TM 9–1100
Instruction Guide: Operation and Maintenance of Ordnance Matériel in Extreme Cold (0 to −65 F)	TM 9–2855
Military Vehicles	TM 9–2800
Motor Transport	FM 25–10

Principles of Automotive Vehicles	TM 9–2700
Supplies and Equipment: Unsatisfactory Equipment Report	SR 700–45–5
e. Repair and Rebuild.	
Cleaning, Preserving, Sealing, and Related Materials Issued for Ordnance Matériel	TM 9–850
Hand, Measuring, and Power Tools	TM 10–590
Instruction Guide: Care and Maintenance of Ball and Roller Bearings	TM 37–265
Instruction Guide: Welding Theory and Application	TM 9–2852
Maintenance and Care of Hand Tools	TM 9–867
Maintenance and Care of Pneumatic Tires and Rubber Treads	TM 31–200
Maintenance Supplies and Equipment: Maintenance Responsibilities and Shop Operation	AR 750–5
Modification of Ordnance Matériel	SB 9–38
Painting Instructions for Field Use	TM 9–2851
Parts Reclamation from Tactical and Administrative Vehicles	SR 750–130–10
f. Shipment and Limited, Standby, or Long-term Storage.	
Army Shipping Document	TM 38–705
Instruction Guide: Ordnance Packaging and Shipping (Posts, Camps, and Stations)	TM 9–2854
Marking and Packing of Supplies and Equipment: Marking of Oversea Supply	SR 746–30–5
Ordnance Storage and Shipment Chart, Group G; Major Items and Major Combinations of Group G	TB 9–OSSC–G
Preparation of Unboxed Ordnance Matériel for Shipment	SB 9–4
Protection of Ordnance General Supplies in Open Storage	TB ORD 379
Shipment of Supplies and Equipment: Report of Damaged or Improper Shipment	SR 745–45–5
Standards for Oversea Shipments and Domestic Issue of Ordnance Matériel Other than Ammunition and Army Aircraft	TB ORD 385
Storage, Inspection, and Issue of Unboxed Serviceable Vehicles; Preparation of Unserviceable Vehicles for Storage and Deprocessing of Matériel Prior to Operation	SB 9–63

INDEX